

VAM® BOOK



December 2020



Introduction

Dear VAM® users,

More than 50 years ago, Vallourec invented VAM®, an innovative connection design for tubing and casing. Since then, VAM® premium connections have connected more than just pipe and tubes: they have connected people, projects and countries. This success was made possible thanks to the longstanding relationship with our stakeholders based on mutual confidence and respect, as well as the VAM® Research & Development partnership established between Vallourec & Nippon Steel Corporation, since 1985.

VAM® is continuously improving its offer to provide the best solutions answering its customer challenges. And we provide all detailed information and recommendations for using the VAM® products in a safe and proper way.

For over 50 years, VAM® products have enabled the Oil and Gas Industry to meet the challenges of increasing well complexity and diversity and to gain in efficiency and reliability.

Great care and thought are taken in the design and manufacture of the VAM® connections in order to provide you with a threaded connection that will not only meet your technical requirements but will also prove to be simple and easy to use at the rig site.

We ask that you take as much care with the product after delivery as we have put into its design and supply. This instruction book outlines the procedures that we recommend you to adopt in order to get complete satisfaction with these VAM® products. Technical data on the main VAM® connections are also included.

While every effort has been made to ensure the accuracy of this book we do not accept any responsibility for the information contained herein. Customers should therefore carry out all necessary investigations, to choose for themselves the technical solutions, suited to the installation and functioning conditions under which our products will be used.

Please check at www.vamservices.com if you have got the latest revision of this VAM® Book.

We welcome your feedback for future updates of this book at [Mr Help](mailto:Mr_Help@vamservices.com) at www.vamservices.com.

Should you require any further assistance, a team of Field Service Technicians are available around the world for technical assistance at the rig site. They are approved and trained on VAM® connections. Please see the dedicated section in this book for more information.

Note: VAM® is a registered trademark of Vallourec Oil and Gas France.

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1. Introduction to VAM® Connections

1.1 VAM® Product Line

1.1.1 Reference Connections

Type of Connection	Connection	Description
T&C	VAM 21	High performance, enhanced resistance, tested, proven and trusted
T&C	VAM 21HT	VAM® 21 compatible high torque version
T&C	VAM TOP	The legacy industry reference for premium connections. Available on high torque (HT) and high compression (HC) designs
Semi-Flush	VAM SLIJ-3	Latest generation, best in class semi-flush connection with advanced premium performances
Semi-Flush	VAM SLIJ-TI	Strong and reliable semi-flush premium connection, with extensive field record
Flush	VAM BOLT-III	Flush design providing superior strength with clearance
Flush	VAM FJL	Maximum clearance. Largest field record for a flush premium connection
T&C	VAM L-OX	Lightweight and easy to run: your cost-effective premium surface casing
T&C	DINO VAM	Fast-running intermediate casing
T&C	bigQ	Economic, quick and reliable large diameter connections

1.1.2 Speciality Products

Type of Connection	Connection	Description
Semi-Flush	VAM SG	High tensile strength for shale applications
Semi-Flush	VAM EDGE SF	
Semi-Flush	VAM SPRINT-SF	Ultra high torque capacity for Shale applications
Semi-Flush	VAM LIFT	Semi-premium high torque for large OD pipes
T&C	VAM HP	Dedicated to HP/HT applications
T&C	VAM HWST	Heavy wall for High Pressure wells
Flush	VAM HTF-NR	Extreme High Torque with advanced premium performances
T&C	VAM HTFC	
Flush	VAM MUST	A heavy wall connection for extreme external pressure loads such as salt domes
T&C	VAM 700PIES	Riser application
T&C	VAM 77R	
Dope Free Solutions	CLEANWELL	The premium dope-free solution by VAM®

For any VAM® connections which are not listed in this VAM® Book, please contact your nearest VAM® Field Service office or contact [Mr Help](mailto:Mr_Help) at www.vamservices.com for further information.

1.1.3 Tubing & Casing Connection Reference Chart

	Premium Threaded and Coupled								Integral flush			Integral Semi-flush		Semi-premium		Riser						
	VAM® 21	VAM® 21 HT	VAM TOP®	VAM TOP® HT	VAM TOP® HC	VAM® HTTC	VAM® HP	VAM® HW ST	VAM® LOX	VAM® SOLT-II	VAM® HTF-NR	VAM® FJL	VAM® MUST	VAM® SG	VAM® EDGE SF	VAM® SLJ-II	VAM® LFT	DINO VAM®	BIG OMEGA®	VAM TOP® FE	VAM® TTR	
2 3/8			✓									✓										
2 7/8			✓									✓										
3 1/2	✓		✓			✓						✓										
4												✓										
4 1/2	✓	✓	✓	✓	✓	✓					✓	✓			✓		✓					
5	✓	✓	✓	✓	✓	✓		✓			✓	✓			✓		✓					
5 1/2	✓	✓	✓	✓	✓	✓		✓			✓	✓	✓		✓	✓	✓					
5 3/4			✓																			
6	✓	✓	✓	✓	✓																	
6 5/8	✓	✓	✓	✓	✓	✓		✓			✓	✓				✓					✓	
6 7/8																						
7	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓				✓	✓		✓		✓	✓
7 5/8	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓			✓	✓				✓	✓
7 3/4	✓		✓		✓						✓					✓					✓	✓
8																					✓	
8 1/8												✓										
8 5/8	✓		✓				✓				✓					✓					✓	✓
8 3/4	✓																					
9							✓															
9 3/8												✓	✓									
9 5/8	✓	✓	✓			✓		✓			✓	✓				✓		✓		✓	✓	✓
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9 7/8	✓		✓								✓	✓				✓		✓		✓	✓	✓
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11 3/4	✓		✓				✓			✓		✓				✓		✓		✓	✓	✓
11 7/8	✓		✓				✓			✓		✓				✓		✓		✓	✓	✓
12 1/4							✓															
12 3/4																✓						✓
13 3/8	✓		✓				✓									✓	✓	✓		✓	✓	✓
13 5/8	✓		✓							✓						✓	✓	✓		✓	✓	✓
13 3/4																✓						
13 7/8																✓						
14	✓		✓				✓			✓						✓		✓	✓	✓	✓	✓
15			✓							✓						✓						
16			✓							✓						✓	✓	✓	✓			
16 1/4																						
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20								✓												✓		
22									✓											✓		
24																				✓		
24 1/2																				✓		
26																				✓		

This table may include some derivative designs referenced as -N..., -K... (ex: 10 1/8" VAM TOP-NA)

* Other dimensions may be available upon request. Contact your local sales representative or Mr Help for more information.

1.1.4 VAM® Accessories

For any VAM® connections, the accessories package can be sourced to cover the specialized tubular parts, engineered products with premium threads used to connect, allow change of diameters and adapt or customize the string to the well conditions.

The accessories package includes:

- Casing and tubing pups, nipples, couplings, cross-overs.
- The surface equipment used to run casing and tubing into the well and to facilitate fluid circulating operations: handling plugs, lifting plugs, lifting subs, circulating heads, waterbushings
- The completion accessories installed with the tubing string and the completion equipment: flow coupling, blast joints, landing nipples, wireline re-entry guides, bull plugs, mule shoes, test fixtures

On top of those tubular parts, all VAM® connections are supported on proprietary equipment manufactured by the Oil Field Services companies. Please contact VAM® Field Service office or [Mr Help](#) at www.vamservices.com for information about accessories.

1.2 VAM® Family Options

1.2.1 Special Bevel (SB)

Couplings can be supplied with a special bevel option. This is recommended when running multiple strings in the same casing, or when there is a risk of a coupling hanging up down hole.

The special bevel design can always handle a stand of 3 joints or less. However, the special bevel reduces the maximum load that can be carried on the coupling face. For this reason, slip type elevators might be required when handling more than 3 joints at the same time.

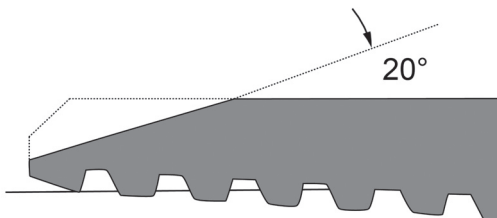
The maximum load on coupling face for this option can be obtained by sending a request through [Mr Help](#) at www.vamservices.com.

The default value of the special bevel is an angle of 20°. Sometimes alternate angles can be available on connection drawings. If other angles than the ones available are needed please contact VAM® before designing or manufacturing the product with this specific SB.

When considering SB option, the following notation is used:

VAM® XXX SB_a (a = angle of the bevel) ex: VAM® 21 SB10

VAM® XXX SB (in case of 20 degree Special Bevel on the coupling)



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1.2.2 Special Clearance (SC)

A Special Clearance connection is a VAM® connection with a reduced coupling OD. With a special clearance coupling, the tensile rating is reduced. A special clearance coupling is identified by a 1 inch wide black paint band located at the center of the coupling. SC option reduces the maximum load that can be applied on the coupling face.

VAM TOP®, VAM TOP® HT and VAM TOP® HC are available with the special clearance option of SC80 and SC90.

VAM® 21 is also available with Special Clearance option.

When considering SC option, the following notation is used:

VAM® XXX SCy (y = Tensile efficiency of the connection)

ex: VAM® 21 SC80

1.2.3 Matched Strength (MS)

Connections have been designed to adapt the coupling efficiency to the pipe efficiency. All VAM TOP® and VAM® 21 connections are Matched Strength by default. While DINO VAM® connections with option -MS, the coupling external diameter is adapted to achieve 100% efficiency in tension. For the the BIG OMEGA® family, the external coupling diameter is adapted to achieve 100% internal pressure resistance.

1.2.4 Isolated VAM® Products

An Isolated Product is a VAM® connection designed for a specific customer application or potential needs whereby products belonging to the standard product line could not cover. As such, Isolated products still require the need for full traceability with respect to the VAM® family of companies, the licensee network and for the customer.

An Isolated Product is differentiated from standard products by the specific notation **VAM® XXX-Kn (example VAM TOP® -KP)** or **VAM® XXX-Nn (example VAM TOP® -NA)**.

Please refer to specific recommendations when using these isolated VAM® products.

1.2.5 Specialty products

1.2.5.1 VAM® IN-LINE – Self-alignment solution

VAM® IN-LINE is an option developed for VAM® Threads which guarantee the connections alignment pipe to pipe during the make-up at the rig site.

This option is mainly dedicated to the downhole equipment that requires a controlled positioning around the tubing circumference, relatively to the previous and the following joints in the completion (main applications: sand screen with shunt pipes, control lines and other smart connections applications where alignment is required).

VAM® IN-LINE option is available on all VAM® T&Cs connections. It is fully compatible with non IN-LINE VAM® connections and exists with all options including special clearance and special bevel coupling.

Please contact VAM® Field Service office or [Mr. Help](mailto:Mr.Help@vamservices.com) at www.vamservices.com for information and specific recommendations when using this option.

1.2.5.2 THERMOCASE® VIT™- Thermal solution

THERMOCASE® is an insulated tubing featuring an engineered and durable gettered vacuum system.

It is a double-walled tubular product that provides temperature isolation in response to various oilfield production challenges due to temperatures differences between the reservoir and wellhead.

Main Applications are steam injection, flow assurance (wax, paraffin, hydrates, etc...), well integrity (APB, natural hydrates, permafrost) and all tubular applications where temperature/heat management is critical may be suitable for insulated tubing.

Please contact VAM® Field Service office or [Mr. Help](mailto:Mr.Help@vamservices.com) at www.vamservices.com for information about this product.

2 VAM® Field Practices

2.1 General information

The storage, transportation and handling requirements for pipe with VAM® connections has more to do with the steel grade rather than the connection type. There are many steel grades and they are listed in section 5.9 of this book along with their identification colour code. The steel grades can be grouped as in the table below. These groups have been simplified further for the purpose of this book into Carbon, Chromium and CRA.

Steel Type (refer to the end of the VAM® Book for full detail of grades)	VAM® Book Simplified Definitions		
	Carbon	Chromium	CRA
API (Carbon)	✓		
API (13% Cr)		✓	
1% Chrome	✓		
High Collapse	✓		
Sour Service	✓		
High Collapse and Sour Service	✓		
Low Temperature	✓		
Martensitic Stainless Steel (13%Cr)		✓	
Martensitic Stainless Steel (Super 13%Cr)		✓	
Duplex and Super Duplex Stainless Steel			✓
Super Austenitic and Nickel Based Alloy			✓
Expandable (Carbon)	✓		
Expandable (13%Cr)		✓	
Riser	✓		

Equally the storage, transportation and handling requirements can be simplified into 3 distinct methods depending on the steel type. These methods are standard, low marking and low marking/non ferrous. The method required for each steel type is listed in the table below.

Steel Type (refer to the end of the VAM® Book for full detail of grades)	Storage and Handling		
	Standard	Low Marking	Low Marking / Non Ferrous
API (Carbon)	✓		
API (13% Cr)		✓	
1% Chrome	✓		
High Collapse	✓		
Sour Service	✓		
High Collapse and Sour Service	✓		
Low Temperature	✓		
Martensitic Stainless Steel (13%Cr)		✓	
Martensitic Stainless Steel (Super 13%Cr)		✓	
Duplex and Super Duplex Stainless Steel			✓
Super Austenitic and Nickel Based Alloy			✓
Expandable (Carbon)		✓	
Expandable (13%Cr)		✓	
Riser		✓	

Below is a summary of the individual aspects associated with the three storage, transportation and handling methods. Chapters 2.2, 2.3 and 2.4 explain these in more detail.

Storage, Transportation and Handling Methods	Standard	Low Marking	Low Marking / Non Ferrous
Storage separators	Hardwood or Plastic	Hardwood or Plastic	Hardwood or Plastic
Drift mandrel	Metal	Metal	Plastic or Aluminium
Forklift forks	Metal	Metal	Plastic covered
Inspection benches	Metal	Metal	Plastic, wood or aluminium
Slings	Metal	Metal	Nylon or plastic sheath
Transport frames	Not required	Not required	Required
Bump rings	Not required	Not required	Required if slung or rolled
Tong, elevator, slip jaws	Standard	Low marking	Low Marking and Non Ferrous
Pipe handling machines	Standard	Low marking	Low Marking and Non Ferrous
Single Joint Elevators	Standard	Standard	Non Ferrous Contact Area
Maximum Grip Mark	See section 2.4.3.6.		
Vee door	No protection required	No protection required	Plastic/Wood covered
Support posts for storage and transport	No protection required	No protection required	Plastic covered
Mousehole	No protection required	No protection required	Plastic lined
Single Joint Load Compensator	Not required	Not required	Recommended
Paints for stencil, bands and tally #'s	Standard	Standard	Without Fluorides

More care is required for pipe with integral or special clearance connections as the connection can be very thin at the pipe ends.

2.2 Pipe Storage

This section covers the storage of pipe. Various other documents and recommended practices exist that go into more detail and there can be regional or customer constraints on pipe storage.

2.2.1 Storage in the pipeyard

All tubular goods must be stored correctly in order to avoid damage to them. Carbon, chromium and CRA steels must be stored separately to avoid contact. Pipes must be fitted with thread protectors at all times when in storage and during loading or unloading. Ensure that pipes are never piled directly on the ground, rails, steel or concrete floors. They must be at least 18 inches (500mm) above ground level to prevent ingress of dirt, surface water or foreign bodies. Any vegetation, growth or standing water below the pipe stacks must be removed. Storage racks or supports must be strong enough to support the stack weight without pipes bending or the stack settling. Place at least two rows of 4" x 4" hardwood under the first tier of pipe, bundles or transport frame. These supports should be positioned to prevent pipe bending. This means positioning them at approximately 1/4 of the pipe length from each end as shown below.

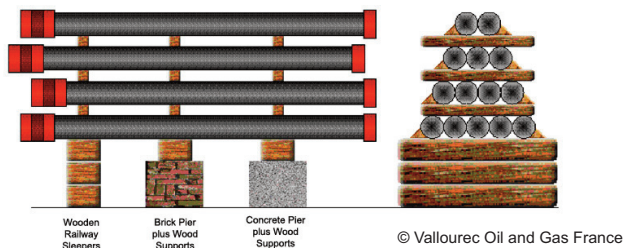


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It is recommended that closed end non-liftable protectors are used. If open end protectors are used the pipe should lie at an angle of about 2 degrees to allow rainwater to drain from the pipe through the pin end protector.

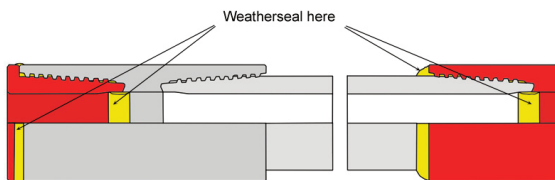
Between each row use 4" x 4" (100mm x 100mm) plastic or wooden separators or 'pipe cradles' positioned perpendicular to the pipe.

Each row of pipe must be secured at each end by nailing safety wedges to the separators to prevent the pipe from rolling off the rack. It is recommended that stacks must be no higher than 10 feet (3 meters) from the ground level.



In order to prevent connections from becoming corroded it is essential that a storage compound is applied to the machined areas (except coupling OD). See section 2.5 for details on storage compounds.

For all protector type, apply storage compound to the machined parts of the bore and protector interface. This process is known as weather-sealing, as illustrated below.



2.2.2 Storage at the rigsite

There is normally less area for pipe storage at the rig site. Therefore it is recommended to have a good supply chain and order the pipe for delivery just in time.

At a land rig the pipes can be stored as if in the pipe yard. At an offshore rig site the pipes will be stored on a pipe deck. The available space on the deck shall be considered prior to running and order. Place wood across the deck beams for the pipe. Place at least 2 rows of wood across the first layer of pipes and directly above the deck beams. Continue this until all the pipes are on board.

Ensure that the top layer of pipe is below the height of the deck posts (Samson posts). Samson post refers to the age of cable drilling and was main upright post or column that supports the walking beam. More recently it refers to any certified load bearing post on the rig floor. As each row of pipe is laid out, spot checks can be carried out offshore to verify accuracy, inclusive of spot inspection of connections, drift or tally pipe. Note : 100% inspection, drift & tally is recommended to be performed onshore during a "Rig Prep" phase to overcome space and time constraints encountered offshore.

During storage it is recommended to keep the protectors fitted in case of damage to the connections by other activities. It is always necessary to ensure that the connections have suitable storage compound or light oil applied to prevent corrosion. See section 2.5 for details on storage compounds. Take care that nothing is placed inside the pipe as this may fall from the pipe when lifted vertically.

2.2.3 Special requirements for storage of chromium and CRA steels

- ⇒ Long term contact with carbon steel under storage conditions is an invitation for localized corrosion initiation of lower grade CRAs. Usage of adequate dunnage is therefore mandatory.
- ⇒ Rough handling can lead to local work hardening.

If long term storage is being considered, indoor storage is recommended. All handling tools and rack space susceptible to be in contact with CRA pipes must be covered with non-metallic material to minimize iron contamination, even though this does not affect the corrosion integrity of the material.

2.3 Pipe Transportation

This section covers transportation of pipe. Various other documents and recommended practices exist that go into more detail and there can be regional or customer constraints.

2.3.1 Road

To ensure pipe/coupling is not in direct contact with the trailer, 3 wooden separators are required to be positioned equally and perpendicular over pipe length on the floor of the trailer and between each row. Separator dimensions must be long enough to span the width of the trailer, thick enough to support weight of pipe and ensure no contact of couplings between rows and allow for forklift access without damaging pipe.

Materials shall be lashed and secured with enough textile slings to be compliant with local legislation and ideally tightened with ratchets to ensure safe and secured transportation. While loading pipes on the trailer, all protectors shall be tight at all times. Load cannot exceed the height of the headboard and for extended journeys we recommend to re-check the ratchet straps to ensure load is adequately secured and re-tighten where appropriate. This should be done as a minimum every 8 hours, at change of driver or at rest stops.

Flatbed trailers shall be used for transportation. Trailers shall be equipped with:

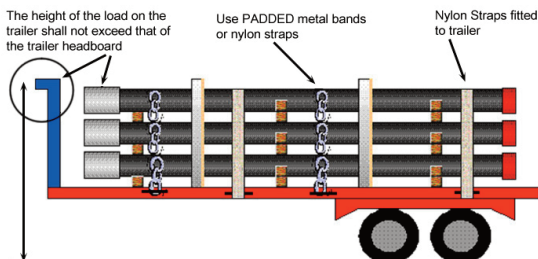
A steel headboard at a height which protects the drivers cabin.

Appropriate slings, ratchets, wooden separators and wedges and all tyre's, lights and other safety equipment shall be proper working and legal order.

Floor bed designed for uniform loading, with a smooth base.

A minimum of four side stanchion posts.

Wooden wedges shall be fastened on both sides of at least two separators per layer to prevent pipe movement. All couplings should be facing, and be as close as possible to the headboard of the trailer. Inland transportation needs to be done in accordance with local regulation for out of gauge shipment and oversize loads. When inland transportation needs to be organized for material lengths which extend over the back of the trailer, all necessary permits and safety signage must be secured by transportation company which meet local legislation prior to moving.



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2.3.2 Forklift

When using a forklift to handle a pipe it is important that the road surfaces are smooth and even. Never exceed the load restrictions of the forklift. It is always best to use a forklift with a clamping mechanism as shown below to hold the pipe firmly on the forks. When travelling or moving from one point to the other with a pipe between the forks, it is advisable to keep the load as close to the ground as possible. Never place a pipe directly on the ground. When setting pipes down, ensure that the pipes are not dropped.

When rolling pipes on the racks, make sure the pipes are parallel and do not allow pipes to gather momentum.

Manuscript loaders should be avoided where possible. Where this is unavoidable, safe working loads must be known to driver when picking up and especially when travelling to ensure loader does not tip.



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2.3.3 Cranes

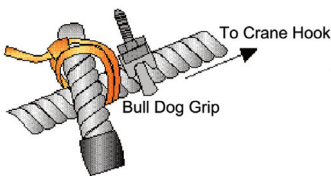
Pipe will need to be lifted on and off trucks and ships. This may have to be done using a crane. It is normal to ship the pipe offshore by either slinging bundles of pipe or by using dedicated pipe transportation frames. This section covers both.

2.3.3.1 Slinging

Before using any wire rope sling, ensure that it has a valid certificate of conformity, in good visual condition, is of correct type and suitable for the load you intend to lift. If the sling becomes damaged during transportation, it must be quarantined and replaced. It is recommended practice to use a wire rope sling only once. In case of re-use, ensure that the slings are visually inspected and retested and certified by a qualified inspector. If sling fails inspection, they should be clearly identified as such and kept in a quarantined area to ensure they are not reused until scrapped.

A wire rope sling should be purchased/rated by its Working Load Limit (WLL). Bear in mind that the WLL will be reduced by 20% when the sling is double wrapped and choked through itself. i.e. $WLL \times 0.8$. The WLL of each sling shall be equal or greater than the gross weight of the load. The ideal position of the slings is 25% of the total length from either end of the load. The angle of the slings under hook must be no greater than 60 degrees therefore the length of the sling should be sufficient to allow this.

Steel wire rope slings must be double wrapped with a choke hitch taking care not to cross over the sling under the load. The choke hitch is pulled tightly to allow for the bulldog and tie wrap to be fitted. The tie wrap will prevent the eye of the sling slipping over the bulldog should it loosen during transit.



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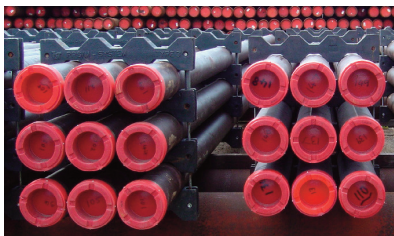


Always carry out a test lift to ensure the load is level before continuing with operation. When moving loads by crane 'tail ropes' shall be fitted to add a further safety control on the operation.

2.3.3.2 Transport frames

For smaller diameters it is often best to use transportation frames. Some designs still need to be slung as the frames just hold the pipes in position. Other designs can take the load using a 4 points lifting harness. Take care

to ensure they are built in accordance with the manufacturer's instructions. Consider the space required for the transport systems as some can take considerable space on deck even when they are empty. Most designs are stackable. For transportation frames, the contact surface of the spacers must be padded or coated.



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2.3.3.3 Supply ship

Care must be taken when transporting pipes to the rig site by supply ship to ensure that the load will not move due to the sea conditions. If using transportation frames consider if or how high they can be stacked on the vessel. Consider also if they need to be strapped to the supply ship.

2.3.3.4 Rig site

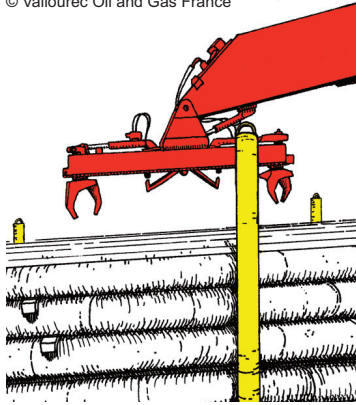
At land rigs handle the pipes with a forklift or crane as described above and place the pipes on a loading rack next to the catwalk.

On offshore rigs the pipe will be taken by crane to the pipe deck and stored in preparation for use. This is normally done on racks on either side of the catwalk or on a separate pipe deck.

Pipes can be stored on deck in layers that are stepped up from the catwalk. The purpose of this is to allow the pipes to be rolled down the steps to the catwalk. This is acceptable for carbon steel as long as there is sufficient soft dunnage to drop the pipe onto, and the rate of decent is controlled and suitable safe working procedures are followed

A better method is to sling the pipes from the pipe deck and lift them by crane to the catwalk. Better still is the use of pipe handling machines as shown on the following page.

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2.3.3.5 Special requirements for chromium steels and CRA

There are 2 risks associated with chromium and CRA steels that must be prevented to ensure the success of the well.

⇒ Long term contact with carbon steel under storage conditions is an invitation for localized corrosion initiation of lower grade CRAs. Usage of adequate dunnage is therefore mandatory.

⇒ Rough handling can lead to local work hardening.

All handling tools susceptible to be in contact with CRA pipes must be covered with non-metallic material to minimize iron contamination.

In order to prevent the above mentioned risks the following actions are recommended:

- ⇒ CRA should ideally be stored in a covered and dry place
- ⇒ Ship pipe using dedicated transport systems
- ⇒ Install plastic spacer rings;
- ⇒ Use a suitable forklift, fitted with protective non metallic covering on the forks, uprights and clamps (replace worn coverings when required);
- ⇒ Use nylon or plastic covered steel slings;
- ⇒ Use trailers fitted with protective sleeves over the bolster pins and uprights. The sleeves should be checked after each load, and if they are worn they must be replaced;
- ⇒ Use wooden or plastic dunnage between each row of pipe;
- ⇒ Use plastic or wooden topped inspection racks;
- ⇒ Use nylon straps to secure pipe to trailers or vessel decks;
- ⇒ Protect the catwalk and Vee door with wood or 'tail' the pipe into the drill floor using a crane and nylon slings;

- ⇒ Cover or pad metallic grips if used;
- ⇒ Use clean low marking dies on slips, elevators and tongs.

Note: Even if low marking/non-metallic dies are recommended best practices for running CRA (refer section 2.1), it is confirmed that surface hardened grips, jaws or dies do not create iron contamination on CRA material assuming they are kept clean (free of any metallic debris).

2.3.3.6 Spacer Rings

To reduce the risk of damage to your OCTG products, especially to chromium and CRA steels during storage, handling and transporting operations, the installation of spacer rings is recommended. At least 3 equidistantly placed spacer rings should be installed on each casing / tubing joint. They are also an effective way to protect integral joints throughout the supply chain.

Care must be taken to ensure the ring thickness exceeds the coupling and thread protector diameters to ensure its protection and prevent thread protectors from loosening during transit.

They are a cost effective preventative measure against heavy handling which can lead to localized work hardening and ferrous contact which can lead to galvanic corrosion.

Although the 'snap on/off' versions are easy to install and remove, care should be taken during these operations to avoid injuries to fingers. Their composition allows them to maintain their strength and rigidity even under heavy handling and storage conditions. Rope versions are not recommended as they wear easily and can trap contaminants.



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2.3.3.7 Thread Protectors

The primary purpose of thread protectors is to prevent damage and deterioration to your OCTG products during storage, handling and transportation operations. Protectors are therefore an important packaging element.

Protectors come in many varieties and it is important that the correct protector is chosen for your products. The VAM® protectors are validated as per Appendix-I of API-5CT. They undergo stringent impact, chemical, vibration and thread-stripping resistance tests as well as salt water spray and pressure testing.

Protector compound options include steel, plastic or metalloplastic. They can be open or closed end, liftable or non liftable as well as driftable or non driftable.

Best practices:

- Should be tight at all times when installed.
- Should be cleaned and dried prior to installation, especially when connection compounds are being changed.
- Tightness should be checked during stockyard periodic inspections or after transit.
- Re-inspect connections where loose or damaged protectors are found.
- Ensure protector matches connection size and type.
- Damaged protectors should be replaced as soon as possible.
- Do not attempt to lift OCTG products with hooks without approved lifting equipment and liftable protectors.
- Re-use or recycle wherever possible or dispose responsibly.

2.4 Pipe Preparation and Running Equipment

2.4.1 Pre job preparation

Prior to running pipe into the well there is some preparation to do. Ideally prepare a completion or drilling program well in advance of operations. This should be based on best practice, previous experience and lessons learned from similar operations.

Ensure that the program is distributed to those who require it, including subcontractors. Send out a daily look-ahead or forecast from the rig and include the subcontractors in the distribution. Request the pipe from the supplier, remembering to include contingency, pup joints, sub-assemblies, shoe track and make-up and handling equipment.

Ensure that there is sufficient space at the rig site for the pipe before it arrives. Consider how it will be run in hole so that the pipe required first is not buried below the pipe that is required last! Only take what is required as shipping excess contingency has an impact on the environment and additional handling increased risk of accident.

2.4.2 Pipe preparation

Before running the pipe the following actions must take place. They are described in more detail on the following pages.

- 1 Check that you have received what you require (size, weight, grade, thread type, quantity)
- 2 Remove the transport packaging and protectors
- 3 Clean storage grease from connections and protectors
- 4 Fit centralisers and stop collars
- 5 Inspect the pin and box connections
- 6 Drift the pipe full length to check for obstructions
- 7 Tally the pipe in order to get an accurate indication of the true length
- 8 Apply running compound
- 9 Refit clean and dried protectors until running is imminent

Much of the pipe preparation can be done at the storage yard rather than waiting until it arrives at the rig site and some specialised companies exist that can provide such services. Contact your local VAM® Field Service centre to find out who can provide these services in your area.

WARNING: never leave exposed connections to the environment, especially on a rig environment, as this can lead to rapid corrosion. Should thread compound be removed from the connections, then some light oil or storage/running compound shall be applied

2.4.2.1 Check that you have received what you require (size, weight, grade, thread type, quantity)

When the pipe arrives at the rig site the first thing to do is to check that you have received what you ordered. First check the paperwork that was supplied with the pipe before checking stencilling and colour codes on the pipe body. If there are discrepancies then contact your supplier immediately to resolve any issues. If you need assistance to carry out these operations contact your local VAM® Field Service Centre.

2.4.2.2 Remove the transport packaging and protectors

Plastic or steel/plastic composite thread protectors are fitted to the ends of the pipe to ensure that damage to the connections does not occur during handling. Storage grease is applied to the ends before the protectors are fitted to prevent corrosion. These storage greases are seldom suitable for running the pipe. Storage greases which can be used for make-up can dry out if left on the pipe for a long period of time and may have to be replaced. In desert and other highly sandy areas, additional attention should be given to protector removal, because sand tends to accumulate around the outside edge of the pin protector adjacent to run out threads. Blowing sand with air or water is not recommended since it might actually increase the amount of sand trapped. Therefore, protectors should be carefully removed using both hands to avoid any contact of the protector with the pin seal area.

It is important to leave the protectors on whenever possible, since removal makes the connections vulnerable to damage. Mostly, the protectors will be new but in many cases second hand protectors will be supplied. These will have gone through a verification process to ensure that they comply with the requirements. In order to reduce waste and packaging it is important that the protectors are cared for and returned through a suitable supply chain so that they can be reused or recycled. Protectors should be 'paired' at the rig site and placed in a suitable container for safe return. If the protectors are to be refitted to the pipe for transportation to the drill floor they must be cleaned thoroughly before being refitted. Failure to do so will contaminate the clean connections and they will require to be cleaned again on the drill floor.

2.4.2.3 Clean storage grease from connections and protectors

Having removed the protectors, the connections will require to be cleaned to remove the storage compound before make-up. This should be done over a suitable enclosed area so that waste is segregated and water can be reused. It is always best to use hot, soapy, high pressure water. Since hot water is seldom available at the rig site cold water can be used as long as the soap is given time to break down the compound and the connections are left perfectly clean. It is normally best to roll the pipe as the connections are being washed. Take care not to point a high pressure washer at yourself or anyone working in the area. Use barrier tape to prevent unauthorised personnel entering the wash area. Stand upwind so that any spray is taken away. Always use safety goggles or a full face visor when using a high

pressure washer. The use of cleaning agents, such as diesel, Kerosen, helifuel or similar is forbidden, because of HSE risk and due to the risk of leaving a thin film of this product on the threads surface.

It may be necessary to use a nylon brush in order to get the soap solution into the threads. Never use a wire brush or barite on a premium connection as even a small scratch on the seal can cause a leak.

2.4.2.4 Fit centralisers and stop collars

Centralisers and stop collars are often fitted to casing strings in order to hold the pipe in the centre of the well. This will ensure an even cementation. The fitting of centralisers requires care and attention due to the fact the pin protectors are removed and the seal area is exposed. Take the stop collar and check that no grub/set screws are protruding. Place the collar over the pin connections taking care not to touch the shoulder or seal area. Now fit the centraliser again taking great care to ensure seal and thread areas are not damaged. Repeat the process with the next stop collar before placing them in the correct position and torque the grub/set screws to the correct value. Lastly check the connection before applying grease and refitting the protector.

2.4.2.5 Inspect the pin and box connections

Before running pipe it is necessary that a competent person checks that the connections are in good condition.

This can be done at the pipe yard as long as there is a robust supply chain between the yard and drill floor.

If there is any doubt as to the integrity of the supply chain then a final inspection must be done at the rig site either on deck (if there is no chance of further damage en route to the drill floor) or on the drill floor itself. The integrity of a well is at risk if this operation is not carried out properly. The person with overall responsibility for the success of the well can carry out this inspection or he can do one of the following depending on the level of assurance that is required...

- ⇒ ask the rig or casing crews to check the pipe and connections
- ⇒ contract an OCTG inspection company
- ⇒ contract personnel from the local VAM® Field Service centre

The choice you make will depend on the amount of risk that you are prepared to take. To reduce the risk to a minimum then it is always best to use personnel from the pipe supplier. VAM® Field Service centers are located around the world and can provide this expertise. After all *'no one knows VAM® like VAM®'*.

Pipe coming from the mill will normally be in good condition, unless it has been badly stored or transported. Pipe that has been returned from previous wells or traded may have other types of damage.



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When inspecting the pin and box end connections check the following...

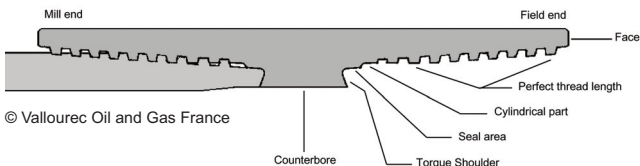
- ⇒ Dents, dings or mashes caused by impact
- ⇒ Galling caused by a poor make-up
- ⇒ Rust, corrosion or pitting caused by the environment

It will be necessary to look closely all around the seal area as simply feeling the connection will not be sufficient to detect minor damage.

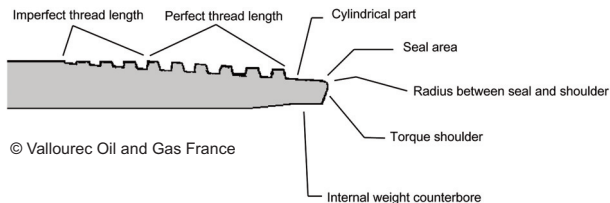
Additional checks to be carried out on box end of non mill supplied pipe, pup joints and accessories...

- ⇒ Check that the coupling is made-up tightly and there is no gap at the shoulder
- ⇒ Check that the coupling has not been over torqued and has yielded
- ⇒ Check that the correct weight of coupling is fitted and that there is no step at the shoulder
- ⇒ Check that there is no plastic pressure test seals left inside the connection. (Some companies use Teflon seals when pressure testing assemblies. These are not recommended by VAM®.)

If a reject is found with the connection it is important that it is reported correctly. The diagrams on the following page describe the parts of a typical VAM® threaded and coupled connection.



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2.4.2.6 Drift the pipe full length to check for obstructions

Pipe can be damaged during transportation and it can be difficult to detect visually. If there is any question as to the quality of the supply chain from the last check (either in the mill or despatch yard) then the pipe must be rechecked at the rig site. This is done by running a drift mandrel of the correct size through the pipe. Always use a drift from a known source with a certificate of conformity or check the drift size in at least 3 places across its length and at 90 degrees to each other using a calibrated external micrometer. The drift dimensions are listed in the technical data sections.

Drift mandrels are typically manufactured oversize for rig use and wear down over time. Non ferrous (normally plastic or aluminium) drift mandrels must be used for chromium or CRA steel grades. Plastic drift mandrels will wear down quickly. They can also swell if left in a damp or hot environment. They can be damaged easily if dropped. Care must be taken when inserting a drift into a pipe so that the connection is not damaged. If a rope or rods are being used to pull or push the drift mandrel it is important that these are kept clean. If the pipe has mill scale then it may be necessary to wash or blow this out of the pipe before commencing drifting. Never use force to push or pull a drift through a restriction. If a restriction is found then the pipe must be either quarantined or drifted again using a drift within API specifications.

The standard API drift diameters are listed in this book. After manufacture the pipe will state 'D' on the stencilling to show that the standard API drift was used, 'DA xxxx' will be stencilled to show that an alternate drift was used with xxxx being the drift size. DT42 is used on the stencil to indicate that a 42" long drift was used for casing sizes. This is only applied when casing is used as tubing. There are 3 very common pipe sizes where alternate drifts are commonly used. These are listed below.

7" x 32 lb/ft alternate drift is 6.000" diameter

9 5/8" x 53.5 lb/ft alternate drift is 8.500" diameter

13 3/8" x 72 lb/ft alternate drift is 12.250" diameter

Drift lengths are typically

6" long for liner applications

12" long for pipe of 7 5/8" casing and above

42" long for pipe for tubing applications

A 6" and 12" long drift is commonly called a 'rabbit'. If casing is used for tubing application then the drift used should be 42" long.



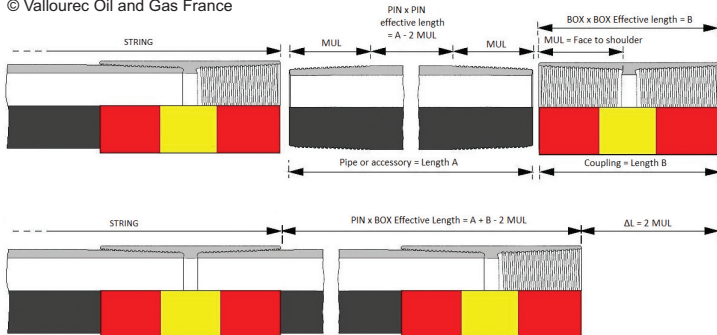
© Vallourec Oil and Gas France

Do not drift GRE (Glass Reinforced Epoxy) lined pipe at the rig site as the drift mandrel may detach the flare at the pipe end. In the case of GRE lined pipe the supply chain from the company inserting the lining to the rig site must be robust.

In order to avoid pin seal damage and the contamination of box threads, the recommended best practice is to drift from box end to pin end where practicable.

2.4.2.7 Tally the pipe in order to get an accurate indication of the true length

Prior to running the string it is important to have an accurate length measurement of each pipe, pup joint and assembly. The length written on the pipe and pup joints coming from the manufacturer is the overall length of the part. API 5CT states that the length stencilled on the part must be accurate to 1/10 of a foot. This is seldom accurate enough for an oil company so most manufactures try to be more accurate. It is vital that an accurate measurement is made in case the manufactures length is not accurate enough or in case of recuts. When running threaded connections the effective length is less as the box thread 'swallows' the pin thread. This is known as the make-up loss. The make-up loss is different for different sizes, weights and connections so it is important that this is known for each connection type. The make-up loss must be subtracted from the overall length to give the effective length as shown on the picture below.



It is best to look up the make-up loss in this book or by using the connection data sheet at www.vamservices.com. Do not measure the make-up loss using a metal rule as it may score the seal area. To measure the pipe length either a metal 'tally tape' or a laser can be used. In either case make sure that the datum point of each does not damage the pin seals.

When marking the tally length and number on CRA pipe use paints that do not contain halogens. Halogens cover the following elements: fluorine, (F); chlorine, (Cl); bromine, (Br); iodine, (I); and astatine (At). This means Trichloroethylene which is sometimes found in paints or paint stick markers must be avoided.

Take care not to apply tally numbers or lengths over the original pipe markings as identification and traceability may be lost.

2.4.2.8 Apply running compound

See section 2.5.2

2.4.2.9 Refit clean protectors until running is imminent

Used protectors must be cleaned and dried. Protectors should be thoroughly examined prior to reuse to ensure that contaminants such as grit or sand particles are not present.

Once the pipe is prepared the protectors must be refitted. If running is about to start then it may not be necessary to refit the box protector. For special clearance or integral that could be damaged during transportation the box protector is required.

2.4.3 Running Equipment

In order for VAM® connections to perform they must be made-up with suitable equipment. There follows below a list then details of the minimum equipment that is required.

- 1 Tong to apply torque to the connections
- 2 Measuring and recording equipment
- 3 Single joint elevators or pipe handling equipment to lift the pipe to the stabbing position
- 4 Elevators to lift and lower the string
- 5 Slips and safety clamp to hold the string in the rotary table
- 6 Jaws
- 7 Stabbing guides
- 8 Single joint load compensator to counterbalance the pipe during stabbing or back-out is recommended
- 9 Thread compound

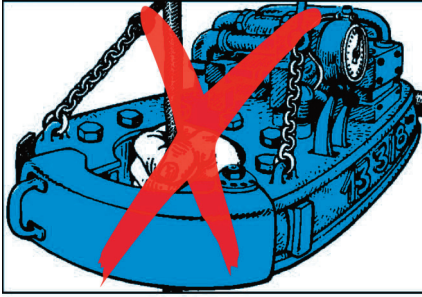
Additional equipment

- 10 Thread protectors if pulling pipe
- 11 Nylon slings and strap wrenches for chromium steels
- 12 Stabbing arm
- 13 Strap wrenches
- 14 Lifting sub and handling plug

There follows more detail about the required equipment.

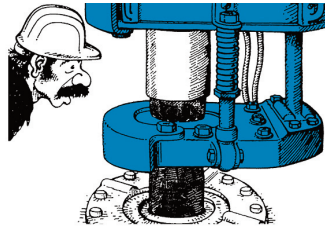
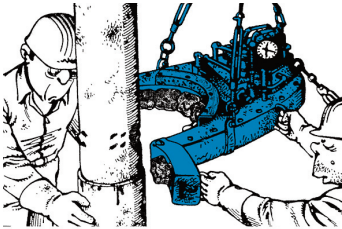
2.4.3.1 Tong to apply torque to the connections

VAM® connections must be tightened to the correct torque values in order that they perform. The torque equipment must have a capacity of at least 30% more than the recommended make-up torque. The reason for this is that if a connection has to be backed out the torque may be higher than make-up torque. The tong must have a variable speed control and be capable of operating at <1 rpm for final make-up. Tongs are normally manufactured in various sizes so it is important to select the correct one for the job. The tong must have grips that are matched to the size of the pipe in order to have a large area of contact with the pipe body. The casing crew must also supply back-up grips suitable for the coupling size in case of back-out. Do not use a 13 3/8" tong for a 5 1/2" completion!



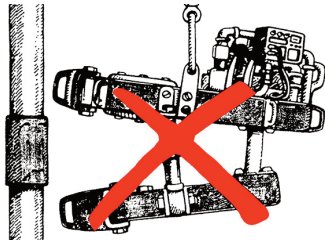
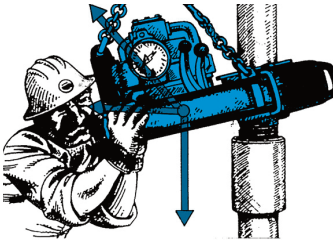
© Vallourec Oil and Gas France

The diameter of the grips should be normally 1% bigger than the nominal pipe diameter as the pipe can be rolled to a maximum of 1% oversize. The grips must be adjusted so that they hold the pipe firmly and not slip. Equally the pressure must not be too high or the pipe body can be damaged.



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For pipe sizes of 7" and below it is recommended to use a tong with integral back-up tongs. On larger sizes it is acceptable to use a tong with a snub line. If this is the case then the line must be at 90° to the tong arm and the line must be attached to a post of sufficient height to ensure that the line is kept horizontal. The tong must have the facility to lower gradually as the threads are made-up. When positioned over the pipe the tong must hang horizontally and not as shown below.



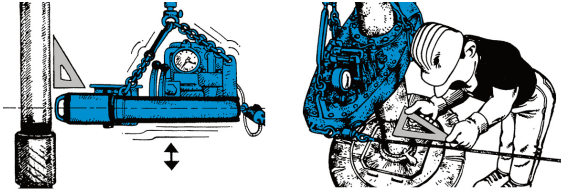
© Vallourec Oil and Gas France

When using a tong with integral back-up, the back-up must be free floating to compensate for any end kink or bend in the pipe or misalignment between the tong jaws. There must be sufficient travel between the tong and back-

up to compensate for the make-up loss as the threads are engaged. When positioned over the pipe the tong must hang horizontally with the tong and back-up tong being parallel.



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On some rigs the tong operation is done remotely. The tong may be mounted on an extending hydraulic arm or on a frame that is pushed over the pipe as required. Pipe wrenches, rig tongs or spinning chain make-up are not permitted.

In recent years companies have applied torque using a top drive make-up system. This tool provides three functions.

- ⇒ Making up the connection
- ⇒ Elevating and lowering the string into the well
- ⇒ Circulation of drilling mud

If such equipment is used care must be taken to ensure that the torque being measured is the same as the torque being applied to the connection.

To reduce the chance of damage to the upper box connection or of debris being left on the torque shoulder an open end protector or handling plug is recommended to be fitted.

It is also important that there is good alignment between the top drive make-up system and the rotary table as the pipe is fixed at both ends.

If using a top drive make-up system in conjunction with a standard tong care must be taken to ensure that when running connections requiring a handling plug that the plug does not unscrew as the pipe is made-up.

2.4.3.2 Measuring and recording equipment

In the VAM® Family of connections only BIG OMEGA® has a visual indicator (make-up triangle) as an indication the make-up is completed. In all other cases the connection must be made-up to the correct torque value and the torque increase to this value must be within the correct parameters.

In the past, and with API Buttress and DINO VAM®, it was sufficient to use only a dial gauge to check this build up in torque and the skill of the tong operator to determine if the make-up is within parameters.

With new technology, more complex connections, and more demanding performances it is required that the torque is plotted on a graph and that a record of this plot is kept for the lifetime of the well. The graph can be produced on paper but is now more likely to be displayed on a computer screen and an electronic copy held. Records shall remain legible, identifiable, and readily retrievable.

Different connections have a different graph profile and this is known as the signature of the connection. The machining tolerances of the connections, the thread compound and other factors can affect this signature. The signature is produced by displaying torque on the vertical axis and turns on the horizontal axis. Both axis must have a linear scale. Only the last 1 to 2 turns require to be shown as the torque increases to the final make-up.

Often turns are substituted by time on the horizontal axis but this does not give such a true signature and is not acceptable. To measure torque a load cell is required. The load cell must be electronic and connected to a computer to display the make-up graph. A hydraulic load cell and dial gauge display can be useful to verify the electronic reading.

Both the load cell and turns counter must be calibrated at a frequency to ensure that it is always working within the tolerances listed below. The calibration certificate must show pre and post adjustment values across the useable range of the sensors as evidence that the proposed frequency is sufficient to keep the make-up unit in control.

As a minimum the calibration shall be done annually as long as there is sufficient historical evidence to show the make-up unit does not vary beyond the accepted tolerances.

Minimum torque measurement accuracy:

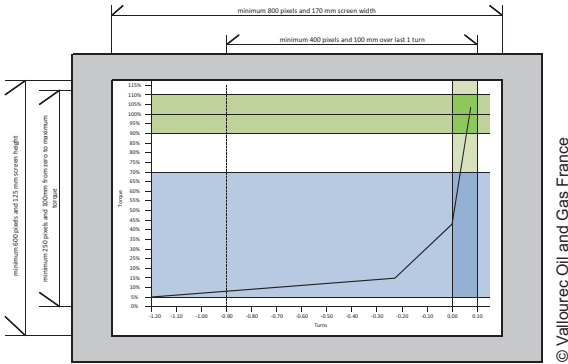
- torque values $\leq 3,120$ N.m. (2,300 ft.lb): $\pm 5\%$
- torque values between 3,120 and 7,800 N.m.
(2,300 and 5,750 ft.lb) ± 156 N.m. (115 ft.lb)
- torque values $\geq 7,800$ N.m. (5,750 ft.lb): $\pm 2\%$

To measure turns a turn counter is required. The turn counter must be capable of recording a minimum of 1,000 positions per turn. This too must be subject to calibration with an accuracy or $\pm 2\%$

If torque or turns sensors are found to be outside the tolerances during the pre adjustment check the make-up company will be required to contact all clients that have had VAM® make-ups performed since the last good calibration was performed in order that the risks can be correctly assessed.

The make-up graph produced shall have the following features:

⇒ Sufficient resolution to accurately display the signature (profile). A display screen of >10" (25 cm) is required with the make-up graph filling at least 30% of the area of the screen. The screen resolution must be at least 800x600 pixels.

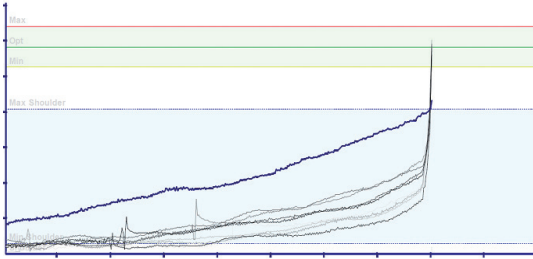


- ⇒ Display of minimum and maximum torque values as horizontal lines (optimum torque value optional)
- ⇒ Display of minimum and maximum shoulder torque values as horizontal lines
- ⇒ Automatic or operator forced detection of the shoulder point value
- ⇒ Numerical display of final torque, shoulder torque and delta turns (turns from shoulder to final torque)

Calculation and display of the shoulder slope factor (preferred)

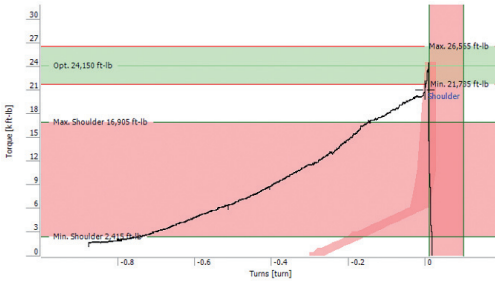
- ⇒ Display of rig tally number on every make-up
- ⇒ Display of date and time of make-up
- ⇒ Ability to have manual comment added
- ⇒ Display of customer, well #, pipe size, weight, grade, thread type and full description of make-up compound and manufacturer in the job report

It is highly recommended for the make-up display equipment to have the ability to overlay the most recent make-up graph on top of the previous make-ups graphs as shown below. This is sometimes known as shadowing. By doing this any unusual profiles can be easily identified and questioned. To do this the make-up graphs must have the shoulder point or the final torque plotted on the same datum line on the turn axis.



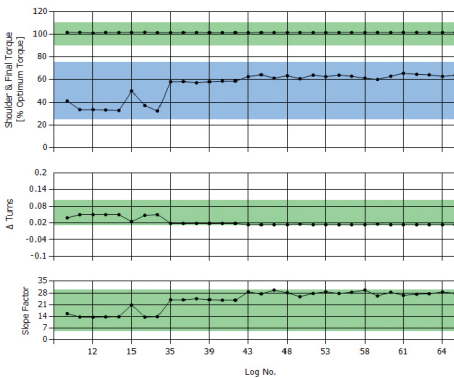
Courtesy of Odjfell

An alternative method is to show the minimum and maximum graphs from previous accepted make-ups as shown below by the dark red area.



Courtesy of Weatherford

It is highly recommended for the make-up display equipment to have the ability to show timelines or trend lines of the make-up parameters for the full job as shown below.



Courtesy of Weatherford

It is highly recommended for the make-up equipment to have the ability to output the date, time and make-up values and comments to a spreadsheet for post job review and archive.

2.4.3.3 Single joint elevators or pipe handling equipment to lift the pipe to the stabbing position

The pipe must be lifted from horizontal on the pipe rack to vertical for stabbing. This is normally done by dragging the pipe from the box end along a catwalk and up an inclined slope called the slide. The pipe can be lifted to the vertical position by attaching a single joint elevator behind the coupling (or a handling plug for integral connections) and using a tugger line to pull the pipe up. The single joint elevators must fit neatly round the pipe and have a safety pin to ensure they do not accidentally unlatch. It is always necessary to use a pin protector and depending on how much impact there is with the slide a box protector may also be required. If running integral connections with increased pipe OD dimensions then special single joint elevators are required to allow for the larger diameter at the connection.

Alternative methods exist to pick up the pipe including 'pick-up and lay down machines' which replace catwalks and raise the pipe on a conveyor system where it can be latched directly by the main elevators.

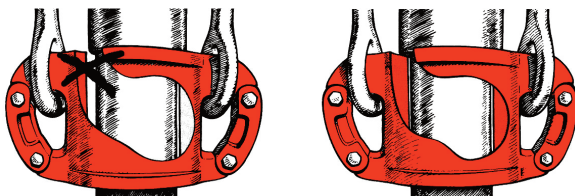
Another method is a pipe handling system which consists of a grab arm which takes the pipe from the catwalk and lifts it to the vertical position before swinging it into the drill floor and to the stabbing position. It is normally possible to handle the pipe without protectors as long as the connections are not damaged by this handling method.

2.4.3.4 Elevators to lift and lower the string

When using slip type elevators the string weight is transferred from the pipe body through the grips and inserts into the elevators body. The inserts must be clean and sharp. Slip type elevators are recommended for integral connections, special clearance couplings, special bevel couplings and **fatigue enhanced connections**.

If using side door elevators for integral strings then lifting subs are required. See section 2.4.3.14 for more information. If running integral connections with increased pipe OD dimensions then special side door elevators are required to allow for the larger diameter at the connection.

The amount of load that can be lifted on the coupling face for all threaded and coupled connections using side door elevators is limited. The reason for this is that the cross sectional area of the coupling face is normally much less than the critical cross sectional area of the connection. If the string weight will exceed this value then the pipe must be gripped on the pipe body and not the coupling face. To do this slip type elevators are required.



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To calculate the maximum value that can be carried on the coupling face simply multiply the coupling face cross section area (as listed in the data tables for threaded and coupled connection) by the steel strength to get the answer in lbs.

Examples:

7" 32lb/ft L80 VAM TOP®

Max Load on Coupling Face= 5.297 sq.in. * 80,000 lbs / sq.in.= 424,000Lbs.

7" 32lb/ft L80 VAM TOP® SC90

Max Load on Coupling Face= 4.400 sq.in. * 80,000 lbs / sq.in.= 352,000 Lbs.

7" 32lb/ft L80 VAM TOP® SC80

Max Load on Coupling Face= 3.647 sq.in. * 80,000 lbs / sq.in.= 292,000 Lbs.

Remember if the coupling has a special clearance or a bevel this value will be much less so make sure to look up the coupling face cross section for the correct coupling design option. For fatigue enhanced connections like VAM TOP FE or VAM TTR, the formulas do not apply. Only one joint can be lifted with side door elevators!

In case of CRA material, in order to take into account the material anisotropy, a 0.80 factor has to be applied on the calculated value.

2.4.3.5 Slips and safety clamp to hold the string in the rotary table

Slips are required to support the string weight in the rotary table during make-up. They can be manually inserted or operated remotely. They can be mounted on the rotary table or flush with the drill floor. Slips work best when the string weight is high. For the first few joints it may be necessary to complement the slips by attaching a safety clamp around the pipe. This will reduce the chance of the string falling into the well if the slips fail. Slips must be designed with inserts that wrap around as much of the pipe body as possible.

2.4.3.6 Dies and inserts

Slips, slip type elevators and tongs are all fitted with dies to grip the pipe. Slips and elevators are fitted with dies known as "slip inserts" or just inserts.

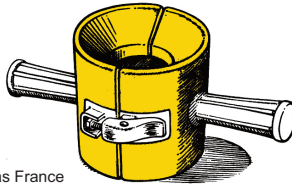
On carbon steels the grip marks must be less than indicated below. Note: API uses grip marks when referring to permissible depth.

Pipe Diameter	Maximum Grip Marks for Standard Handling Methods	
	inch	mm
2 3/8" to 2 7/8"	0.025	0.64
3 1/2" to 5 1/2"	0.030	0.76
6 5/8" and above	0.040	1.02

On chromium steels the grips must be low marking: indentations shall be no greater than 0.3mm (0.012") in depth. A pit depth gauge is recommended to measure the depth of grips mark. On CRA materials the maximum allowable depth is 0.3 mm. The use of non ferrous or stainless steel grips is mandatory.

2.4.3.7 Stabbing guides

One of the most critical operations to ensure integrity is stabbing the pin and the box for make-up. After this point the connections will never be seen so great care must be taken to ensure that no damage occurs during stabbing. The best method to protect against stabbing damage is to use a stabbing guide. This is a plastic guide which is fitted over the box connection in the rotary table. As the pin is inserted into the box the guide will ensure it is central and prevent damage to the connections. The stabbing guide must be correctly designed for the connection. Some tongs have a stabbing guide which is built in to the tong.



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2.4.3.8 Single joint compensator to counterbalance the pipe during stabbing (recommended)

When stabbing together the threads care must be taken to ensure they are correctly aligned. It is always best to do this by hand so the operator can have a feel to ensure that no cross threading has taken place. This is easy if the pipe is a small diameter but for pipe over 4 1/2" a counterbalance is useful. This counterbalance is called a single joint load compensator and is highly recommended for steel grades that are susceptible to galling such as chromium steels. It is also extremely recommended in case of running in double or triple stands. A single joint load compensator is also useful when pulling pipe or running in stands as again it reduces the chance of galling. In many cases single joint load compensators are not used simply because they take time to rig up. They are well worth the effort.

2.4.3.9 Thread compound, brushes and applicators

See section 2.5.2

2.4.3.10 Thread protectors if pulling pipe

The purpose of thread protectors is to hold the storage compound which avoids corrosion and to protect the threads against damage. They are designed to strict specifications from VAM® products designers and API. Thread protectors are designed to suit specific diameters and thread types and in some cases pipe weights. Protectors have a value and should not be treated as waste when they are removed from the pipe. Thread protectors can be reused many times as long as they pass performance tests. In many countries there will be a supply chain for returning thread protectors to the pipe manufacturer or for recycling them. Take care when removing thread protectors to pair them together and place them in a compactor bag or container for return.

If pulling pipe remember to order thread protectors. If running pipe keep the protectors on board until the string is in the well and tested in case it has to be pulled. Remember to keep some protectors for returning contingency pipe. Always apply some thread compound or storage grease to returned pipe in case there is a delay in the restocking.

Recommended make-up torques for VAM® thread protectors	
Diameter (in)	Torque Value (ft.Lb)
2 3/8 - 2 7/8	20 - 40
3 1/2 - 5 1/2	25 - 50
6 5/8 - 8 5/8	40 - 80
9 5/8 - 11 3/4	50 - 90
13 3/8 - 13 5/8	60 - 100

Always use the correct thread protector for the job. NEVER fit the wrong protector as it may fall off the pipe onto a supply ship or on the public roads. If the correct protectors are not available it is best to fit none

and live with the consequences of a damaged connection rather than the consequences of a protector falling and injuring someone!

Some protectors can be used with several different connections. Protector interchangeable rules can be found in the library section at www.vamservices.com

In order to ensure that the protectors are properly tightened to the connection, it is recommended to use the torque values in the table. The torques in the table apply for ALL VAM® connections on OCTG pipes (when coated with CLEANWELL® technology, pipes shall use CLEANWELL® recommended protectors in order to maintain coating integrity and runnability - if needed, please contact your local VAM® representatives, VAM® Services or VAM® Field Service International for more information about CLEANWELL® procedures).

Quick release pin end thread protectors are useful for short term use to handle the pipe from the rack to the drill floor. Some designs are better than

others. A common design is the inflatable thread protector which works well as long as the air does not escape. They are normally just designed for connections with a 1:16 thread taper.

Never use thread protectors with a locking arm as shown below as this can cause pin seal damage.



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Thread protectors can be all plastic or a composite with plastic and metal. They can be open ended or closed end. Protectors that are open end will normally permit a drift mandrel to pass. Closed end protectors normally give better resistance against corrosion.

2.4.3.11 Nylon slings and strap wrenches for chromium steels

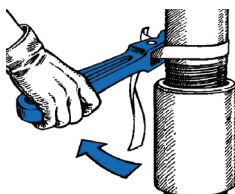
Slings are normally required for pipe handling at the rig site. Metallic slings are used for carbon steels and nylon slings (or plastic wrapped metal slings) must be used for chromium steels. Slings must be double wrapped round the pipe and each sling must have the capacity to lift the entire load in case one breaks. See section on handling for more details.

2.4.3.12 Stabbing Arm

When stabbing pipe it is best to have an operator positioned on a stabbing board to hold the top of the pipe central during stabbing. Nowadays most rigs do not use a stabbing operator and instead have a remotely operated stabbing arm or the main elevators to hold the pipe centrally. A stabbing arm is normally attached to the derrick and retracts when the pipe is made-up. It is important to ensure that the arm is central as any eccentricity will prevent good make-up.

2.4.3.13 Strap Wrenches

When making-up pipe manufactured from chromium steels it is recommended to use a strap wrench as shown below to ensure the threads are stabbed correctly. This should be used in conjunction with a single joint load compensator for heavy pipes. Alternatively a chain tong may be used as long as the pipe body is protected with rubber or similar to prevent ferrous contact.



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2.4.3.14 Lifting and handling Tools for flush/semi-flush connections

Scope of use:

VAM® lifting tools are compatible with API 8C elevator bores for Non-upset casing and tubing.

As flush/semi-flush connections have no coupling face on which the elevator can sit, specific tools must be used to:

- Safely raise and lower single joints, or in certain cases the entire string.
- Allow peculiar pipe/connection characteristics to be adapted to Standard Square or Slip Type elevators.
- Prevent contact between CRA material and elevator

It is highly important that the pipes as well as the lifting/handling tools shall perfectly fit the elevator in use. In particular, using standard square elevator (even slip type elevators) with semi-flush connections whose box OD at the connection level is slightly bigger than the pipe OD can seriously damage the connections at a critical area.

The users may freely purchase lifting or handling tools adapted to the rig specificities, equipment and procedures. However, the threads shall be machined by a VAM® Licensee.

The VAM® Family have available “proprietary” ready-made designs which address most of the situations and can be offered with the required VAM® Threads as well as specific surface treatment (use with CRA pipes). Their design is optimized for limitation of weight. Those designs are described in the table below.

Name	LIFTING SUB (1)	LIFTING PLUG	HANDLING PLUG
String connection type	Flush, Semi Flush or T&C	Flush and Semi Flush*	Flush and Semi Flush*
Lifting tool connection type	full thread length	full thread length	Reduced thread length
Lifting tool capacity	Lower than string connection due to safety factor	Lower than string connection due to safety factor	3 pipes (1 strand) maximum
Recommended elevator type	Side door elevators Lifting on lifting sub face	Slip type elevators but grip below connection Use lifting plug as a safety device	Single joint or side door elevator
Alternate elevator type	Slip type elevators grip on lifting sub body	Side door elevators lifting on lifting plug face	
Other remarks	Compatible with standard elevator designs No ferrous contamination in case of CRA pipe.	For CRA pipe, Lifting Sub is mandatory.	For CRA pipe, Lifting Sub is mandatory.
Max weight of the lifting tool	Depending on Pipe OD Can be higher than 50 kg / 110 lb	Depending on Pipe OD Can be higher than 50 kg / 110 lb	Max 25 kg / 55 lb
Overall length of the lifting tool	Pipe OD > 7" : OAL = 31,50" Pipe OD ≤ 7" : OAL = 27,60"	lifting tool connection length + 4"	lifting tool connection length + 2"
<p>(1) Proprietary drawings, contact our commercial service to order the tool.</p>			

If lifting capacity is needed, contact Mr. Help at <http://www.vam-services.com/support/help.aspx>
 * when running casing with a Semi-Flush connection, the single joint or side doors elevators must be capable of sliding over the expanded box OD so as to not get hung up on the transitional area from the pipe OD to the connection OD
 For Semi-flush connection with expanded box OD, lifting capacity of Lifting Plug is lower than Lifting Sub

Naming and definitions:

- LIFTING SUB: Tool that can lift the full pipe string. The rig elevator is only in contact with the Lifting Sub.
- LIFTING PLUG: Tool that can lift the full pipe string. The rig elevator is in contact with the pipe and the plug face.
- HANDLING PLUG: Tool with a limited lifting capacity (3 pipes maxi).

In all cases, the nominal lifting capacity is engraved on each tool.

These are screwed by hand then chain tong into the box connection. They must be made up so there is no gap at the box face except for semi-flush connections where a gap about 1mm is expected. They can also be used to protect the box connection from damage caused by elevators or fill up tools. A minimum of three sets of tools are taken to the rig site. Some connection types have different designs across the weight range so the tools must be matched to the weight of the pipe as well as the diameter. Care must be taken when fitting these as they can be heavy. Always apply storage grease and a thread protector to these tools when not in use. It is recommended to paint a white stripe on the tools so that they can be seen to be rotating as the pipe rotates. Take care when installing and removing the lifting tools to ensure that no damage is done to either the connection or the tool. Check the threads of the lifting tools before and after each use.

Threads shall be visually inspected between two uses: In case of galling, the piece shall be repaired by a VAM® qualified person. At the beginning and end of each job, it is recommended that the entire piece shall be inspected by a representative qualified for VAM® products. A dye penetrant or magnetic particle inspection can be performed to detect cracks, in case of presence of cracks, the piece shall be rejected. The square loading face shall not be deformed. Body for lifting Sub shall not present dent, jaw marks with a depth more than 5% of the wall thickness.

The LIFTING SUB is designed for using side door or slip-type elevators with chromium of CRA pipe to ensure there is no ferrous contact. VAM® lifting tools have low interference threads and no contact on the metal-to-metal seal surfaces. They can be made-up using a chain tong until there is no gap between lifting tool face and the end of the pipe

2.5 Lubricants and thread compounds

The purpose of this chapter is to inform the recommended practices for thread compounds for storage and running of VAM® tubing and casing connections and how it must be applied.

Better still, some connections have a mill applied coating called CLEANWELL®. They DO NOT REQUIRE STORAGE OR RUNNING COMPOUND to be applied.

A separate procedure details the methods to be taken when products are supplied with CLEANWELL® coating.

See section 3.20 for details on CLEANWELL® Products.

2.5.1 Storage compound

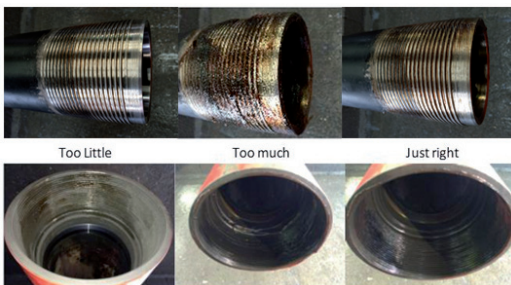
After manufacture or heat treatment, steel starts a process of corrosion. For some steel types this process can start quite quickly and actions need to be taken to ensure that the connections are fit for use. Following manufacture, a thick storage compound is applied to the machined parts of the connection to prevent the ingress of water and reduce the time to corrode the connections.

The list of most used storage compounds can be found in the 'VAM® Recommended Storage Compounds' table on the Vallourec or NIPPON STEEL websites in the E-library or download sections. For details on service rating, product application and corrosion performances, please refer to the manufacturers data.

As a general statement, it is recommended to inspect a random 10 % of the stored pipes every 6 months to check for degradation. If there is sign of corrosion or damage, all threaded pipes should be cleaned, inspected and new storage compound shall be re-applied.

Guidelines for removal of storage compound is detailed in section 2.4.2.3

It is important to apply storage compound on clean dry pin and box connections and make sure that threads, seal area and shoulder are fully covered as shown in the picture below.



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Clean and undamaged protectors need to be fitted right after storage compound application to prevent any contamination.

Seldom are storage compounds suitable as running compounds so they must be removed and the connections cleaned prior to application of a thread running compound for make-up.

2.5.2 Running compound

In order to provide lubrication between the connections during make-up and prevent galling of the mating surfaces it is necessary to apply a running compound (often called dope) to the connections prior to stabbing and makeup.

API modified thread compounds conforming to API RP 5A3 are suitable for all VAM® connections.

For example:

⇨ BESTOLIFE™ 72733

⇨ BESTOLIFE™ API modified

⇨ Weatherford® Lubeseal

⇨ JetLube™ API Modified High-Pressure Thread compound

Are lead-based thread compounds which are recommended by VAM®.

Please note that the following thread compounds have not been qualified to date with VAM® connections:

⇨ BESTOLIFE™ 72732

⇨ JetLube™ API Modified-Calcium

⇨ Weatherford® Lubeseal II

As such, sealability and make-and-break properties of VAM® connections are not guaranteed by VAM® with these thread compounds.

Do not mix different thread compounds as incompatibility may exist between thread compounds.

Running compounds contain soft metals that act well as a lubricant. They may be harmful for the environment and can cause affection to the skin. Ensure that barrier cream is applied to hands and wrists and wear suitable gloves.

In order to meet the latest safety and environmental standards, metal free running compounds have been tested and approved for VAM® connections. They offer alternative to API modified type for use especially in countries where there is strict environmental legislation.

The full list of recommended thread compounds is available on the VAM® Services website. Should the end-user wish to use another type of running

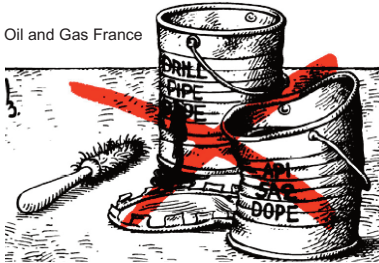
compound, please contact VAM® Services or your sales contact for more information as VAM® connections performances could be downgraded.

2.5.3 Recommendations prior to running pipe

Before starting to run pipe, first check that there is sufficient quantity of running compound available at the rig site to complete the job. If any expiry date is marked on the container check that it has not expired. It is recommended to use a new container of thread compound for each job. If excess thread compound has been left from a previous job and it has been stored properly then it is acceptable to use this. Always stir the running compound prior to use. Ensure that the compound is free of foreign particles and ensure the lid is placed on top when not being used or between make-ups.

Never use a thread compound which has been contaminated (liquids, solids particles, emulsified with water, etc.). This may have a negative effect on the anti-galling performance of the thread compound or its lubrication characteristics such as friction factor. Never dilute the compound with oil, diesel, water or any other compound as this may affect the friction factor of the compound which could lead to the connection being overtorqued or undertorqued. Do not allow the mud or drilling/completion fluids to overflow the box connection when filling up or running in hole. If this happens carefully clean the mud from the connection and take preventative action to stop reoccurrence. Remove all other compounds from the rig floor to prevent confusion.

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Do not use drill pipe compounds for tubing and casing and vice-versa. If the pipe has been prepared for running (Rig Ready) at a location other than the rig site it is essential that the compound applied to the connection is known as well as the duration that the thread compound has been on the pipe. If there is a robust supply chain between the company preparing the pipe and the rig site it may not be required to further inspect the pipe. It is still best practice to perform a final check of the connections immediately prior to stabbing.

If the pipe has come straight from stock then an inspection at the rig site before application of running compound is required. Contact VAM® Field Services for information on local suppliers of thread inspectors.

In cold climates the running compound may have to be warmed slightly to make application easier. Thread compounds are all required to be regularly mixed during use.

2.5.4 Application of thread compound

Prior to applying running compound and make-up it is necessary to check the connections to ensure that there is no damage or corrosion. Never use barite or a wire brush to clean connections as damage can occur. See section 2.4.2.5 for details on inspection.

Never use diesel or helifuel to clean the connection as this will leave a film that may cause make-up problems or affect the performance. Water contamination of the thread compound can cause a change in its friction factor which may in turn affect make-up. For this reason the connections and brushes must be kept as dry as possible and the compound must not become contaminated with water. If it is raining then rag wipe or blow dry the connections before application of compound to remove the excess water. Keep the bucket of thread compound in a dry location on the drill floor. If the compound becomes contaminated with water or other contaminants it must be replaced with a new bucket.

The same rules apply when running compound is applied to connections prior to shipping to the rig.

For all VAM® connections except BIG OMEGA®, DINO VAM® and VAM® HP the thread compound shall be applied to both pin and box ends. For BIG OMEGA®, DINO VAM® and VAM® HP, refer to the connections specific sections in the VAM® Book.

A flat brush can be used to apply the thread compound to the pin end and a 'moustache' type brush can be used for the box end. Motorised applicators can also be used to apply the thread compound to the box connections.



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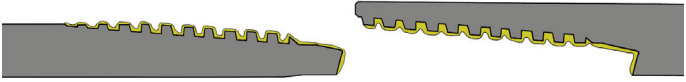
Evenly apply the correct quantity of compound to all the thread, seal and shoulder areas. The compound must reach the bottom and sides of the thread.

The minimum (and maximum for double step connections) quantities of thread compound are listed in the connections specific sections.

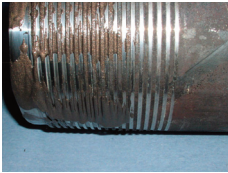
To put these values in perspective use a plastic cup, like the type found on a drill floor, and knowing its volume calculate how many make-ups can be

achieved with a full cup. Cups are typically 12 fluid ounces or 200 ml. If the cup is emptied before completing the specified number of make-ups then too much is being used and it will extrude from the connection during make-up.

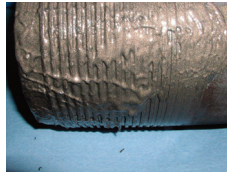
The pictures below show good application of thread compound.



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Too little



Too much



Just right Pin



Just right Box

© Vallourec Oil and Gas France

It is essential to ensure that there is no contamination of the threads and seal areas with mud or drilling fluid prior to stabbing the connections. Mud can contain small particles which may tear the connection seals or change the friction factor of the thread compound. If drilling fluid is on the connections it must be removed and fresh thread compound applied. In order to prevent this from happening in the first place the reason for the contamination must be found and actions taken to prevent reoccurrence. If no action can be taken, then the responsible person must be informed that proceeding with contaminated threads and seals may affect the integrity of the well. VAM® connections are not qualified with mud on the threads so to run pipe in this way is an unknown risk.

The thread compound must be stirred at regular intervals during use. After use ensure that the lid is placed firmly back on the container of the thread compound. The container must be placed back in a suitable store, and labelled properly, ready for the next job.

***** Remember - Good 'doping' practice is the key to success *****

2.5.5 Friction Factors

Some thread compounds have a 'Friction Factor' written on the label. The friction factor of the thread compound may have an effect on make-up as the threads engage. The friction factor has no or little effect during seal and shoulder engagement. For this reason, only use VAM® recommended running compound.

2.5.6 Thread locking of the shoe track

It may be necessary to use thread locking compound for the shoe track on a liner or casing string. This is required if the shoe will be drilled out using a torque greater than the make-up torque. If thread locking compounds are used the following guidelines must be applied.

Thread locking compounds normally come with instructions that are written for API type connections and do not apply to shouldering type VAM® connections. The instructions usually refer to a friction factor and recommend to multiply the torque by the friction factor. This recommendation **does NOT apply to shouldering type VAM® connections.**

When using thread locking compounds there will be a significant increase in torque required reaching the shoulder point. Higher shoulders than 70% of optimum torque are common.

This procedure **only applies for Thread locking compounds with Friction Factor equal or above 1.0** and for casing sizes (5" and above) for VAM® 21, VAM® 21 HT, VAM TOP®, VAM TOP® HT, VAM TOP® HC, VAM® SLIJ-II, DINO VAM®, VAM® HP, VAM® HW ST, VAM® FJL, VAM® BOLT-II, VAM® HTF-NR, VAM® HTTC and VAM® LOX. It also can be used for 4 1/2" VAM TOP® and VAM TOP® HT.

It is recommended to use Bakerlok Thread Locking Compound for VAM® products.

It is recommended to avoid the use of thread locking compound on high torque connections (high torque connections are connections with self locking profile).

For other thread locking compounds (with FF below 1.0) or all other VAM® connections, and tubing sizes, or in case CLEANWELL® products, please contact VAM® Field Service Technical Support for more information.

Torque set up

Check the specified torque figures for the connection(s). In case of Interchangeability, for thread lock application only: use the lowest torque between pin and box of the connection assembly. Set the torque/turn computer as follows

- Set the new maximum torque to the book maximum torque + 10%*
 - * Some connections have a quoted Maximum Torque with Sealability (MTS) or Field Liner Maximum. Where this is quoted in the VAM® Book or Connection Data Sheet (CDS) AND it is lower than maximum torque + 10% then the MTS or field liner maximum value must be used as a new maximum torque. If no MTS value is listed in these documents then set new maximum as above.

- Set the new minimum torque to the book maximum torque.
- Set the new optimum about half way between the above two values.
- Set the new dump torque at a level agreed with the casing crew chief to ensure the final torque is between the new minimum and maximum levels.
- Set the new maximum shoulder torque to the book minimum torque.

For example in the case of 13 3/8" x 72# L80 VAM TOP[®] use the torque figures (ft.lbs) as shown below

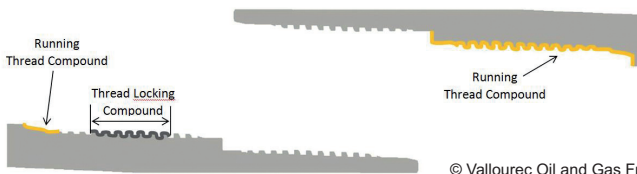
Lubrication	Maximum shoulder	Minimum torque	Optimum torque	Maximum torque
Normal thread compound	16,205	20,850	23,150	25,450
Thread lock with FF \geq 1.0	20,850	25,450	26,720	27,995

Application of compounds

When shoe track components are to be thread locked remember to also thread lock coupling mill ends for shoe collar, landing joint and intermediate joints. In addition to thread lock compound, it is necessary to apply running thread compound on some part of the connection to ensure lubricating and prevent galling. Compounds application shall be done with care to avoid contamination of the thread lock compound with running thread compound. The pictures below show good application for running thread compound and thread locking compound application depending of the type of connection.

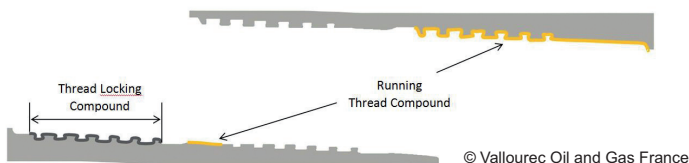
Integral joint connection (VAM[®] SLIJ-II, etc) except VAM[®] HTF product family.

Apply thread compound to the first step of the box (threads closest to the pipe ID), the box internal seal and the box torque shoulder. Apply thread-locking compound to the second step of the pin (threads closest to the pipe OD). Apply thread compound to the pin external seal (seal closest to the pipe OD).



Specific case for VAM[®] HTF product family

Apply thread compound to the first step of the box (threads closest to the pipe ID), the box internal seal and the box torque shoulder. Apply thread-locking compound to the second step of the pin (threads closest to the pipe OD). Apply thread compound to the pin external seal (seal closest to the pipe OD).



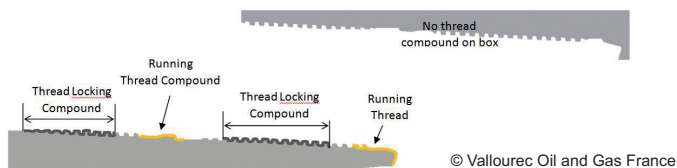
T&C connection (VAM TOP[®], VAM[®] 21 etc) except VAM[®] HP

Apply running thread compound on box seal and firsts threads (1/4 of threads part). Apply thread locking compound on imperfect threads and first perfect thread of pin end (half of threads part).



Specific case for VAM[®] HP product

For VAM[®] HP, thread compound needs to be applied on pin end only. Apply running thread compound on internal seal and shoulder (closest to the pipe ID) and intermediate seal (between both thread steps). Apply thread locking compound on last threads of second step (close to pipe OD) and on the middle of the threads of the first step. Take care to ensure thread locking compound and running thread compound separation, by maintaining few threads without any thread compound between running thread compound and thread locking compound application.



Make-up acceptance

After applying the thread compound and thread locking paste quickly stab the connections and make-up by chain tong the first five turns to ensure the threads are well engaged. If early thread resistance is observed do not continue the make-up. Early thread resistance would indicate misalignment or cross threading and if continued would result in high shouldering and

possibly thread galling. This problem must be corrected before proceeding. In the case of vertical make-up of casing it may not be possible to make-up using a chain tong so the power tong can be used in high gear and low speed until the threads are fully engaged.

- If the shoulder torque is less than or equal to the new shoulder torque and the final torque is between the new minimum and new maximum and the graph is an acceptable profile then the make-up can be accepted. This will ensure there is the required 20% torque applied to the shoulder to engage the seals.
- If the shoulder is more than the new maximum shoulder torque, the make-up cannot be accepted and must be broken out quickly, the connections cleaned and a new attempt made or new pipes used.
- If the dump valve opens early and the final torque is between the VAM® book minimum and maximum torque values, as long as there is 20% of the optimum torque on shoulder and the profile is acceptable the make-up can be accepted.

Torque vs turn chart and shouldering torque

Torque vs turn chart shall provide clear evidence of shouldering. In case of shouldering torque higher than new shoulder values, or in case of any doubtful torque vs turn chart, do not break out the connection. Contact [Mr Help](mailto:Mr_Help@vamservices.com) at www.vamservices.com to explain the situation and join to request the following datas:

- Connection information (size / weight / grade / design / options)
- Torque turn chart of concerned joint with visible torque values
- Application of the assembly

2.5.7 Lubricants based on MoS2

Some products based on MoS2 (such as Molykote™) may provide additional lubrication properties. To this extent, they may be used with VAM® connections; please ask VAM® Field Service Technicians for more detailed guidelines.

However, under some conditions, it may potentially be linked with risks of stress corrosion cracking or hydrogen embrittlement of the steel. Before considering using MoS2, assess the risks with the end-user.

2.5.8 CLEANWELL®

CLEANWELL® products are dopefree coatings applied in manufacturing plants that replace both storage and running compounds.

CLEANWELL® is not available for connections already manufactured, since it relates to an embedded technology for newly produced pipes.

During the running of a connection coated with CLEANWELL®, it is not required to apply any additional makeup dope or other thread compound.

Specific rules apply when running CLEANWELL® coated connections or when running a CLEANWELL® connection with a standard, non coated part. Please, contact your local VAM® representatives, VAM® Services or VAM® Field Service International for further details.

For more details, see section 3.20 about CLEANWELL® Technology.

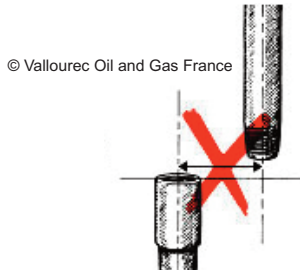
2.6 Running

Running is the process of connecting the pipes and lowering them into the well. This section includes stabbing, make-up, checking the make-up graph and if necessary backing out and also horizontal make-up.

2.6.1 Stabbing and Make-up

Stabbing is the process of placing the connections together. Make-up is the process of applying rotation to the connections until they reach the required torque. The correct make-up torque for each connection is listed in this book and on connection data sheets. The make-up torque is a factor of diameter, weight, steel grade and connection type and, in the case of VAM TOP® HT, the steel type and final application.

Prior to make-up select the correct torques. Most VAM® connections are run with the pin end down so stabbing is when the pin connection is placed into the box connection. To prevent cross threading or make-up problems there must be good alignment between the two pipes.



In order to have the pipe well aligned during the stabbing and make-up then there are four common methods to support the pipe

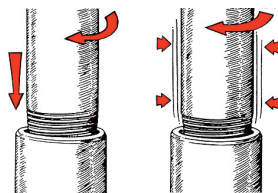
- ⇒ Adjust Link Tilt on Top Drive
- ⇒ A stabbing operator standing on a stabbing board to hold the box end
- ⇒ A stabbing arm to hold the pipe centrally
- ⇒ Remotely operated pipe handling equipment found on latest generation rigs

In order to reduce the chance of damage to the pin seal it is required to use a plastic or rubber stabbing guide over the box connection. Care must be taken by the driller not to lower the pin into the box too fast or damage may occur. The driller must have a clear line of vision so that he can see the stabbing process.

Some casing crews can supply a 'load compensator' which makes the stabbing and make-up process easier. It allows more control over the stabbing and acts as a counterbalance during initial make-up ensuring that

there is little, or no, load on the threads. It is particularly useful for Chromium, CRA steels, pulling operations or running in stands.

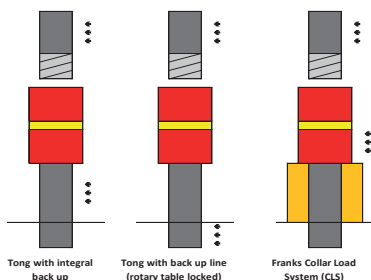
Remove the stabbing guide when the threads have been stabbed. After the pipe has been stabbed the first one or two turns are critical to ensure that the threads are properly engaged. This can be done using a strap wrench or chain tong for small diameter pipes or using the power tong in high gear at low speed for larger diameter pipe. If a torque build up is detected then back-out the connection and retry. If the damage is severe the connections must be rejected. The make-up speeds and gears as listed on the following page are recommended.



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Do not rock the pipe to engage the threads. If the threads do not align after stabbing then rotate the pipe in reverse until the threads drop and commence make-up.

Once the threads are engaged the power tong can be used on the pipe. If the power tong has a single set of rotating grips then these are placed just above the pin threads taking care to ensure that the back-up line is level and that the tong grips will not hit the coupling (or box) face as the threads engage. If the tongs are equipped with integral back-ups, they should be placed with the backup grips below the coupling and the rotating tong grips above the coupling. In the case of integral joints, the back-up grips must be placed below the box connection to avoid the connection being crushed. Do not lower the elevators over the pipe until the connection is fully made-up. If the elevator is already on the pipe it must be released before make-up.



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It is normal for the tong to have a high and low gear ratio. It is best to start in high gear with a low speed as cross threading will cause the tong to stall before damage has occurred. Once the threads are engaged then a higher speed can be used until the torque starts to increase as the threads interfere. At this point low speed and low gear is required to take the make-up to the correct torque in a controlled manner.

Material	Single Joint Load Compensator for Stabbing	Type	Initial Stabbing		Running In		Final make-up including seal and shoulder engagement	
			Tong Gear or Manual	Tong, CRT or Manual Maximum Speed (rpm at pipe)	Tong Gear	Tong or CRT Maximum Speed (rpm at pipe)	Tong Gear	Tong or CRT Maximum Speed (rpm at pipe)
Carbon	Not required	Tubing (4 1/2" and below)	High or chain tong	5	High	30	Low	Between 2 and 5
		Casing (5" and above)	High or chain tong	5	High	15	Low	Between 2 and 5
Standard 13% Chrome	Recommended	Tubing (4 1/2" and below)	High or nylon strap wrench / Memac	5	High	15	Low	Between 2 and 5
		Casing (5" and above)	High or nylon strap wrench / Memac	5	High	10	Low	Between 2 and 5
Super 13%Cr and Corrosion Resistant Alloys (CRA)	Highly Recommended	Tubing (4 1/2" and below)	High or nylon strap wrench / Memac	2	High	5	Low	Between 2 and 5
		Casing (5" and above)	High or nylon strap wrench / Memac	2	High	5	Low	Between 2 and 5

Any early torque increase is indicative of a problem in make-up such as a cross threading or galling. If this occurs rotation must be stopped and the connection broken-out fully and inspected. Thread interference does not normally start until 2/3 of the threads have disappeared inside the box.

Although not necessary for all connections it is recommended to use torque turn monitoring equipment which is described in the next section. After the connection is made-up check the monitoring system for the 'VAM® Signature'.

When the make-up is finished and the signature is accepted, disengage the power tong. If the string is not open at the bottom as it is run in hole it will be required to fill it from the top at regular intervals. If this is not done the external pressure can collapse the string. Care must be taken to ensure the casing fill up tool does not damage box connections or leave drilling or completion fluids or debris on the connections.

Many modern rigs can have more than one derrick allowing stands of pipe to be made up 'offline' and racked back in a spare derrick until required. Running pipe into a well in stands is much quicker than doing it as single joints as fewer make-ups are required over the well. When working by stands speed must be reduced by 50%.

Final torque must be between minimum and maximum as per the torque tables. Some end users may require the final torque to be between optimum and maximum.

Shoulder torque must be between 5% and 70% of optimum torque. For VAM® SLIJ-II, it is acceptable to have a shoulder torque of up to 80% of optimum torque.

Evidence of shouldering only is required for DINO VAM® and BIG OMEGA® IS. A visual guide (make-up triangle) is used to ensure BIG OMEGA® and BIG OMEGA® IS are made-up correctly. Refer to the connection specific sections in this book for more detail about these connections.

For every VAM® connection that has a torque shoulder, it is mandatory to check also the delta-turn and the shouldering slope factor.

The delta-turn is the number of turn between the shouldering point and the final torque point.

The shouldering slope factor is calculated from the make-up datas as follow:

$$\text{Shouldering slope factor} = \frac{\text{delta torque}}{\text{delta turn} \times \text{optimum torque value}}$$

Some make-up companies do this calculation with their software and identify any make-ups that have a slope out with the criteria.

For all connections having a MTS, including the high torque connections, it is recommend to make-up at the optimum torque, avoiding to go above the maximum torque. If the customer wants to torque with the power tong up to the MTS, this may generate some mill end coupling rotation, risk of crushing or deep marks on the pipe if pressure is not evenly and carefully applied.

The table below summarizes the make-up parameters of the different VAM® connection:

Criteria	VAM TOP® HC VAM TOP® HC VAMP HW ST VAMP HP VAMP FJL			VAM TOP® HT ⁽¹⁾			VAMP ZI			VAM TOP 21 HT VAMP 21 HT Excl. cold worked CRA			VAMP SUJ II			VAMP SG			VAMP B01/H			VAMP LDX			VAMP HT-NR VAMP HT C VAMP EDGE SF			BIG OMEGA® DINO VAMP			BIG OMEGA®-IS					
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max						
Final Torque	Refer to torque tables			Refer to torque tables			Refer to torque tables			Refer to torque tables			Refer to torque tables			Refer to torque tables			Refer to torque tables			Refer to torque tables			Refer to torque tables			Refer to torque tables			Refer to torque tables			Refer to torque tables		
Shoulder Torque (% of optimum)	5	70	5	70	5	70	5	70	5	70	5	70	5	80	5	80	5	85	5	70	5	70	5	70	5	70	5	70	5	70	n/a	n/a				
Delta Turns ⁽²⁾	0.010	0.100 ⁽⁵⁾	0.010	0.130 ⁽⁶⁾	0.010	0.130	0.010	0.130	0.010	0.130 ⁽⁶⁾	0.010	0.130	0.010	0.200	0.010	0.200	0.005	0.030	0.005	0.030	0.005	0.030	0.005	0.030	0.005	0.030	0.005	0.030	0.005	0.030	n/a	n/a				
Shouldering slope factor ⁽⁴⁾	5	-	5	-	5	30	5	30	5	30	5	30	5	-	5	-	5	-	5	-	5	-	5	-	5	-	5	-	5	-	n/a	n/a				
Make-up graph overlay	Recommended			Recommended			Recommended			Recommended			Recommended			Recommended			Recommended			Recommended			Recommended			Recommended			Recommended			Not required		

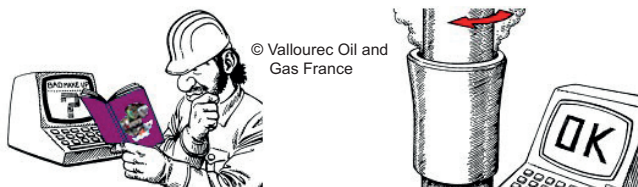
Notes

- (1) MTS = Maximum Torque with Sealability
- (2) Non linearity permitted at final torque
- (3) Delta turn = final turn - shouldering turn
- (4) Shouldering slope factor = (final torque - shoulder torque) / (optimum torque x delta turns)
- (5) For 4" 18.9 lb/ft and 4" 23.7 lb/ft VAM TOP® 1: Max Delta Turn = 0.130
- (6) For Carbon and up to 1.5% Cr material only. For CrNi, max delta turn is 0.100.
- (7) See specific VAM TOP® HT section of the VAM® Book for more details

2.6.2 Understanding make-up graphs

When casing or tubing is joined using VAM® premium connections, the connection performance is validated only when the connections are checked to ensure they are in good condition, the correct torque is applied and the correct 'VAM® Signature' is obtained.

The most accurate method of ensuring that connections are made up correctly is by monitoring the torque being applied by the tong relative to the number of turns. By connecting a computer to both the load cell on the tong and an electronic turns counter a graph can be plotted showing torque on the vertical axis and turns on the horizontal.



It is mandatory to have torque/turn monitoring and recording for all VAM® premium connections. BIG OMEGA® and DINO VAM® are semi premium connections and do not require torque/turn monitoring. Most casing crew companies provide a torque/turn monitoring service and keep a record of each makeup for future reference. Simply by connecting a torque/turn monitoring device to the tong does not guarantee a good make-up. It can be useful to detect any anomalies, particularly during thread engagement. Eyes to inspect the connections and review the graphs and a brain to accept/reject are also required. A qualified operator is therefore needed in addition to the make-up equipment. Such persons can be provided by your local VAM® Field Service Centre.

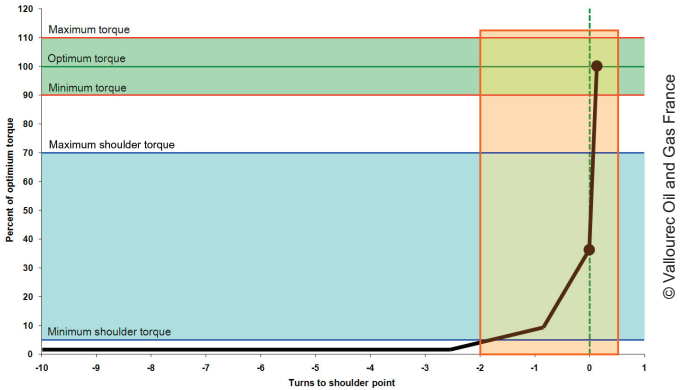
There must be a system of ensuring that a qualified operator is on the drill floor at all times with the most senior person checking any make-up graphs that have been done during his breaks. If any unacceptable makeup graphs have been accepted then the string should be pulled back to investigate any anomalies. It is better to proceed immediately rather than having a leak in the future.

Some tubing and casing running companies claim to have automatic graph evaluation software. At the time of writing, any such third party software or algorithms are not approved for use in the field for VAM® connection graph validation.

For all VAM® connections there is low resistance during the first few turns until the threads start to interfere. This normally occurs during the last two

turns and is followed by a sharp increase again as the 'shoulders' of the connections meet.

Some connections also show a change in profile during seal engagement. The black line below is typical of VAM TOP[®] signature from stabbing to final make-up.

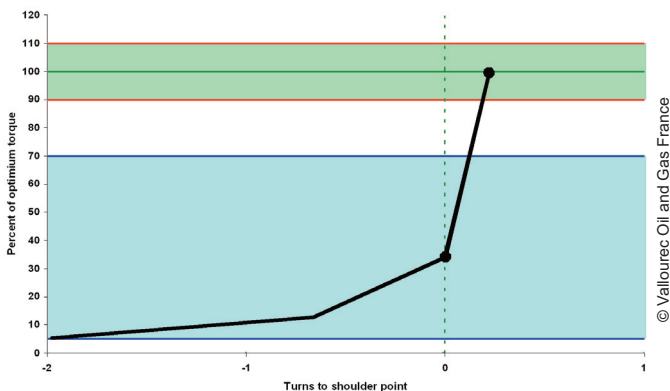


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As it is impossible to achieve a final torque that is exactly the same after each make-up, an acceptance window exists. This is normally $\pm 10\%$ of optimum torque however some VAM[®] connections have a wider window while others have a narrower window. This is displayed as the green shaded area above. A final torque anywhere between minimum and maximum is acceptable although some end users may insist on the final torque being between optimum and maximum.

It is required that the shoulders will meet when the torque is greater than 5% of optimum and less than 70% of optimum as shown by the blue shaded area above. As there is a $\pm 10\%$ acceptance criteria for the final torque this guarantees that at least 20% of the optimum torque will be applied to the connection after the shoulders have made contact.

Depending on the scale and resolution of the make-up graph axis very different make-up profiles can be achieved. A make-up graph can be 'stretched' or 'squashed' depending on the scale so it is important to not only look at the profile but also the numbers on the axis. There can be circumstances where, if the resolution is poor, a make-up graph can look acceptable but when the resolution is increased the graph may not be acceptable. For this reason the graph should be as large as possible on the screen with a turns scale showing at least the last 2 turns as shown by the orange area above and in the stretched graph below.



All make-up graphs must have the pipe tally number, time and date. If for any reason a graph is not accepted it must be kept for records along with a reason for rejection.

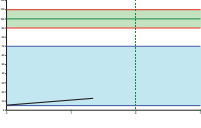
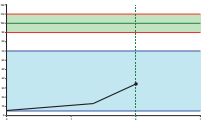
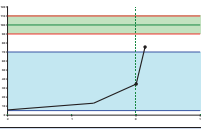

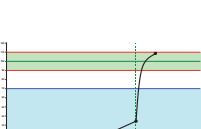
2.6.3 Unacceptable make-up graphs

By oilfield standards, running casing or tubing is a very low-risk activity and VAM® products have been designed with ease and reliability of make-up as priorities. As such 98% of connections are made-up first time without a problem. There still remains a small chance of incorrect make-up. The problems that might occur include:

- ⇨ Low Final Torque with no seal or shoulder contact
- ⇨ Low Final Torque with seal but no shoulder contact
- ⇨ Low Final Torque having reached shoulder
- ⇨ Short Graph - no thread interference
- ⇨ Plastic deformation/yielding
- ⇨ High Final torque
- ⇨ Low Shoulder
- ⇨ High Thread Interference
- ⇨ 'Humping' (peak below the shoulder)
- ⇨ 'Humping' (peak above the shoulder)
- ⇨ Irregular Thread Interference
- ⇨ High turns after shoulder
- ⇨ Step/Torque Drop During Shouldering
- ⇨ Step in Graph
- ⇨ Spike in Graph
- ⇨ Unusual profile

Although not exhaustive, the possible cause, consequences and remedial actions for each of the above is as listed on the table on the following page.

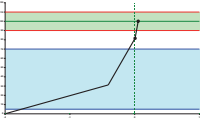
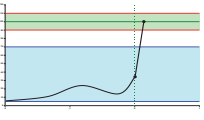
This table uses VAM TOP[®] as the comparison.

Unacceptable make-up graph	Possible Causes	Consequences	Remedial Actions
Low final torque with no seal or shoulder contact			
	<ol style="list-style-type: none"> 1. Wrong dump valve setting 2. Unable to select low gear 3. Operator stopped make-up 	<ol style="list-style-type: none"> 1. Risk of back out 2. Risk of threads jump out 3. Risk of leak 	<ol style="list-style-type: none"> 1. Back-out three turns (unless Oil Company or end user has different policy) 2. Remake
Low final torque with seal but no shoulder contact			
	<ol style="list-style-type: none"> 1. Wrong dump valve setting 2. Unable to select low gear 3. Operator stopped make-up 	<ol style="list-style-type: none"> 1. Risk of back out 2. Risk of leak 	<ol style="list-style-type: none"> 1. Break out fully 2. Clean and inspect threads and seal 3. If OK remake
Low final torque having reached shoulder			
	<ol style="list-style-type: none"> 1. Wrong dump valve setting 2. Unable to select low gear 3. Operator stopped make-up 	<ol style="list-style-type: none"> 1. Risk of back out 2. Risk of leak 	<ol style="list-style-type: none"> 1. Break out fully 2. Clean and inspect threads and seal 3. If OK remake
Short graph - no thread interference			
	<ol style="list-style-type: none"> 1. Reference torque set too high 2. Second attempt at make-up without back out 	<ol style="list-style-type: none"> 1. There is no thread engagement shown so it is not know what may have happened 2. Consequences unknown so risky 	<ol style="list-style-type: none"> 1. Break out fully 2. Clean and inspect threads and seal 3. If OK remake
Yielding / Plastic deformation			
	<ol style="list-style-type: none"> 1. Bad load cell calibration 2. Wrong torque values entered 3. Wrong tong arm length 4. Mixing interchangeable connections with big difference in weight or grade 5. Wrong connection types 	<ol style="list-style-type: none"> 1. Risk of jump in 2. Risk of coupling parting 3. Risk of leak 4. No drift – damage to pin and box shoulder area 	<ol style="list-style-type: none"> 1. Break out fully 2. Clean threads and seal 3. Inspect counter bore (D1) for deformation 4. If OK remake

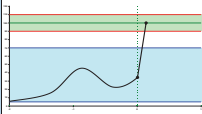
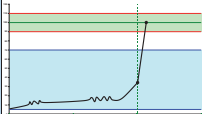
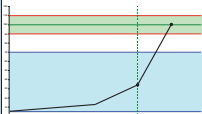
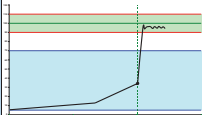
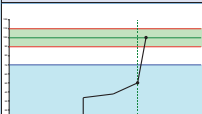
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Unacceptable make-up graph	Possible Causes	Consequences	Remedial Actions
High final torque			
For VAM® 21, such graph is acceptable if final torque is below MTS value.			
	<ol style="list-style-type: none"> 1. Bad load cell calibration 2. Wrong dump valve setting 3. Bad tong adjustment 4. Tong too powerful 	<ol style="list-style-type: none"> 1. Risk of jump in 2. Risk of coupling parting 3. Risk of leak 4. No drift – damage to pin and box shoulder area 	<ol style="list-style-type: none"> 1. Break out fully 2. Clean threads and seal 3. Visual inspect counter bore (D1) for deformation 4. If OK remake to correct torques
Low Shoulder			
	<ol style="list-style-type: none"> 1. Friction factor < 1.0 2. Wrong type of thread compound 3. Compound not stirred 4. Compound too hot 5. Compound contaminated 6. Wrong torque values 7. MoS2 (Molykote) on connections 8. Wrong connection types 	<ol style="list-style-type: none"> 1. Risk of back out 2. Risk of threads jump out 3. Risk of leak 	<ol style="list-style-type: none"> 1. Break out fully 2. Clean and inspect threads and seal 3. If OK remake

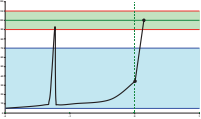
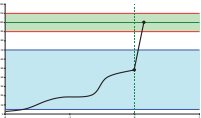
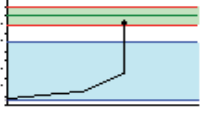
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Unacceptable make-up graph	Possible Causes	Consequences	Remedial Actions
High Thread Interference			
	<ol style="list-style-type: none"> 1. Wrong type of thread compound 2. Not enough thread compound 3. Compound too cold 4. Compound not stirred 5. Friction factor > 1.0 6. Grit/dirt in thread compound 7. Bad load cell calibration 8. Wrong torque values 9. Wrong tong arm setting 10. Running speed too high or too low 11. Tong dies reaching coupler face 12. Not enough freedom between tong and backup 13. Spring supporting tong completely extended 14. Coupler hitting face of elevators 15. Misalignment between pin and box 16. Bad stabbing 17. Threads not clean 18. Threads galled 19. Threads damaged 20. Wrong connections 	<ol style="list-style-type: none"> 1. Risk of back out 2. Risk of leak 3. Risk of threads and/or seal galling 	<ol style="list-style-type: none"> 1. Break out fully 2. Clean and inspect threads and seal 3. If OK remake
Humping (peak below the shoulder)			
	<ol style="list-style-type: none"> 1. Too high a thread compound applied. 2. Slight misalignment 3. Bad stabbing 4. Thick phosphate 5. Minor thread damage 6. Teflon seal from assembly testing left in box connection (Note: These are not to be used for VAM testing) 7. Elevators hitting coupling face 	<ol style="list-style-type: none"> 1. Excessive thread compound down hole 2. Unable to set plugs 3. Contamination of well 4. Leak or drift failure if plastic seal (teflon ring) is left by mistake in the connection 	<ol style="list-style-type: none"> 1. Accept once but establish reasons and correct problem 2. If there is any suspicion that there may be a seal in the connection then back out fully and remove. Report to Co. Man.

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Unacceptable make-up graph	Possible Causes	Consequences	Remedial Actions
Humping (peak above shoulder)			
	<ol style="list-style-type: none"> 1. Too much thread compound 2. Slight misalignment 3. Bad stabbing 4. Minor thread damage 5. Plastic seal from assembly testing left in box connection (Note: These are not to be used for VAM testing) 	<ol style="list-style-type: none"> 1. Excessive thread compound down hole 2. Unable to set plugs 3. Contamination of well 4. Leak or drift failure if plastic seal (teflon ring) is left by mistake in the connection 	<ol style="list-style-type: none"> 1. Break out fully 2. Clean and inspect threads and seal 3. If OK remake
Irregular thread interference			
	<ol style="list-style-type: none"> 1. Blocks coming down catching elevators 2. Problems with electric or hydraulic power systems 3. Poor alignment 	<ol style="list-style-type: none"> 1. Galled threads 2. Unacceptable profile 3. Questionable torque data 	<ol style="list-style-type: none"> 1. Break out fully 2. Clean and inspect threads and seal 3. If OK remake
High turns after shoulder			
	<ol style="list-style-type: none"> 1. Wrong pipe diameter for turns counter 2. Mill side torque lower than field side (coupling turns) 3. Wrong shoulder detection 	<ol style="list-style-type: none"> 1. Risk of leak if debris in mill end torque shoulder 2. Risk of leak if wrong shoulder detection 3. Risk of back out 	<ol style="list-style-type: none"> 1. Break out fully (including mill ends) 2. Clean and inspect threads and seals 3. If OK remake
Step/Torque drop during shouldering			
	<ol style="list-style-type: none"> 1. Unsuitable dies 2. Hydraulic pressure for jaws too low 3. Rotary table turning 4. Excessive paint on pipe causing slippage 	<ol style="list-style-type: none"> 1. Damage to pipe body 	<ol style="list-style-type: none"> 1. Accept if cause is grips slipping and pipe body is not damaged. If reason is unknown then 1. Break out fully 2. Clean and inspect threads and seals 3. If OK remake
Step in graph			
	<ol style="list-style-type: none"> 1. Turns counter sticking 	<ol style="list-style-type: none"> 1. No immediate consequence but what happened during make up when turns were not recorded? 	<ol style="list-style-type: none"> 1. Break out fully 2. Clean and inspect threads and seals 3. If OK remake

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Unacceptable make-up graph	Possible Causes	Consequences	Remedial Actions
Spike in graph			
	<ol style="list-style-type: none"> 1. Late gear change 2. Radio interference (mobile phone or lightening) 3. Elevators banging on pipe body 4. Electrical interference caused 	<ol style="list-style-type: none"> 1. No consequence for connection 2. Customer will not accept 	<ol style="list-style-type: none"> 1. Break out fully 2. Clean and inspect threads and seals 3. If OK remake
Unusual profile			
	<ol style="list-style-type: none"> 1. Teflon seal from assembly testing left in box connection 2. Wrong connections 3. Minor thread damage 4. Plastic seal from assembly testing left in box connection (Note: These are not to be used for VAM testing) <p>NB: Wrong connections may also produce a 'good' make up graph. Always check connections before make-up</p>	<ol style="list-style-type: none"> 1. Drift failure 2. Unable to set plugs 3. Contamination of well 4. Leak or drift failure if plastic seal (teflon ring) is left by mistake in the connection 	<ol style="list-style-type: none"> 1. Break out fully 2. Clean and inspect threads and seals 3. If OK remake
Very low delta turn			
	<ol style="list-style-type: none"> 1. Turn counter sticking 2. Turn encoder cable damaged 	<ol style="list-style-type: none"> 1. What happened after shouldering when turns were not recorded ? (Delta turn can be higher than allowed; Connection can be yielded) 	<ol style="list-style-type: none"> 1. Break out fully 2. Clean and inspect threads and seal 3. If OK remake 4. Check and replace turn encoder / cable

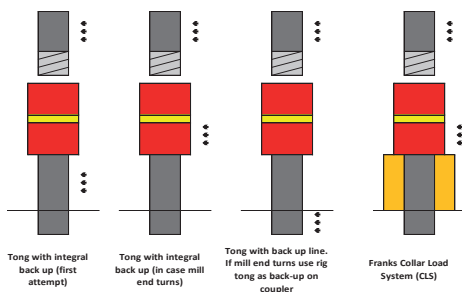
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The maximum number of break-out is 3 for tubing sizes (4 1/2" and below) and 2 for casing sizes (5" and above), before picking up a new pin connection. If this does not make-up into the box on the next attempt then the box connection (or coupling) should be replaced. If the pin connection of the laid out joint has no damage it can be retried later in string.

The reason for this restriction is to save rig time.

2.7 Break out

Unlatch the elevators before breakout. Locate the connection to be broken out at a comfortable working height above the slips. Set the power tong and the backup tongs or slips as close together as possible to prevent bending during breakout. For threaded and coupled connections place the back-up tongs as shown below. For VAM TOP® FE then grip the central flat section of the coupling.

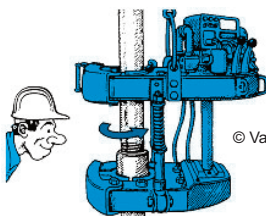


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Maintain vertical alignment and control of pipe. This is accomplished by a man on the stabbing board or a stabbing arm. Slowly apply the torque required to break the connection. Never use a hammer or other hard object to beat on a connection. It may be that considerably more torque is required to break out a connection compared to make-up. This is especially true if the pipe has been in the well for some time. The opposite can be true in some instances.

Maintain a steady, controlled speed until the pin jumps inside the box. A weight compensator may be used to reduce the chance of thread galling during breakout. Ensure that the pin does not bounce as it is pulled out of the box by using a stabbing guide.

Once the connections are broken out, if they are being returned for inspection and stockholding they must have storage grease applied before fitting thread protectors. Ensure the correct protectors are available. Never fit the wrong type of protector to a joint as it may become loose during transportation.



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2.8 Management of surplus and pulled pipe at the rig site

2.8.1 Surplus pipe

Typically, the operators will take between 5% to 10% of contingency pipes to the rig site in the unlikely case of problems. These pipes still have a value after the string is run in hole and **MUST NOT** be treated as waste. A good management system would ensure that the contingency pipes from well n°1 is run at the bottom of well n°2.

If contingency pipes have had protectors and grease removed at the rig site, then care must be taken to clean and dry the connections. After that apply a thick coat of suitable compound to the entire threaded and sealing area of the connection to prevent water ingress and protect from corrosion. Then, fit clean and undamaged protectors to prevent any contamination. Make sure that the correct protectors for the connections are used.

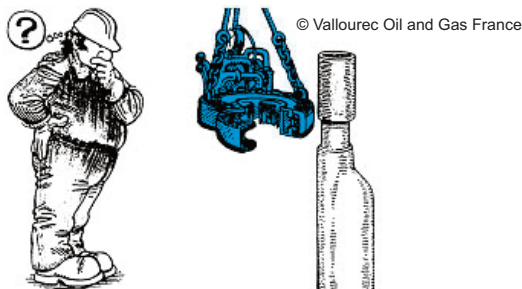
For more details, see specific sections on 2.4 and 2.5.

2.8.2 Pulled pipe

If pipes are pulled carefully from the well, they can be re-used. The entire pipes must be thoroughly cleaned with a high pressure washdown gun using fresh water to remove all completion fluids. The connections must be cleaned, dried, greased and protected as described above for the surplus pipe.

2.9 Horizontal make-up of accessories

It is normal to make-up accessories at a workshop prior to sending them to the rigsite. The reason for this is that the rig is designed to handle long items with standard diameters and weights. Typically short pipe called pup joints will be attached above and below assemblies to ease handling at the rig site. The equipment is different from the one used at the rig site since the make-up is normally done horizontally. The equipment has grips that can be adjusted to cover many sizes and even components with offset connections.



The equipment for horizontal make-up is often called a 'bucking unit' or horizontal make-up machine. Companies with such equipment may not be part of the VAM® Licensee network so this section covers the minimum requirements that they must meet.

The bucking unit must have a minimum capacity of 130% of the maximum torque to be reached (160% in the case of BIG OMEGA® connections). A torque/turn monitoring device must be connected to the bucking unit as described in previous sections. The bucking unit must have rotating grips and back-up grips with at least one set being 'free floating' to accommodate any kink or eccentricity in the pipe or on the connection. The tong and back-up grips must be perpendicular to the pipe. The bucking unit must have a continuous rotation and is not permitted to use a chain tong type arrangement as the method of gripping.

For a list of permitted thread compounds and their application and make-up graphs see previous sections.

Prior to starting check the torque figures to be used. This requires that the steel strength is known. Enter the parameters into the make-up computer.

If making up items with different steel strengths or weights, refer to the interchangeability section of this book. Next, clean the connections

thoroughly and apply running compound. To avoid galling, the connection shall be made-up as far as possible by hand, then by using a strap wrench or chain tong. This must be done without crossing or forcing the threads. Next, grip on pin and box ends being careful not to place the grips over the box thread location. It is preferable to rotate the lighter of the two components. The components have to be carefully aligned after clamping into bucking unit and prior to torquing.

Make-up the connections at low speed until optimum torque is reached. Check the make-up graph for conformance and accept or reject as necessary. Keep all records of make-ups for at least 5 years or as required to meet the end user's requirements. If a make-up is not acceptable then break it out fully using the bucking unit. Rotate until it is possible to unscrew by hand. Inspect the connections and if OK then remake.

Some situations may require to apply more torque:

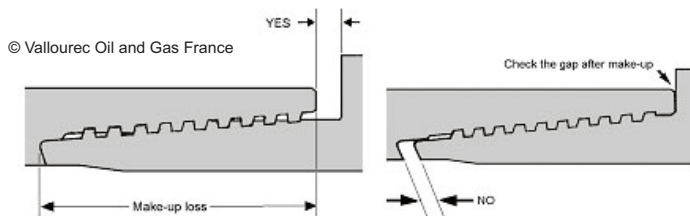
- if using thread locking compound
- when the inside and/or the outside diameter of accessories is larger than the standard design (for instance: hanger body)

Only in both cases specified above: to establish the correct torque to use, first make-up the connections to the standard torque and if there is at least 20% of the torque applied to the shoulder then accept the make-up. If there is less, record the shoulder torque value and break-out the connection fully, then clean and visually inspect. If there is no galling or damage then remake to a final torque defined by

$$FT = ST + 0.20 \times OT$$

Whereby FT = final torque
 ST = shouldering torque evaluated from the first graph
 OT = optimum torque specified by the torque table

The final torque may be above the range given by the torque table. Take care with assemblies that they have been manufactured with sufficient clearance behind the pin threads otherwise there could be a case as shown on the following page where the assembly upset causes a false shoulder and of course the make-up is unacceptable.



After making up assemblies they should be full length drifted and pressure tested using VAM® approved pressure test caps as described below.

If assistance is required for assembly make-up then contact your nearest VAM® Field Service centre.

2.10 Interchangeability

2.10.1 Objectives

This chapter explains when it is possible to mix connections, the consequences of such action, the torque figures to apply and what to do if extra help is required. All these potential issues should be taken into account during the well design process and the use of a cross over shall be considered as the best option. The rules explained in this chapter may not be the last update. Refer to VAM® Services website to check if any update has been done since the edition of this revision of the VAM® Book.

2.10.2 Definitions

Designs which are interchangeable can be successfully made-up and will retain, at a minimum, the performance (including seal ability) of the side with the lowest grade, lowest weight. Internal flushness is not guaranteed as often a step may appear in the bore as a consequence of different internal diameters.

2.10.3 General rules

VAM® connections are not interchangeable with:

- Competitors connections
- VAM® Copies* ('copy cat') connections
- Different families of VAM® connections (see below for detail)
- Connections with the suffix Nx where 'x' is a sequential letter

'VAM® Copies' are imitation connections made by companies which do not have a VAM® licence. Genuine VAM® connections are made by Vallourec, Nippon Steel Corporation or companies that are currently licensed by VAM® Services. For a list of all VAM® Licensees, the connections they are licensed to cut and their Licensee Logo go to www.vamservices.com website.

Connections with the suffix Ky, where 'y' is a sequential letter, may be interchangeable (see table below in 2.9.4.3).

On some interchangeable make-ups there may be a step in the bore. The consequence of accepting this are as follows

- Turbulance which may lead to erosion
- Wireline tools to 'hang up' or stick in the well
- Damage to the cement plugs



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In order to achieve high performance some connections can have different geometric designs across the weight range. These include VAM TOP[®] Tubing, VAM[®] FJL, VAM[®] SLIJ-II, VAM[®] SG, VAM[®] HW ST, BIG OMEGA[®], VAM[®] HP, DINO VAM[®], VAM[®] HTF, VAM[®] HTTC and VAM[®] 21. These differences may include thread/seal diameter, thread taper, thread pitch, etc.

The interchangeability must be checked through 4 steps:

First step = Check the design interchangeability.

Second step = Check the weight and grade constrain.

Third step = Calculate the resulting make-up torques.

Fourth step = Determine the resulting performances.

Note: even if there is a make-up torques overlap between two connections, the rules describe above have to be followed. Make-up torques overlap does not automatically mean that the connections can be made-up and performed as expected.

VAM[®] FPO needs a special study for interchangeability and mix-torque calculation. Please contact Mr Help to do so.

The online “Mix Torque Calculation Tool” is now available on VAM[®] Services website. It allows to calculate the feasibility and torque calculation of mixed weight & grade combinations.

2.10.4 VAM TOP® Casing Interchangeability

		PIN®						
		VAM TOP® HT	VAM TOP® HC	VAM TOP® casing	VAM TOP® -KS	VAM TOP® -KX	VAM TOP® -KP	VAM TOP® FE
BOX	VAM TOP® HT	Interchangeable	Interchangeable	Interchangeable	n/a	n/a	Interchangeable	NOT interchangeable
	VAM TOP® HC	Interchangeable	Interchangeable	Interchangeable	n/a	Interchangeable	Interchangeable	NOT interchangeable
	VAM TOP® casing	Interchangeable	Interchangeable	Interchangeable	Interchangeable	Interchangeable	Interchangeable	NOT interchangeable
	VAM TOP® -KS	n/a	n/a	Interchangeable	Interchangeable	Interchangeable	n/a	NOT interchangeable
	VAM TOP® -KX	n/a	n/a	Interchangeable	Interchangeable	Interchangeable	n/a	NOT interchangeable
	VAM TOP® -KP	Interchangeable	Interchangeable	Interchangeable	n/a	n/a	Interchangeable	NOT interchangeable
	VAM TOP® FE	Interchangeable	Interchangeable	Interchangeable	Interchangeable	Interchangeable	Interchangeable	Interchangeable

Note: For all n/a cases, please contact Mr Help on VAM® Services website www.vamservices.com.
 4 1/2" VAM TOP® tubing is not compatible with 4 1/2" VAM TOP® HC nor 4 1/2" VAM TOP® HT nor 4 1/2" VAM TOP® -ND.

2.10.5 FIRST STEP = Design Interchangeability

For each VAM® connection with a given OD, several designs can be found. The different designs are not interchangeable with each other, whatever the weight and grade differences.

		VAM® 21, VAM® 21 HT																			
		3 1/2	4 1/2	5	5 1/2	6	6 5/8	7	7 1/4	7 5/8	7 3/4	8 5/8	9 5/8	9 7/8	10 3/4	11 3/4	11 7/8	13 3/8	13 5/8	14	
Design 1 - OK to mix same diameter in these weights <small>Design 1 is not compatible with other designs</small>	9,20 ⁽²⁾	11,60 ⁽²⁾	16,00 ⁽¹⁾	17,00 ⁽¹⁾	18,60	23,20 ⁽¹⁾	23,20 ⁽¹⁾	23,00 ⁽¹⁾	29,70 ⁽¹⁾	29,70 ⁽¹⁾	44,00	44,00	40,00 ⁽¹⁾	45,50	54,00	61,00	61,00	82,50 ⁽²⁾	86,00 ⁽²⁾		
	10,20 ⁽²⁾	12,60 ⁽¹⁾⁽²⁾	20,00 ⁽¹⁾	24,50 ⁽³⁾	24,00 ⁽¹⁾	26,00 ⁽¹⁾	26,00 ⁽¹⁾	33,70 ⁽¹⁾	33,70 ⁽¹⁾	44,00	44,00	44,00	40,00 ⁽¹⁾	45,50	54,00	61,00	61,00	82,50 ⁽²⁾	86,00 ⁽²⁾		
	12,70 ⁽²⁾	13,50 ⁽¹⁾⁽²⁾	23,00 ⁽¹⁾⁽⁴⁾	23,00 ⁽¹⁾⁽⁴⁾	28,00 ⁽¹⁾	29,00 ⁽¹⁾⁽⁴⁾	29,00 ⁽¹⁾	35,80 ⁽¹⁾	35,80 ⁽¹⁾	44,00	44,00	44,00	40,00 ⁽¹⁾	45,50	54,00	61,00	61,00	82,50 ⁽²⁾	86,00 ⁽²⁾		
		15,10 ⁽¹⁾⁽²⁾			32,00 ⁽¹⁾	32,00 ⁽¹⁾	35,00 ⁽¹⁾⁽⁵⁾	39,00 ⁽¹⁾	39,00 ⁽¹⁾												
Design 2 - OK to mix same diameter in these weights <small>Design 2 is not compatible with other designs</small>	16,60 ⁽²⁾	17,00 ⁽²⁾	17,70 ⁽²⁾	18,90 ⁽²⁾																	
Design 3 - OK to mix same diameter in these weights <small>Design 3 is not compatible with other designs</small>	21,50 ⁽²⁾	21,40 ⁽¹⁾	26,00 ⁽¹⁾⁽⁴⁾	30,90 ⁽²⁾	34,50 ⁽¹⁾⁽²⁾	38,00 ⁽¹⁾⁽⁴⁾	41,50 ⁽²⁾	47,10	46,10	59,40 ⁽¹⁾	62,80	65,70	71,00	71,80	77,00 ⁽⁴⁾	77,00 ⁽⁴⁾	93,00 ⁽²⁾	96,90 ⁽²⁾	100,00	106,00	
Design 4 - OK to mix same diameter in these weights <small>Design 4 is not compatible with other designs</small>																					

⁽¹⁾ = also applicable for VAM® 21 HT.

⁽²⁾ = contact Mr Help.

⁽³⁾ = only applicable for VAM® 21 HT.

⁽⁴⁾ = compatible with its oversize.

⁽⁵⁾ = not compatible with its oversize.

		VAM TOP @ Casing																						
		5	5 1/2	5 3/4	6	6 5/8	7	7 5/8	7 3/4	8 5/8	9 5/8	9 7/8	10	10 3/4	10 7/8	11 3/4	11 7/8	13 3/8	13 5/8	14	15	16		
Design 1 - OK to mix same diameter in these weights Design 1 is not compatible with other designs	13,00 ⁽⁵⁾	14,00 ⁽⁴⁾	18,10	30,90 ⁽³⁾	20,00 ⁽⁴⁾	23,00 ⁽⁴⁾	26,40 ⁽⁴⁾	28,40 ⁽⁴⁾	46,10 ⁽⁴⁾	36,00	35,00	62,80 ⁽⁶⁾	67,20	45,50 ⁽⁶⁾	72,00	54,00 ⁽⁶⁾	67,80 ⁽⁶⁾	61,00 ⁽⁶⁾	86,20 ⁽⁶⁾	82,20 ⁽¹⁾	92,50	84,00 ⁽²⁾		
	15,00 ⁽⁶⁾	15,50 ⁽⁴⁾	19,70	23,20 ⁽⁴⁾	26,00 ⁽⁴⁾	29,70 ⁽⁴⁾	29,70 ⁽⁴⁾	29,70 ⁽⁴⁾	40,00	40,00	65,30 ⁽⁶⁾	68,70	51,00 ⁽⁶⁾	68,00 ⁽⁶⁾	60,00 ⁽⁶⁾	71,80 ⁽⁶⁾	71,80 ⁽⁶⁾	68,00 ⁽⁶⁾	118,20	82,50 ⁽¹⁾	95,00 ⁽²⁾	97,00 ⁽²⁾		
	18,00 ⁽⁶⁾	17,00 ⁽⁴⁾	21,80	24,00 ⁽⁴⁾	29,00 ⁽⁴⁾	33,70 ⁽⁴⁾	33,70 ⁽⁴⁾	33,70 ⁽⁴⁾	44,00	43,50 ⁽⁷⁾	66,40 ⁽⁶⁾	71,80	56,50 ⁽⁷⁾	72,00 ⁽⁶⁾	65,00 ⁽⁶⁾	72,00 ⁽⁶⁾	72,00 ⁽⁶⁾	72,00 ⁽⁶⁾	86,00 ⁽¹⁾	86,00 ⁽¹⁾	93,00 ⁽¹⁾	104,00 ⁽²⁾		
	20,30 ⁽⁴⁾	20,00 ⁽⁴⁾		28,00 ⁽⁴⁾	32,00 ⁽⁴⁾	35,80 ⁽⁴⁾	35,80 ⁽⁴⁾	35,80 ⁽⁴⁾	49,00	47,00 ⁽⁷⁾	66,90 ⁽⁶⁾	66,90 ⁽⁶⁾	60,70 ⁽⁷⁾	77,00 ⁽⁶⁾	71,00 ⁽⁶⁾	77,00 ⁽⁶⁾	77,00 ⁽⁶⁾	80,70 ⁽⁶⁾	80,70 ⁽⁶⁾	93,00 ⁽¹⁾	96,90 ⁽¹⁾	100,00 ⁽¹⁾	100,00 ⁽¹⁾	
	20,80 ⁽⁴⁾	23,00 ⁽⁴⁾		32,00 ⁽⁴⁾	35,00 ⁽⁴⁾	39,00 ⁽⁴⁾	39,00 ⁽⁴⁾	39,00 ⁽⁴⁾	52,00	53,50 ⁽⁷⁾	67,50 ⁽⁶⁾	67,50 ⁽⁶⁾	65,70 ⁽⁷⁾	85,00 ⁽⁶⁾	85,00 ⁽⁶⁾	85,00 ⁽⁶⁾	85,00 ⁽⁶⁾	85,00 ⁽⁶⁾	85,00 ⁽⁶⁾	100,00 ⁽¹⁾	100,00 ⁽¹⁾	106,00 ⁽¹⁾	106,00 ⁽¹⁾	
Design 2 - OK to mix same diameter in these weights Design 2 is not compatible with other designs	21,40 ⁽⁶⁾	26,80 ⁽⁴⁾		36,70 ⁽⁴⁾	38,00 ⁽⁴⁾	42,80 ⁽⁴⁾	42,80 ⁽⁴⁾	42,80 ⁽⁴⁾	58,40 ⁽⁶⁾	68,00 ⁽⁶⁾	68,00 ⁽⁶⁾	71,10 ⁽⁷⁾	73,20	73,20	73,20	73,20	73,20	73,20	86,00 ⁽⁶⁾	86,00 ⁽⁶⁾	112,00	112,00	114,00 ⁽¹⁾	
	23,20 ⁽⁶⁾	26,80 ⁽⁴⁾		41,00 ⁽⁶⁾	45,30 ⁽⁴⁾	45,30 ⁽⁴⁾	45,30 ⁽⁴⁾	45,30 ⁽⁴⁾	70,50 ⁽⁶⁾	70,50 ⁽⁶⁾	70,50 ⁽⁶⁾	70,50 ⁽⁶⁾	70,50 ⁽⁶⁾	70,50 ⁽⁶⁾	70,50 ⁽⁶⁾	70,50 ⁽⁶⁾	70,50 ⁽⁶⁾	70,50 ⁽⁶⁾	92,00	92,00	114,00 ⁽¹⁾	114,00 ⁽¹⁾	115,00 ⁽¹⁾	
	24,10 ⁽⁶⁾	28,40 ⁽⁴⁾		42,70 ⁽⁴⁾	47,10 ⁽⁴⁾	47,10 ⁽⁴⁾	47,10 ⁽⁴⁾	47,10 ⁽⁴⁾	72,00 ⁽⁶⁾	72,00 ⁽⁶⁾	72,00 ⁽⁶⁾	72,00 ⁽⁶⁾	72,00 ⁽⁶⁾	72,00 ⁽⁶⁾	72,00 ⁽⁶⁾	72,00 ⁽⁶⁾	72,00 ⁽⁶⁾	72,00 ⁽⁶⁾	92,00	92,00	114,00 ⁽¹⁾	114,00 ⁽¹⁾	116,00 ⁽¹⁾	
Design 2 - OK to mix same diameter in these weights Design 2 is not compatible with other designs																							109,00 ⁽³⁾	
																								118,00 ⁽³⁾
																								128,00 ⁽³⁾

(1) = VAM TOP @-KB only.
 (2) = VAM TOP @-ND only.
 (3) = VAM TOP @-NE only.
 (4) = also applicable for VAM TOP @-KP.
 (5) = VAM TOP @-K only.
 (6) = also applicable for VAM TOP @-KX.
 (7) = also applicable for VAM TOP @-KS and VAM TOP @-KX.

	VAM TOP® HT					VAM TOP® HC					VAM TOP® Tubing										
	4 1/2	5	5 1/2	6 5/8	7	7 5/8	4 1/2	5	5 1/2	6 5/8	7	7 5/8	7 3/4	2 3/8	2 7/8	3 1/2	4	4 1/2*			
Design 1 - OK to mix same diameter in these weights <i>Design 1 is not compatible with other designs</i>	10,50 11,60 12,60 13,50	15,00 18,00 20,30 20,80 21,40 23,20	17,00 20,00 23,00 26,00 29,70	23,20 24,00 28,00 32,00 36,70	26,00 29,00 32,00 35,00 38,00 41,00	29,70 33,70 35,80 39,00 42,80 45,30 47,10	10,50 11,60 12,60 13,50 15,10 17,00 17,70 18,90 21,50 23,70	15,00 18,00 20,30 20,80 21,40 24,10 29,70	15,50 17,00 20,00 23,00 26,00 28,40 29,70	23,20 24,00 28,00 32,00 35,00 38,00 41,00	26,00 29,00 32,00 35,00 38,00 41,00	29,70 33,70 35,80 39,00 42,80 45,30 47,10	46,10	4,60 5,10	6,40	6,50 7,70	8,20 9,50 10,90 12,10 13,50 15,10	10,50 11,60 12,60 13,50 15,10			
Design 2 - OK to mix same diameter in these weights <i>Design 2 is not compatible with other designs</i>	15,10 17,00 17,70 18,90 21,50 23,70													5,80 6,30 6,60 7,35	7,80 8,60 9,35	12,70 13,70 14,30 14,70	14,80 16,10 16,50	17,00 17,70 18,90			
Design 3 - OK to mix same diameter in these weights <i>Design 3 is not compatible with other designs</i>																			11,50 16,70 18,35	15,50 22,20 18,35	18,90 23,70

* 4 1/2" VAM TOP® HC and VAM TOP® HT are not compatible with 4 1/2" VAM TOP® tubing

	DINO YAM®										BIG OMEGA ®								
	7	9 5/8	9 3/4	9 7/8	10 3/4	11 3/4	11 7/8	13 3/8	13 5/8	14	16	14	16	18 5/8	20	22	24	24 1/2	26
<i>Design 1 - OK to mix same diameter in these weights</i>	20,00	36,00	59,20	62,80	40,50	47,00	71,80	54,50	78,90	82,50	65,00	82,50	75,00	84,00	96,50	94,00	162,00	140,00 ⁽¹⁾	207,00 ⁽²⁾
<i>Design 1 is not compatible with other designs</i>	23,00	40,00	60,20	66,40	45,50	54,00	61,00	88,20	86,00	86,00	75,00	86,00	75,00	94,50	106,50	115,00	174,00	160,00 ⁽¹⁾	223,00 ⁽²⁾
	26,00	43,50	67,50	67,50	51,00	68,00	68,00	93,00	93,00	84,00	84,00	99,00	84,00	99,00	114,00	118,50	189,00	165,00 ⁽¹⁾	237,00 ⁽²⁾
<i>Design 2 is not compatible with other designs</i>	29,00	47,00	68,90	68,90	55,50	72,00	72,00	94,80	94,80	84,80	84,80	99,00	84,80	110,00	136,00 ⁽¹⁾	133,00 ⁽¹⁾	203,00	182,00 ⁽¹⁾	270,00 ⁽²⁾
	53,50	53,50	70,50	70,50	60,70	65,70	65,70	99,00	99,00	100,00	100,00	106,00	106,00	118,00 ⁽¹⁾	139,00 ⁽¹⁾	147,00 ⁽¹⁾	147,00 ⁽¹⁾	207,00 ⁽¹⁾	207,00 ⁽¹⁾
<i>Design 2 - OK to mix same diameter in these weights</i>	59,40	59,40	66,15	66,15	60,00	60,00	77,00	77,00	94,50	94,50	94,50	94,50	97,00	97,00	104,00	104,00	109,00	109,00	128,00
<i>Design 2 is not compatible with other designs</i>	61,10	61,10	73,20	73,20	65,00	65,00	80,70	80,70	97,00	97,00	97,00	97,00	97,00	97,00	104,00	104,00	109,00	109,00	128,00
	64,90	64,90	76,10	76,10	71,00	71,00	85,00	85,00	104,00	104,00	104,00	104,00	104,00	104,00	109,00	109,00	109,00	109,00	128,00
	70,30	70,30	79,20	79,20	71,80	71,80	86,00	86,00	109,00	109,00	109,00	109,00	109,00	109,00	109,00	109,00	109,00	109,00	128,00
	71,80	71,80																	

⁽¹⁾ = also applicable for BIG OMEGA ®-IS

⁽²⁾ = BIG OMEGA ®-IS only

	VAM® HP					VAM® SW-I					VAM® SIM-SW						
	7	7 5/8	7.664	9	10 1/2	10 3/4	10 7/8	11.055	12 1/4	4-1/2	7	8-5/8	9-5/8	11-3/4	7	7-5/8	9-5/8
Design 1 - OK to mix same diameter in these weights Design 1 is not compatible with other designs										11.60	23.00	32.00	36.00	65.00	26.00	33.70	40.00
	Wt = 1.2"	51.20		110.30	96.00	71.10	72.00	125.20	134.25		26.00	36.00	40.00		29.00	43.50	47.00
Design 2 - OK to mix same diameter in these weights Design 2 is not compatible with other designs		55.30															
Design 3 - OK to mix same diameter in these weights Design 3 is not compatible with other designs		59.20	61.50														
Design 4 - OK to mix same diameter in these weights Design 4 is not compatible with other designs																	
Design 5 - OK to mix same diameter in these weights Design 5 is not compatible with other designs																	

For any case that is not listed in the table above, please contact Mr Help.

2.10.6 SECOND STEP = Check the Weight and Grade constraint

Weight and grades are constraints for interchangeability and the rules below explain the limitations.

When this document mentions a grade difference of 30 ksi allowed, that means the nominal SMYS (not the actual YS). For example 7" 26 lb/ft L80 VAM TOP® and 7" 26 lb/ft P110 VAM TOP® can be mixed (110 ksi – 80 ksi = 30 ksi).

The definition of weight per foot difference is the number of rows they are apart in the VAM® Book. For example the difference between 7" 35 lb/ft and 7" 38 lb/ft is 1 weight difference.

OD size (in)	Nominal weight (lb/ft)
7"	23
	26
	29
	32
	35
	38

Weight difference between 23 lb/ft and 29 lb/ft = 2.

Weight difference between 35 lb/ft and 38 lb/ft = 1.

VAM® 21

Grade difference (ksi)	[0;45]		>45
	Weight difference (rows)		
0	✓	✗	✗
1	✓	✗	✗
2	✓	✗	✗
3	?	✗	✗
4	?	✗	✗
>4	✗	✗	✗

MTS: Maximum Torque with Sealability

VAM® 21 HT

Grade difference (ksi)	[0;45]		>45
	Weight difference (rows)		
0	✓	✗	✗
1	✓	✗	✗
≥2	?	✗	✗

VAM TOP® casing

VAM TOP®-KP, -KX, -KS, -KB

Grade difference (ksi)	[0;15]	[15;30]	[30;45]	> 45
	Weight difference (rows)			
0	✓	✓	?	✗
1	✓	✓	?	✗
2	✓	?	?	✗
3	?	?	?	✗
4	?	?	?	✗
>4	✗	✗	✗	✗

VAM TOP® tubing

Grade difference (ksi)	[0;15]	[15;30]	> 30
	Weight difference (rows)		
0	✓	?	✗
1	✓	✗	✗
2	✓	✗	✗
>2	✗	✗	✗

Mixing VAM TOP ® HT and VAM TOP ® HC

Mixing VAM TOP ® HC with VAM TOP ® HC

Mixing VAM TOP ® HT with VAM TOP ® HT

Grade difference (ksi)	[0;15]	]15;30]	> 30
Weight difference (rows)			
0	✓	✓	✗
1	✓	?	✗
2	✓	?	✗
3	?	?	✗
>3	✗	✗	✗

VAM® HW-ST

Grade difference (ksi)	[0;30]	]30;45]	> 45
Weight difference (rows)			
0	✓	?	✗

VAM® FJL

Grade difference (ksi)	[0;30]	]30;45]	> 45
Weight difference (rows)			
0	✓	?	✗

Mixing VAM TOP ® Casing with VAM TOP ® HT

Mixing VAM TOP ® Casing with VAM TOP ® HC

Grade difference (ksi)	[0;15]	]15;30]	> 30
Weight difference (rows)			
0	✓	✓	✗
1	✓	✓	✗
2	✓	?	✗
3	?	?	✗
>3	✗	✗	✗

VAM® HP

Grade difference (ksi)	[0;45]	>45
Weight difference (rows)		
0	✓	✗

VAM TOP ® FE

Grade difference (ksi)	[0;15]	> 15
Weight difference (rows)		
0	✓	✗

VAM® MUST

Grade difference (ksi)	[0;30]	]30;45]	> 45
Weight difference (rows)			
0	✓	?	✗

VAM® SLJ-II

Grade difference (ksi)	[0;15]	> 15
Weight difference (rows)		
0	✓	✗

BIG OMEGA ®

Grade difference (ksi)	[0;15]	]15;45]	> 45
Weight difference (rows)			
0	✓	✓	✗
1	✓	?	✗
2	✓	?	✗
3	?	?	✗
>3	✗	✗	✗

DINO VAM®

Grade difference (ksi)	[0;15]	]15;30]	> 30
Weight difference (rows)			
0	✓	✓	✗
1	✓	✓	✗
2	✓	?	✗
3	?	?	✗
>3	✗	✗	✗

BIG OMEGA ®-IS

Grade difference (ksi)	[0;15]	]15;45]	> 45
Weight difference (rows)			
0	✓	✓	✗
1	✓	?	✗
2	✓	?	✗
3	?	?	✗
>3	✗	✗	✗



Select suitable torque values using the rules in the following tables.



A crossover is highly recommended but if not available contact VFSI if urgent at rig site or Mr Help if non urgent (>5 day response required).



If the lighter connection of the assembly is the Pin, interchangeability is acceptable. If not, contact Mr Help on VAM® Services website: <http://www.vamservices.com/support/help.aspx>.



A cross-over is mandatory even if the torque values overlap.

For any other VAM® connections, not mentioned in the tables above, please contact [Mr. Help](#) at www.vamservices.com

If a crossover is required to bridge a gap in steel grades then it must be manufactured from material with a yield strength that is approximately half way between the two connection grades. This situation is most likely to occur with hangers that are made with 75ksi material and higher grade pup joints.

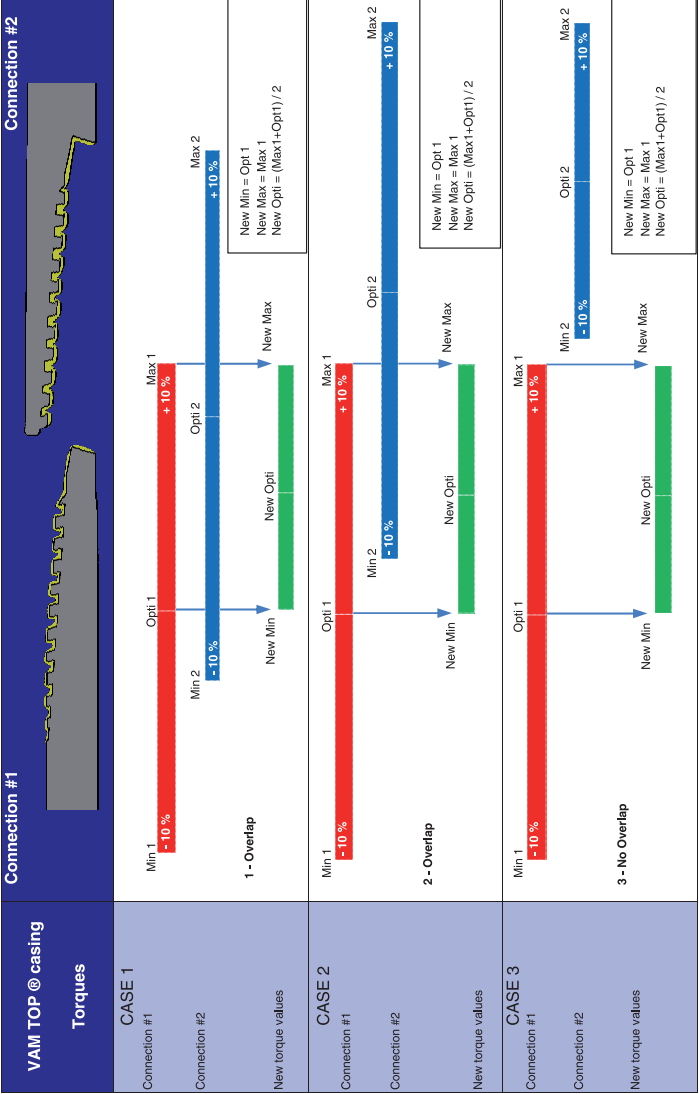
In the case of accessories where the OD and ID dimensions are non standard then these rules do not apply and the only option is to contact [Mr Help](#) for advice.

2.10.7 THIRD STEP = Calculation of the Resulting Make-up Torques

If a decision is made to mix different connections then the selection of new torque values is critical to the success of the make-up.

Theoretical examples applicable for:

- VAM® 21 / VAM® 21 HT
- VAM TOP® Casing
- VAM TOP® HC
- VAM TOP® HT / HC / Casing (when VAM TOP® HT is a part of the assembly, Mill & Licensee Torques are not taken into account)
- VAM TOP® -KP, VAM TOP® -KX, VAM TOP® -KS
- VAM TOP® FE
- DINO VAM® (use Mill torques if contact on arrestor, Field torques for all other cases)
- VAM® HW-ST
- VAM® SLIJ-II
- VAM® FJL
- VAM® MUST
- VAM® SW-I and VAM® SM-SW.
- BIG OMEGA® and -IS

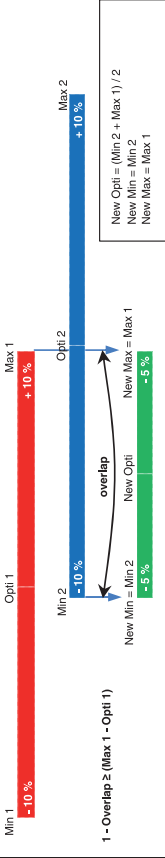
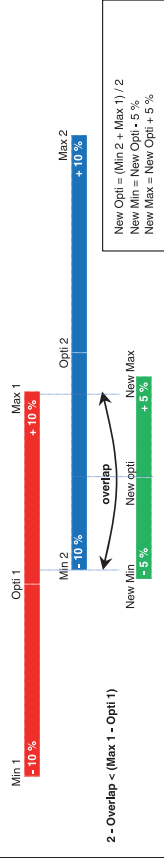
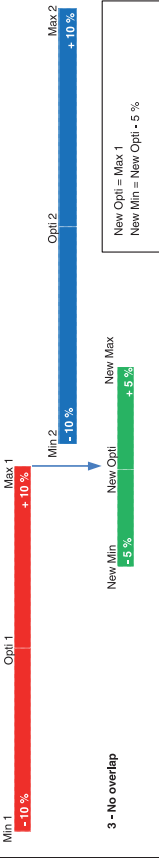


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2.10.7.1 Specific rules for VAM TOP® tubing

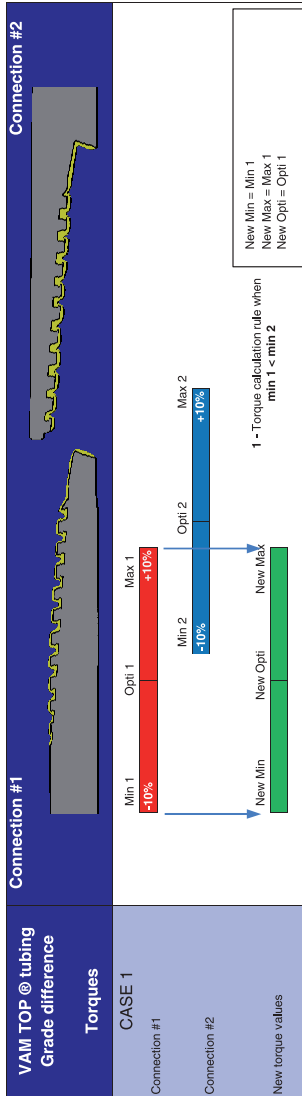
2.10.7.2 Mixing Weights or Mixing Weights and Grades VAM TOP® tubing

When mixing **maximum 2 weights with the same grade or different grades** the following rules shall be applied:

VAM TOP® tubing Other cases Torques	Connection #1	Connection #2
<p>CASE 1</p> <p>Connection #1</p> <p>Connection #2</p> <p>Same grades & different weights or Different grades & weights New torque values</p>	 <p>Min 1 -10 %</p> <p>Opti 1</p> <p>Max 1 +10 %</p> <p>Min 2 -10 %</p> <p>Opti 2</p> <p>Max 2 +10 %</p> <p>overlapp</p> <p>New Opti</p> <p>New Max = Max 1</p> <p>New Min = Min 2</p> <p>1 - Overlap \geq (Max 1 - Opti 1)</p> <p>New Opti = (Min 2 + Max 1) / 2 New Min = Min 2 New Max = Max 1</p>	
<p>CASE 2</p> <p>Connection #1</p> <p>Connection #2</p> <p>Same grades & different weights or Different grades & weights New torque values</p>	 <p>Min 1 -10 %</p> <p>Opti 1</p> <p>Max 1 +10 %</p> <p>Min 2 -10 %</p> <p>Opti 2</p> <p>Max 2 +10 %</p> <p>overlapp</p> <p>New Opti</p> <p>New Max</p> <p>New Min = New Opti</p> <p>New Max = New Opti + 5 %</p> <p>2 - Overlap $<$ (Max 1 - Opti 1)</p> <p>New Opti = (Min 2 + Max 1) / 2 New Min = New Opti - 5 % New Max = New Opti + 5 %</p>	
<p>CASE 3</p> <p>Connection #1</p> <p>Connection #2</p> <p>Same grades & different weights or Different grades & weights New torque values</p>	 <p>Min 1 -10 %</p> <p>Opti 1</p> <p>Max 1 +10 %</p> <p>Min 2 -10 %</p> <p>Opti 2</p> <p>Max 2 +10 %</p> <p>3 - No overlap</p> <p>New Opti = Max 1 New Min = New Opti - 5 %</p>	

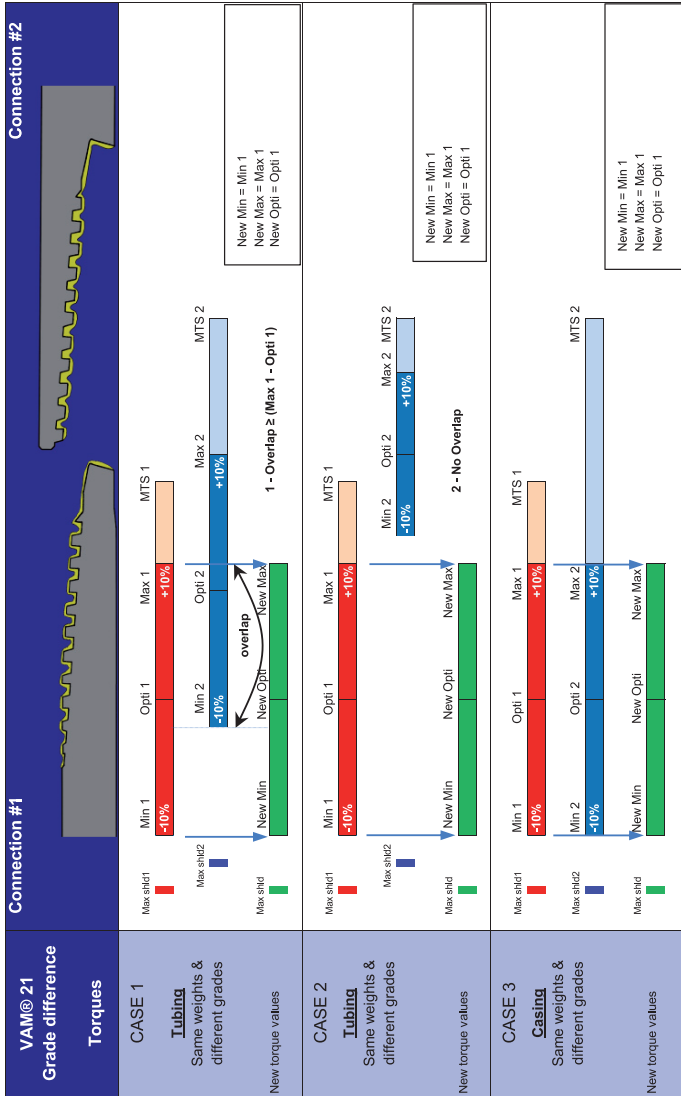
2.10.7.3 Mixing grades VAM TOP® tubing

When mixing grades with a difference of maximum 15 ksi and with the same weight take the smallest grade torques .



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2.10.7.4 VAM® 21 & VAM® 21 HT



VAM® 21 Other cases Torques	Connection #1	Connection #2
<p>CASE 1</p> <p>Same grades & different weights or</p> <p>Different grades & weights</p> <p>New torque values</p>	<p>1 - Overlap \geq (Max 1 - Opt 1)</p> <p>New Min = Opt 1 New Max = Max 1 New Opt = (New Min + New Max) / 2</p> <p>SEE NOTE</p>	<p>2 - Overlap < (Max 1 - Opt 1)</p> <p>New Min = Opt 1 New Max = Max 1 New Opt = (New Min + New Max) / 2</p> <p>SEE NOTE</p>
<p>CASE 2</p> <p>Same grades & different weights or</p> <p>Different grades & weights</p> <p>New torque values</p>	<p>3 - No Overlap</p> <p>New Min = Opt 1 New Max = Max 1 New Opt = (New Min + New Max) / 2</p> <p>SEE NOTE</p>	<p>3 - No Overlap</p> <p>New Min = Opt 1 New Max = Max 1 New Opt = (New Min + New Max) / 2</p> <p>SEE NOTE</p>
<p>CASE 3</p> <p>Same grades & different weights or</p> <p>Different grades & weights</p> <p>New torque values</p>	<p>SEE NOTE</p>	<p>SEE NOTE</p>
<p>CASE 4</p> <p>Same grades & different weights or</p> <p>Different grades & weights</p> <p>New torque values</p>	<p>SEE NOTE</p>	<p>SEE NOTE</p>

Note: In case of high shouldering, if the torque on shoulder \geq 20% of Opt torque, high shouldering is acceptable. If the new torque window is too small to be set-up in the bucking machine, contact Mr Help on VAM® Services website : <http://www.vamservices.com/support/help.aspx>.

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Contact Mr Help

Mr Help on VAM® SERVICES website

VAM® 21 HT Torques for Field end Grade difference	Connection #1	Connection #2
<p>FIELD END, make-up at rig site or accessories connection (for standard coupling refer to MILL END): ANY torque between Min and Max can be used MILL END, make-up at Mill, licensee: Contact Mr Help on VAM® Services website: http://www.vamservices.com/support/help.aspx</p>		
<p>CASE 1</p> <p>Same weights & different grades</p> <p>New torque values</p>		<p>New Min/opt = Min/opt 1 New Max = Max 1</p>
<p>CASE 2</p> <p>Same weights & different grades</p> <p>New torque values</p>		<p>New Min/opt = Min/opt 1 New Max = Max 1</p>
<p>CASE 3</p> <p>Same weights & different grades</p> <p>New torque values</p>		<p>New Min/opt = Min/opt 1 New Max = Max 1</p>

VAM® 21 HT Torques for Field end Other cases	Connection #1	Connection #2
<p>FIELD END, make-up at rig site or accessories connection (for standard coupling refer to MILL END): Any torque between Min and Max can be used</p> <p>MILL END, make-up at Mill, licensee: Contact Mr Help on VAM® Services website: http://www.vamservices.com/support/help.aspx</p>		
<p>CASE 1</p> <p>Connection 1 Connection 2 Same grades & different weights or Different grades & weights New torque values</p>		<p>New Min/Opt = Min/Opt 2 New Max = Max 1</p>
<p>CASE 2</p> <p>Connection 1 Connection 2 Same grades & different weights or Different grades & weights New torque values</p>		<p>New Min/Opt = Min/Opt 2 New Max = Max 2</p>
<p>CASE 3</p> <p>Connection 1 Connection 2 Same grades & different weights or Different grades & weights New torque values</p>		<p>New Min/Opt = Min/Opt 2 New Max = Max 2</p>

CONTACT Mr Help on VAM® SERVICES website

Contact Mr Help

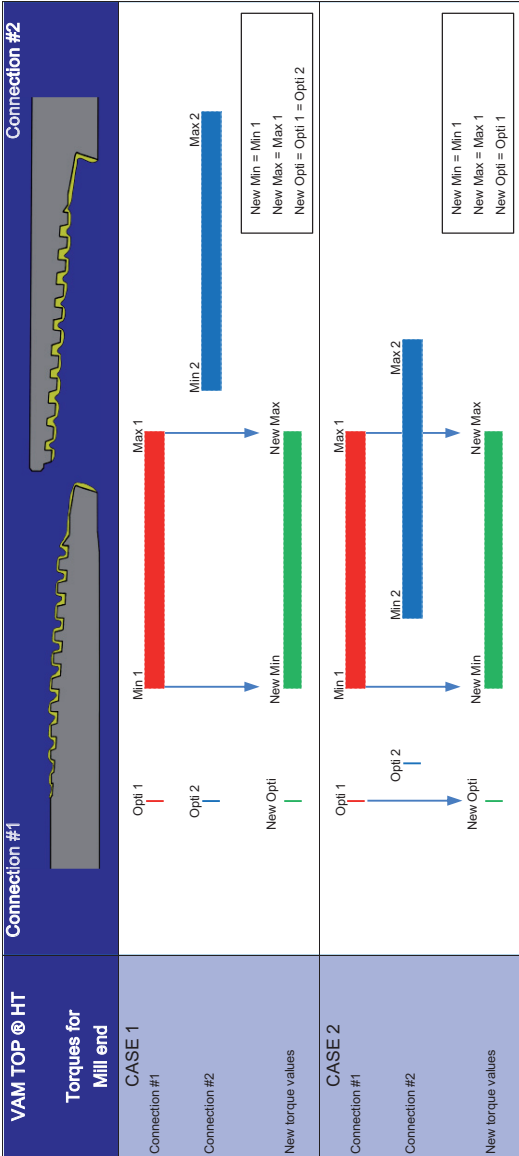
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INTERCHANGEABILITY

2.10.7.5 VAM TOP® HT

Make-up at the rig site: Use Field end for non rotation torques. For rotation of the string: Liner Max can be used as defined below.

VAM TOP® HT Torques for Field ends	Connection #1	Connection #2
<p>CASE 1</p> <p>Connection #1</p> <p>Connection #2</p> <p>Field End New torque values</p>	<p>Min 1 -10 %</p> <p>Opti 1</p> <p>Field Liner Max 1</p> <p>Opti 2</p> <p>Field Liner Max 2 +10 %</p> <p>1 - Overlap \geq (Max 1 - Opti 1)</p> <p>New Min</p> <p>New Opti</p> <p>New Max</p> <p>New Field Liner Max</p> <p>New Min = Min 2 New Max = Max 1 New Field Liner Max = (New Min + New Max) / 2</p>	<p>Field Liner Max 2 +10 %</p> <p>Opti 2</p> <p>Field Liner Max 1</p> <p>Min 1 -10 %</p> <p>Opti 1</p> <p>2 - Overlap $<$ (Max 1 - Opti 1)</p> <p>New Min</p> <p>New Opti</p> <p>New Max</p> <p>New Field Liner Max</p> <p>New Opti = (Min 2 + Max 1) / 2 New Min = New Opti - 5 % New Max = New Opti + 5 % New Field Liner Max = Field Liner Max 1</p>
<p>CASE 2</p> <p>Connection #1</p> <p>Connection #2</p> <p>Field End New torque values</p>	<p>Min 1 -10 %</p> <p>Opti 1</p> <p>Field Liner Max 1</p> <p>Opti 2</p> <p>Field Liner Max 2 +10 %</p> <p>2 - Overlap $<$ (Max 1 - Opti 1)</p> <p>New Min</p> <p>New Opti</p> <p>New Max</p> <p>New Field Liner Max</p> <p>New Min = New Opti - 5 % New Max = New Opti + 5 % New Field Liner Max = Field Liner Max 1</p>	<p>Field Liner Max 2 +10 %</p> <p>Opti 2</p> <p>Field Liner Max 1</p> <p>Min 1 -10 %</p> <p>Opti 1</p> <p>3 - No overlap</p> <p>New Min</p> <p>New Opti</p> <p>New Max</p> <p>New Field Liner Max</p> <p>New Opti = Max 1 New Min = New Opti - 5 % New Max = New Opti + 5 % New Field Liner Max = Field Liner Max 1</p>
<p>CASE 3</p> <p>Connection #1</p> <p>Connection #2</p> <p>Field End New torque values</p>	<p>Min 1 -10 %</p> <p>Opti 1</p> <p>Field Liner Max 1</p> <p>Opti 2</p> <p>Field Liner Max 2 +10 %</p> <p>3 - No overlap</p> <p>New Min</p> <p>New Opti</p> <p>New Max</p> <p>New Field Liner Max</p> <p>New Opti = Max 1 New Min = New Opti - 5 % New Max = New Opti + 5 % New Field Liner Max = Field Liner Max 1</p>	<p>Field Liner Max 2 +10 %</p> <p>Opti 2</p> <p>Field Liner Max 1</p> <p>Min 1 -10 %</p> <p>Opti 1</p> <p>3 - No overlap</p> <p>New Min</p> <p>New Opti</p> <p>New Max</p> <p>New Field Liner Max</p> <p>New Opti = Max 1 New Min = New Opti - 5 % New Max = New Opti + 5 % New Field Liner Max = Field Liner Max 1</p>



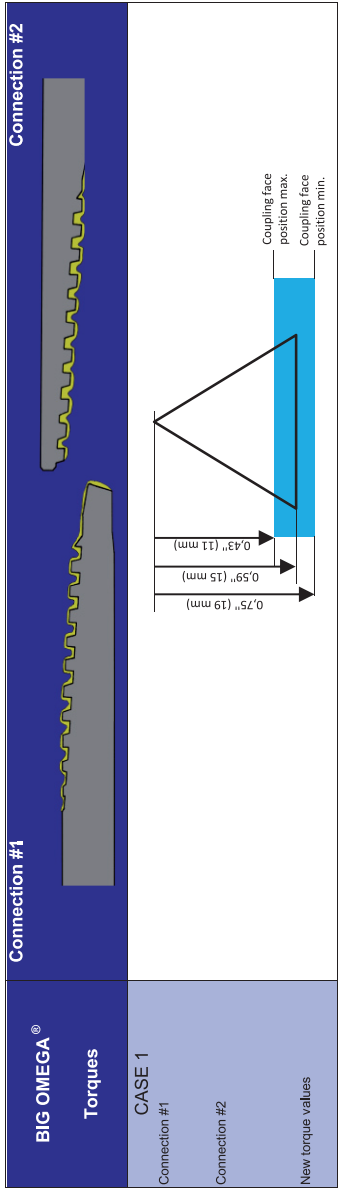
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2.10.7.6 VAM® HP

VAM® HP Torques	Connection #1	Connection #2
CASE 1 Connection #1	<p>Min 1 - 10 %</p> <p>Opt 1</p> <p>Max 1 + 10 %</p>	
Connection #2	<p>Min 2 - 10 %</p> <p>Opt 2</p> <p>Max 2 + 10 %</p>	
New torque values	<p>Min 2</p> <p>Opt 2</p>	<div style="border: 1px solid black; padding: 5px;"> <p>New Min = Min 1 = Min 2 New Max = Max 1 = Max 2 New Opti = Opti 1 = Opti 2</p> </div>

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2.10.7.7 BIG OMEGA®



2.10.7.8 BIG OMEGA ® -IS

BIG OMEGA ®-IS		Connection #1	Connection #2
CASE 1			
Connection #1			
Connection #2			
New torque values		<p>1 - Overlap \geq (Max 1 - Opti 1)</p> <p>New Min = Min 2 New Opti = New Opti New Max = Max 1 New MAT = MAT 1</p>	
CASE 2			
Connection #1			
Connection #2			
New torque values		<p>2 - Overlap $<$ (Max 1 - Opti 1)</p> <p>New Opti = (Min 2 + Max 1) / 2 New Min = New Opti - 5 % New Max = New Opti + 5 % New MAT = MAT 1</p>	
CASE 3			
Connection #1			
Connection #2			
New torque values		<p>3 - No overlap</p> <p>New Opti = Max 1 New Min = New Opti - 5 % New Max = New Opti + 5 % New MAT = MAT 1</p>	

2.10.8 FOURTH STEP = Resulting Performances

Below is a mix connections maximum performances table.

Resulting performances when mixing connections – Not for calculations (1)

BOX \ PIN	VAM TOP ®	VAM TOP ® HC	VAM TOP ® HT
VAM TOP ®	T=100% C=60% (2)	T=100% C=60% (2)	T=100% C=60% (2)(Not using liner torques)
VAM TOP ® HC	T=100% C=60% (2)	T=100% C=100% (2)	T=100% C=80% (2)(Not using liner torques)
VAM TOP ® HT	T=100% C=60% (2)(Not using liner torques)	T=100% C=80% (2)(Not using liner torques)	T=100% C=80% (2) Using liner torques

(1) – For actual performances contact VAM® Services

(2) – In % of most critical connection of the assembly

T: For numerical calculation of Tension, use conservatively the lowest grade and weight of the 2 members

C: For numerical calculation of Compression, use conservatively the lowest grade and weight of the 2 members

2.10.9 Protectors

It is also important to use protectors that are interchangeable.

- A loosely fitted protector may cause it to fall off during transportation leading to a dropped object with the potential to harm someone.
- A tightly fitted protector may be difficult to remove and require to be cut off leading to a risk of injury.
- A protector with the wrong thread form or length can cause water ingress leading to corrosion resulting in a connection having to be scrapped.

In the main oil and gas hubs there are normally companies which prepare protectors for reuse or recycling. They normally keep a stock of the best protectors available for sale. Contact your local VAM® Field Service centre to get a list of local suppliers.

2.11 Pressure Test Caps & Plugs

Pressure testing down-hole equipment is a common practice. In order to hold the pressure each end shall be closed by:

- Pressure test plug where the element to be tested has a box connection.
- Pressure test cap where the element to be tested has a pin connection.



The pressure test caps and plugs shall meet the following requirements.

- Meet all safety standards regarding use of pressure testing equipments
- Fit the connection to be tested.
- Ability to hold the required test pressure.
- Easy to install and remove.
- Withstand numerous make and break
- Shall be designed to prevent any change the dimensional characteristics of the connection after test.
- Shall not damage the connection due to makeup and breakout (removal of the surface treatment, galling of the threads or sealing area...).
- May be used with any type steel.

For safety reasons, pressure testing with gas may be prohibited or with a limited pressure level. Please refer to the corresponding User Manual or contact gauges.dept@vamservices.com

There are two types of pressure test fixtures:

“Type-1” (Also called “Metal to Metal Pressure Test Fixtures”): Here the pressure tightness is achieved by metal to metal seal engagement (just like the product). Although designed to minimize the torque to be applied, these test fixtures need a power tong to reach the necessary complete make-up whenever the product sizes is greater than 5 inches.

Make-up torque = 25% of the torque needed for the lowest weight & grade of the corresponding OD.

See below an example. All 5 ½” pressure test fixtures shall be made-up using the highlighted torques.

VAM® 21 / VAM® 21 HT TORQUE VALUES (FIELD END ONLY)

Size (OD)	Nominal weight	Wall thickness	Make-up Torque (all grades)			80ksi
			ft.lb <i>N.m</i>			
<i>In</i> <i>mm</i>	<i>lb/ft</i>	<i>In</i> <i>mm</i>	Min.	Opti.	Max.	
5 <i>127.00</i>	18.0	0.362	8 750	9 450	10 150	10 15
		<i>9.195</i>	<i>11 800</i>	<i>12 800</i>	<i>13 800</i>	<i>13 80</i>
	21.4	0.437	10 300	11 100	11 900	11 90
		<i>11.100</i>	<i>13 900</i>	<i>15 100</i>	<i>16 200</i>	<i>16 20</i>
	23.2	0.478	11 400	12 300	13 200	13 20
	<i>12.141</i>	<i>15 400</i>	<i>16 700</i>	<i>17 900</i>	<i>17 90</i>	
5 1/2 <i>139.70</i>	17.0	0.304	7 250	7 850	8 400	8 400
		<i>7.722</i>	<i>9 800</i>	<i>10 600</i>	<i>11 400</i>	<i>11 40</i>
	20.0	0.361	9 450	10 200	10 900	10 90
		<i>9.169</i>	<i>12 800</i>	<i>13 800</i>	<i>14 800</i>	<i>14 80</i>
	23.0	0.415	11 600	12 500	13 400	13 40
		<i>10.541</i>	<i>15 700</i>	<i>17 000</i>	<i>18 200</i>	<i>18 20</i>
	26.0	0.476	13 300	14 350	15 400	15 40
		<i>12.090</i>	<i>18 000</i>	<i>19 500</i>	<i>20 900</i>	<i>20 90</i>
26.8	0.500	14 050	15 200	16 300	16 30	
	<i>12.700</i>	<i>19 000</i>	<i>20 600</i>	<i>22 100</i>	<i>22 10</i>	

The “Type-1” is available for all VAM® Connections and may be purchased from any VAM® Licensee or approved suppliers. For more information on ordering these contact [Mr Help](#).



These “Type-1” test caps or plugs will not generate any product deformation under pressure only if the make-up with the product to be tested is complete i.e.: at shoulder point. It is reminded that inserting any kind of seal ring between the shoulders to escape the power make-up shall be banned because it causes permanent deformation of the product.

As there is metal to metal seal engagement a particular care shall be taken about using and applying the proper thread compound. A systematic inspection shall be conducted before each engagement to prevent damaging the product due to galled or indented seal of the test cap or plug.

“**Type-2**” (Also called “Soft Seal Low Torque Pressure Test Fixures”): Here the pressure tightness is achieved by a specially designed polymeric seal ring.

** Ability to hold 15,000 psi Maximum Working Pressure (or even 22,500 psi for some advanced designs)

** Testing media water and/or gas

- Available on rental (short term or long term agreements) or for sale.

- No risk of seal damage (thanks to specific soft seals)
- Real hand-tight solution for all sizes. No need of power tong, a wrench is enough.
- No deformation after test, the connection remains “new” after pressure test this has been proven by tests.
- Keep control on condition and serviceability through rental only.



At the moment the "Type 2" is available for VAM® 21, VAM TOP® family, VAM® HTTC, VAM® SLIJ-II and VAM® TTR HW-NA.

Visit our website www.vamservices.com to get the updated list of available test fixtures.

For any question you may have on their availability or to order them, please contact gauges.dept@vamservices.com

2.12 VAM® Thread Protectors

A comprehensive range of VAM® thread protectors can now be supplied by VAM® Services to support our VAM® Licensees' network. The VAM® thread protectors available in our product catalogue can be ready to be delivered by courier service within 20 days (EXW – working days only).

More information is available on the VAM® Services website: www.vamservices.com.

2.13 Surface Treatment

2.13.1 Phosphating

Phosphating is the anti galling treatment for carbon steels. It is grey or black in colour and must be applied to one end of each pipe (normally the box end). It may also be applied to the pin end. The phosphate may be worn in areas after repeated make-up but unless it is missing it is not cause for rejection.

2.13.2 Copper Coating

Copper coating is the anti galling treatment mainly for chromium steels. It is copper in colour and must be applied to one end of each pipe (normally the box end). The pin end is normally left as machined. The copper may be tarnished in appearance and this is not reason for rejection.

To copper plate both pin and box is not authorized on VAM® connections.

2.13.3 Blasting

Blasting is commonly used on CRA steels. It turns the machined surface from shiny to dull in aspect. Blasting is usually with copper coating on the counterpart connection (typically Blasted pin and Copper coated box).

2.13.4 As machined

It is permitted to have one connection as machined (no treatment) as long as the other end of the connection has a treatment as described above. Never make-up two as machined connections together.

Any other type of coating on VAM® connections are not permitted and are always cause for rejection.

The following combinations are forbidden except clear requirement in the TSLI:

- Copper plating / copper plating;
- As machined / as machined;
- As machined / alumina (Al₂O₃) sand blasting or ceramic bead blasting.

2.14 Corrosion

Rust is light corrosion that can eventually be removed with a plastic scouring pad. Contact [Mr Help](#) to get guidelines for repair.

Pitting creates small holes that can be deeper than they appear. Pitting is not acceptable on VAM® connections.

3.1 VAM[®] 21 and VAM[®] 21 HT

VAM[®] 21 is the latest generation of Threaded and Coupled (T&C) connection introducing an innovative and revolutionary design. Confidence thanks to API RP 5C5 CAL-IV compliance within the full pipe body envelope extends the opportunities for your well designs.



© Vallourec Oil and Gas France

Description:

Threaded & Coupled Premium Connection
3 1/2" – 14" OD



Applications:

– Tubing – Liner – Production Casing
– Tie-Back – Extreme HPHT Well Designs – Drilling with Casing



Benefits:

- Simple, reliable and easy running
- Seal protected from rough handling
- Suitable for automated rig handling systems
- Clear and repeatable make-up charts
- Performances preserved after fatigue
- Reduced drilling wear susceptibility

Performances:

- Most of the product line qualified to API RP 5C5: 2017 CAL-IV, the most stringent connection qualification procedure to date
- Validated CAL-IV product line within the full pipe envelope
- Extreme compression resistance (100% of Pipe Body Yield Strength)
- Bending with sealability: up to 65°/100ft
- Sealability validated up to 240°C (464°F)

The best VAM[®] T&C premium connection

VAM[®] 21 is the highest performing and most reliable VAM[®] connection to date with excellent gas tight sealing under combined loads, extreme compression resistance (100%) and innovative VAM[®] Effect with the VAM[®] Stabilizer. Seal and shoulder functions are separated so that torque and compression have no effect on the sealing performance.

Thread compound

VAM® 21 is not sensitive to thread compound quantity and has no mandatory minimum or maximum volumes of thread compound. It is required to apply a thin even coating equally on mating parts of both pin and box connections as per general VAM® Book guidelines.

Torque

It is recommended that VAM® 21 is made-up to its optimum torque value (Opti.). It is allowed to make-up the connection up to the Maximum Torque with Sealability (MTS) value with all performances retained. It is allowed to make-up the connection up to the Maximum Torque with Sealability (MTS) value with all sealability performances retained. However, It is recommended that VAM® 21 is made-up to its optimum torque value (Opti.) and between minimum field end torque and maximum field end torque.

VAM® 21 liner rotation up to MTS (Maximum Torque with Sealability) is possible with all sealability performances retained.

VAM® 21 HT

This option, available on some sizes, provides even more torque for dedicated applications such as rotating liners, drilling with casing, ERD, multilateral wells, horizontal sections. VAM® 21 HT is interchangeable with VAM® 21. The connections mainly differ by inside diameter value and torque applied.

When making up VAM® 21 HT at the mill, always aim between minimum mill end torque and maximum mill end torque.

When making up VAM® 21 HT at the licensee or assembly workshop, always aim between minimum field end torque and maximum field end torque.

For running VAM® 21 HT at the rig site, it is recommended to make-up between minimum field end torque and maximum field end torque. For specific operations it is also possible to make-up the VAM® 21 HT connections up to MTS (Maximum Torque with Sealability).

VAM® 21 HT liner rotation up to MTS (Maximum Torque with Sealability) is possible.

Other options

VAM® 21 is available with special clearance (SC80 for example) as well as with CLEANWELL® dopefree option.

Interchangeability

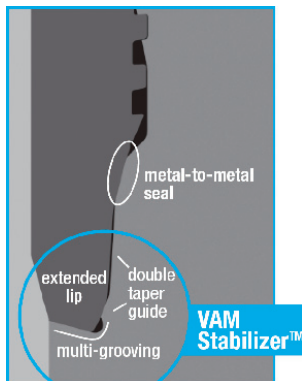
The list of interchangeable sizes within the VAM[®] 21 product line can be found in section 2.10.5 of the VAM[®] Book. VAM[®] 21 and VAM[®] 21 HT are interchangeable following the same rules.

Seal location

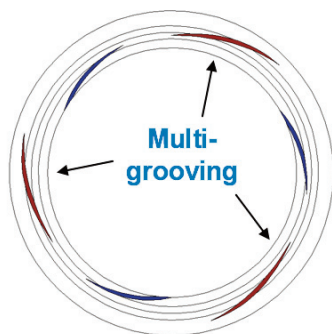
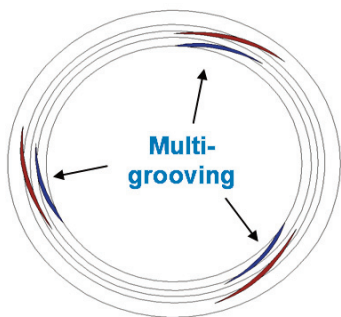
Contrary to historical Threaded & Coupled premium connections, the metal-to-metal seal is not located at the end of the lip, but just after the threads. This position allows the pin seal to be protected against some handling damages. Use of protectors is still recommended.

VAM Stabilizer™ – Multi-grooving

The VAM Stabilizer™ lip design includes a multi-grooving. Three spiral grooves should be present on both the shoulder and taper guide of the pin. This allows easy recognition of the connection and easy extrusion of thread compound if too much is applied. Relative positions of grooves may vary.



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VAM® 21 | VAM® 21 HT TECHNICAL DATA (FIELD END ONLY)

Size (OD) in mm	Nominal weight lb/ft	Wall thickness		VAM® 21 VAM® 21 HT			VAM® 21 HT			With SC2B option			With SC30 option			Tenable Yield Strength & Compression Resistance (except 30 options) (x1000) bbl								
		mm	in	Make-up Loss	Coupling Length	Coupling OD	Coupling Face Area	Drift (API)	Drift (Special)	Coupling ID	Drift (API)	Drift (API)	Coupling OD	Coupling Face Area	Coupling OD	Coupling Face Area	80 ksi	95 ksi	110 ksi	125 ksi				
3 1/2	9.20	0.254	6.45	3.469	7.914	3.930	1.556	2.867	2.900	2.981						207	246	285	324					
66.90	10.20	0.289	7.34	3.469	7.914	3.983	1.820	2.797	2.870	2.870						233	277	321	364					
	12.70	0.375	9.53	3.469	7.914	4.107	2.450	2.625	2.706	2.706						285	350	405	460					
4 1/2	11.60	0.250	6.35	3.587	8.150	4.334	1.955	3.075	3.380	3.342						4.839	1.417	4.682	1.890	287	317	367	417	
114.30	12.60	0.271	6.88	3.587	8.150	4.969	2.219	3.833	3.880	3.942	3.833	3.895	4.814	4.912	1.859	4.867	4.914	4.871	1.871	288	342	396	450	
	13.50	0.290	7.37	3.587	8.150	4.999	2.400	3.795	3.845	3.907	3.795	3.857	4.888	4.938	2.019	4.867	4.938	4.938	2.032	307	364	422	480	
	15.10	0.337	8.56	3.587	8.150	5.073	2.875	3.701	3.750	3.812	3.701	3.763	4.949	5.006	2.400	4.949	5.006	2.400	2.438	353	419	485	551	
	16.60	0.371	9.42	4.020	9.016	5.103	3.060	3.633	3.744	3.744						3.85	457	529	602	385	457	529	602	
	17.00	0.380	9.65	4.020	9.016	5.117	3.150	3.615	3.648	3.744						393	467	541	615	393	467	541	615	
	17.70	0.402	10.21	4.020	9.016	5.189	3.369	3.571	3.723	3.723						414	492	569	647	414	492	569	647	
	18.90	0.430	10.92	4.020	9.016	5.189	3.623	3.515	3.540	3.762						440	522	605	687	440	522	605	687	
5	21.50	0.500	12.70	4.532	10.040	5.264	4.115	3.375	3.366	3.366						503	597	691	785	503	597	691	785	
	15.00	0.296	7.52	3.707	8.386	5.504	2.370	4.283	4.345	4.345														
127.00	18.00	0.362	9.19	4.079	9.134	5.605	3.068	4.151	4.294	4.294	4.151	4.211	5.471	2.135	5.532	2.577	2.577	2.577	2.577	422	501	580	659	
	21.40	0.437	11.10	4.472	9.922	5.699	3.742	4.001	4.126	4.001	4.001	4.061	5.544	2.640	5.615	3.138	3.138	3.138	3.138	501	595	689	783	
	23.20	0.478	12.14	4.472	9.922	5.758	4.167	3.919	4.000	4.089	3.919	3.979	5.591	2.976	5.668	3.514	3.514	3.514	3.514	543	645	747	849	
	24.10	0.500	12.70	4.472	9.922	5.790	4.392	3.875	4.069	4.069						566	672	778	884	566	672	778	884	
5 1/2	17.00	0.304	7.72	4.079	9.134	6.018	2.698	4.767	4.891	4.891						397	471	546	620	397	471	546	620	
139.70	20.00	0.361	9.17	4.079	9.134	6.111	3.399	4.653	4.700	4.806	4.653	4.714	5.975	2.366	6.038	2.842	2.842	2.842	2.842	466	554	641	729	
	23.00	0.415	10.54	4.079	9.134	6.195	4.056	4.545	4.600	4.720	4.545	4.606	6.044	2.887	6.113	3.414	3.414	3.414	3.414	530	630	729	829	
	26.00	0.476	12.09	4.472	9.922	6.268	4.628	4.423	4.500	4.615	4.423	4.483	6.097	3.292	6.176	3.901	3.901	3.901	3.901	601	714	826	939	
	26.80	0.500	12.70	4.472	9.922	6.304	4.904	4.375	4.415	4.593	4.375	4.436	6.126	3.522	6.207	4.150	4.150	4.150	4.150	628	746	864	982	
	28.40	0.530	13.46	4.864	10.769	6.359	5.111	4.315	4.320	4.520						662	786	910	1034	662	786	910	1034	
	29.70	0.562	14.28	4.864	10.769	6.375	5.470	4.251	4.461	4.628	4.461	4.604	6.180	3.932	6.268	4.251	4.251	4.251	4.251	697	828	959	1090	
5.228	23.00	0.415	10.54	4.079	9.134	6.195	3.857	4.545	4.600	4.720						604	718	831	944	604	718	831	944	
146.40	26.00	0.476	12.09	4.472	9.922	6.268	4.428	4.423	4.500	4.615						6.097	3.092	6.176	3.701	6.04	7.18	8.31	9.44	

* VAM® 21 HT

Some designs may need oversized pipes to achieve special drift

For products manufactured before 01/04/2016 with nominal OD ≥ 7", couplings are 25mm shorter than the value published in this table.



VAM® 21 / VAM® 21 HT TECHNICAL DATA (FIELD END ONLY)

Size (OD)	Nominal weight	Wall thickness		VAM® 21 and VAM® 21 HT				VAM® 21				VAM® 21 HT				With SC80 option				With SC00 option				Tensile Yield Strength & Compression Resistance (except SC options) (x1000 lb)			
		in	mm	Make-up Loss	Coupling Length	Coupling OD	Coupling Face Area	Drift (API)	Drift (ALL)	Drift (Special)	Drift (ANL)	Coupling ID	Drift	Drift	Coupling ID	Coupling OD	Coupling face area	Coupling OD	Coupling face area	80 ksi	95 ksi	110 ksi	125 ksi				
10.34 273.05	45.50	0.40	10.16	4.847	11.693	11.483	8.185	9.794	9.975	10.119	in	in	in	in	in	sq.in	in	sq.in	6.948	6.948	1040	1236	1431	1626			
	51.00	0.450	11.43	5.280	12.560	11.548	9.125	9.694	10.028	10.028				11.371	6.677	11.451	7.738	11.651	11.371	11.371	1383	1602	1820				
	55.50	0.495	12.57	5.280	12.560	11.626	10.275	9.604	9.625	9.700	9.947	9.604	9.625	11.434	7.479	11.522	8.763	11.522	11.434	11.434	1276	1515	1754	1993			
	60.70	0.545	13.84	5.280	12.560	11.711	11.522	9.504	9.600	9.659	9.659	9.504	9.600	11.500	8.445	11.597	9.838	11.597	11.500	11.500	1660	1922	2184				
	65.70	0.595	15.11	5.358	12.717	11.778	12.511	9.404	9.500	9.763	9.763	9.404	9.500	11.552	9.183	11.656	10.714	11.656	11.552	11.552	1519	1803	2068	2373			
	73.20	0.672	17.07	5.638	13.268	11.876	13.667	9.250	9.330	9.304	9.304	9.250	9.330	12.367	7.105	12.445	8.337	12.445	12.367	12.367	1702	2021	2340	2660			
11.34 288.45	54.00	0.435	11.05	5.043	12.087	12.540	9.812	10.724	10.625	10.963	10.963	10.724	10.625	12.430	8.066	12.518	9.462	12.518	12.430	12.430	1644	1903	2163	2466			
	60.00	0.489	12.42	5.280	12.560	12.623	11.124	10.616	10.625	10.865	10.865	10.616	10.625	12.491	9.042	12.587	10.570	12.587	12.491	12.491	1788	2070	2352				
	65.00	0.534	13.56	5.280	12.560	12.701	12.361	10.526	10.625	10.807	10.807	10.526	10.625	12.544	9.875	12.648	11.537	12.648	12.544	12.544	1940	2246	2553				
	71.00	0.582	14.78	5.280	12.560	12.770	13.486	10.430	10.625	10.881	10.881	10.430	10.625	12.632	9.904	12.731	10.966	12.731	12.632	12.632	1955	2252	2446				
11.78 307.63	67.80	0.550	13.97	5.398	12.796	12.847	12.630	10.619	10.625	10.933	10.933	10.619	10.625	12.668	9.600	12.770	11.606	12.770	12.668	12.668	1652	1962	2271	2581			
	71.80	0.582	14.78	5.319	12.638	12.894	13.606	10.555	10.625	10.825	10.825	10.555	10.625	13.977	7.793	14.056	9.184	14.056	13.977	13.977	1399	1661	1924	2186			
13.38 339.73	61.00	0.430	10.92	5.280	12.560	14.150	10.868	12.359	12.250	12.709	12.709	12.359	12.250	14.032	8.761	14.121	10.335	14.121	14.032	14.032	1556	1847	2139	2431			
	72.00	0.514	13.06	5.555	13.111	14.225	12.187	12.259	12.250	12.558	12.558	12.187	12.250	14.081	9.544	14.174	11.277	14.174	14.081	14.081	1661	1973	2284	2586			
	77.00	0.550	13.97	5.909	13.819	14.319	13.891	12.119	12.250	12.502	12.502	12.119	12.250	14.101	9.980	14.199	11.741	14.199	14.101	14.101	1773	2105	2438	2770			
13.58 346.08	88.20	0.625	15.88	6.425	14.843	14.699	16.531	12.188	12.250	12.444	12.444	12.188	12.250	14.441	11.807	14.571	14.177	14.571	14.441	14.441	2042	2425	2808	3191			
14 355.60	82.50	0.582	14.28	5.876	13.741	15.022	15.983	12.689	12.750	13.100	13.100	12.689	12.750	14.796	11.720	14.908	13.821	14.908	14.796	14.796	1858	2254	2610	2966			
	86.00	0.600	15.24	5.876	13.741	15.095	17.346	12.613	12.750	13.031	13.031	12.613	12.750	14.855	12.880	14.975	15.076	14.975	14.855	14.855	2021	2400	2778	3157			
	93.00	0.650	16.51	7.095	16.182	15.097	17.384	12.513	12.850	12.941	12.941	12.513	12.850	14.837	12.512	14.967	14.947	14.837	14.837	14.837	2181	2590	2999	3408			
	96.90	0.670	17.02	7.095	16.182	15.134	18.105	12.473	12.903	12.903	12.903	12.473	12.903	14.807	13.054	15.000	15.588	15.000	14.807	14.807	2245	2666	3086	3507			
	100.00	0.700	17.78	7.095	16.182	15.189	19.153	12.413	12.850	12.850	12.850	12.413	12.850	14.912	13.896	15.052	16.531	15.052	14.912	14.912	2340	2779	3217	3656			
	106.00	0.750	19.05	7.095	16.182	15.282	20.915	12.313	12.671	12.671	12.671	12.313	12.671	14.989	15.342	15.136	18.143	15.136	14.989	14.989	2488	2966	3434	3903			
	114.00	0.800	20.32	7.095	16.182	15.373	22.667	12.213	12.250	12.250	12.250	12.213	12.250	15.062	16.720	15.219	19.426	15.219	15.062	15.062	2654	3152	3649	4147			
	115.00	0.812	20.62	7.095	16.182	15.394	23.092	12.189	12.250	12.250	12.250	12.189	12.250	15.079	17.061	15.239	20.090	15.239	15.079	15.079	2691	3196	3701	4205			
	116.00	0.820	20.83	7.095	16.182	15.410	23.383	12.173	12.250	12.250	12.250	12.173	12.250	15.091	17.289	15.250	20.320	15.250	15.091	15.091	2716	3226	3735	4244			

* VAM® 21 HT

Some designs may need oversized pipes to achieve special drift

For products manufactured before 01/04/2016 with nominal OD $\geq 7"$, couplings are 25mm shorter than the value published in this table.

VAM® 21 TORQUE VALUES (FIELD END ONLY)

Size (OD) in mm	Nominal weight lb/ft	Wall thickness in mm	VAM® 21 Make-up Torque 80-85-90 ksi ft.lb N.m			VAM® 21 Make-up Torque 95-100-105 ksi ft.lb N.m			VAM® 21 Make-up Torque 110-115-120 ksi ft.lb N.m			VAM® 21 Make-up Torque 125-130-135 ksi ft.lb N.m		
			Min.	Opti.	Max.	Min.	Opti.	Max.	Min.	Opti.	Max.	Min.	Opti.	Max.
3 1/2 88.90	9.20	0.254	3.400	3.650	3.900	3.525	3.800	4.075	3.700	4.000	4.300	3.700	4.000	4.300
			4.600	4.950	5.300	4.750	5.150	5.550	5.000	5.450	5.850	5.000	5.450	5.850
10.20	0.289	0.375	4.000	4.350	4.675	4.000	4.350	4.675	4.225	4.575	4.900	4.225	4.575	4.900
			5.400	5.900	6.350	5.400	5.900	6.350	5.700	6.200	6.650	5.700	6.200	6.650
12.70	0.375	0.53	5.100	5.500	5.900	5.100	5.500	5.900	5.200	5.650	6.075	5.200	5.650	6.075
			6.900	7.450	8.000	6.900	7.450	8.000	7.050	7.650	8.250	7.050	7.650	8.250
4 1/2 114.30	11.60	0.250	4.625	5.000	5.375	4.625	5.000	5.375	4.700	5.100	5.475	4.700	5.100	5.475
			6.250	6.800	7.300	6.250	6.800	7.300	6.350	6.900	7.450	6.350	6.900	7.450
12.60	0.271	0.375	4.700	5.100	5.475	5.100	5.500	5.900	5.325	5.750	6.175	5.325	5.750	6.175
			6.350	6.900	7.450	6.900	7.450	8.000	7.200	7.800	8.400	7.200	7.800	8.400
13.50	0.290	0.375	5.200	5.600	6.000	5.250	5.675	6.000	5.925	6.350	6.775	5.925	6.350	6.775
			7.050	7.600	8.150	7.750	8.350	8.950	8.000	8.600	9.200	8.000	8.600	9.200
15.10	0.337	0.375	6.025	6.525	7.000	7.325	7.900	8.475	7.725	8.300	8.875	7.725	8.300	8.875
			8.150	8.850	9.500	9.900	10.700	11.500	10.450	11.250	12.050	10.450	11.250	12.050
16.60	0.371	0.420	6.200	6.700	7.175	7.325	7.900	8.475	7.725	8.300	8.875	7.725	8.300	8.875
			8.400	9.100	9.750	9.900	10.700	11.500	10.450	11.250	12.050	10.450	11.250	12.050
17.00	0.380	0.420	6.200	6.700	7.175	7.325	7.900	8.475	7.725	8.300	8.875	7.725	8.300	8.875
			8.400	9.100	9.750	9.900	10.700	11.500	10.450	11.250	12.050	10.450	11.250	12.050
17.70	0.402	0.420	6.900	7.450	8.000	7.600	8.200	8.800	7.725	8.350	8.975	7.725	8.350	8.975
			9.350	10.100	10.850	10.300	11.150	11.950	10.450	11.350	12.200	10.450	11.350	12.200
18.90	0.430	0.420	7.500	8.100	8.700	7.600	8.200	8.800	7.725	8.350	8.975	7.725	8.350	8.975
			10.150	11.000	11.800	10.300	11.150	11.950	10.450	11.350	12.200	10.450	11.350	12.200
21.50	0.50	0.420	8.900	9.600	10.275	8.900	9.600	10.275	9.000	9.750	10.500	9.000	9.750	10.500
			12.050	13.000	13.950	12.050	13.000	14.250	12.200	13.250	14.250	12.200	13.250	14.250

Milli-end torque values may differ from field end. Milli end torque values are available in the VAM® TSLI or through Mr. Help.
For data not displayed or for grades higher than 135 ksi contact Mr. Help.

VAM® 21 TORQUE VALUES (FIELD END ONLY)

Size (OD)	Nominal weight	Wall thickness	VAM® 21 Max. Torque with Sealability (MTS) ft.lb N.m						
			80-85-90 ksi	95-100-105 ksi	110-115-120 ksi	125 ksi	80-85-90 ksi CRA	110-115-120 ksi CRA	125ksi CRA
in mm	lb/ft	in mm	ksi	ksi	ksi	ksi	ksi CRA	ksi CRA	ksi CRA
3 1/2 88.90	9.20	0.254	3 900	4 475	5 000	5 475	3 900	4 475	4 900
		6.45	5 300	6 100	6 800	7 450	5 300	6 100	6 650
	10.20	0.289	4 675	5 300	5 775	6 400	4 675	5 200	5 600
4 1/2 114.30		7.34	6 350	7 200	7 850	8 700	6 350	7 050	7 600
	12.70	0.375	6 175	6 775	7 400	8 000	6 175	6 600	7 100
		9.53	8 400	9 200	10 050	10 850	8 400	8 950	9 650
4 1/2 114.30	11.60	0.250	5 375	6 300	7 300	8 175	5 375	6 400	7 175
		6.35	7 300	8 550	9 900	11 100	7 300	8 700	9 750
	12.60	0.271	5 475	6 475	7 400	8 400	5 475	6 600	7 400
4 1/2 114.30		6.88	7 450	8 800	10 050	11 400	7 450	8 950	10 050
	13.50	0.290	6 000	7 100	8 175	9 400	6 000	7 300	8 275
		7.37	8 150	9 650	11 100	12 750	8 150	9 900	11 250
4 1/2 114.30	15.10	0.337	7 000	8 475	10 100	11 800	7 000	9 100	10 500
		8.56	9 500	11 500	13 700	16 000	9 500	12 350	14 250
	16.60	0.371	7 175	8 475	9 800	11 200	7 175	8 875	9 975
4 1/2 114.30		9.42	9 750	11 500	13 300	15 200	9 750	12 050	13 550
	17.00	0.380	7 175	8 475	9 800	11 200	7 175	8 875	9 975
		9.65	9 750	11 500	13 300	15 200	9 750	12 050	13 550
4 1/2 114.30	17.70	0.402	8 000	9 400	10 800	12 200	8 000	9 675	10 800
		10.21	10 850	12 750	14 650	16 550	10 850	13 150	14 650
	18.90	0.430	8 800	10 200	11 675	13 200	8 800	10 375	11 600
4 1/2 114.30		10.922	11 950	13 850	15 850	17 900	11 950	14 100	15 750
	21.50	0.50	11 375	12 500	13 600	14 775	11 375	12 075	13 075
		12.70	15 450	16 950	18 450	20 050	15 450	16 400	17 750

For data not displayed or for grades higher than 135 ksi contact Mr. Help.

VAM® 21 TORQUE VALUES (FIELD END ONLY)

Size (OD)	Nominal weight	Wall thickness	VAM® 21			VAM® 21												
			lb/ft	in mm	Make-up Torque 80-85-90 ksi ft.lb N.m	Min.	Opti.	Max.										
5 127.00	15.00	0.296 7.52	5 500 7 400	5 950 8 100	6 400 8 700	8 750 11 800 10 300 13 900 11 400 15 400 13 900 18 800	7 850 10 600 9 450 12 800 11 600 16 700 15 050 20 400	9 450 13 800 11 100 15 100 12 300 17 900 15 050 20 400	10 150 13 900 16 200 13 200 17 900 16 150 21 900 8 400									
	18.00	0.362 9.19	7 400 11 800	8 100 12 800	8 700 13 800					10 150 11 900	10 600 13 200	11 400 14 800	11 900 16 200					
	21.40	0.437 11.10	11 800 13 900	12 800 15 100	13 800 16 200					15 100 13 200	16 700 12 300	17 900 15 400	18 200 13 400					
	23.20	0.478 12.14	13 900 15 400	15 100 16 700	16 200 17 900					13 200 12 300	15 400 16 700	17 900 15 400	18 200 13 400					
	24.10	0.500 12.70	15 400 18 800	16 700 20 400	17 900 21 900					12 300 8 400	16 150 8 400	15 050 7 850	16 150 8 400					
	5.528 140.41	17.00	0.304 7.72	7 250 9 800	7 850 10 600					8 400 11 400	9 450 12 800 11 600 15 700 13 300 18 000 16 300 21 100	10 600 13 800 12 500 17 000 15 400 19 500 16 300 22 100	11 400 14 800 13 400 18 200 15 400 20 900 16 300 22 100	12 500 16 300 14 550 19 300 16 600 21 100 13 400 18 200				
		20.00	0.361 9.17	9 800 12 800	10 600 13 800					11 400 14 800					11 400 13 200	10 900 14 800	10 900 14 800	10 900 14 800
		23.00	0.415 10.54	12 800 15 700	13 800 17 000					14 800 18 200					13 400 12 500	15 400 17 000	16 300 18 200	16 300 18 200
		26.00	0.476 12.090	15 700 18 090	17 000 19 500					18 200 20 900					12 500 19 500	17 000 20 900	17 000 20 900	17 000 20 900
		26.80	0.50 12.70	17 000 19 000	18 000 20 600					19 500 22 100					15 200 22 100	16 300 22 100	16 300 22 100	16 300 22 100
28.40		0.530 13.46	19 000 16 600	20 600 18 000	22 100 19 300	14 200 18 000	14 200 18 000	14 200 18 000	14 200 18 000									
29.70		0.562 14.28	19 300 18 100	21 100 19 600	21 100 21 100	15 550 13 400	15 550 13 400	15 550 13 400	15 550 13 400									
23.00		0.415 10.54	11 600 15 700	12 500 17 000	13 400 18 200	13 400 18 200	13 400 18 200	13 400 18 200	13 400 18 200									
26.00		0.476 12.09	13 300 18 000	14 350 19 500	15 400 20 900	15 400 19 500	15 400 19 500	15 400 19 500	15 400 19 500									

Mill-end torque values may differ from field end. Mill end torque values are available in the VAM® TSLI or through Mr. Help.

For data not displayed or for grades higher than 135 ksi contact Mr. Help.

VAM® 21 TORQUE VALUES (FIELD END ONLY)

Size (OD)	Nominal weight	Wall thickness	VAM® 21 Max. Torque with Sealability (MTS)						
			ft.lb	N/m	125-130-135 ksi	80-85-90 ksi CRA	110-115-120 ksi CRA	125-130-135 ksi CRA	110-115-120 ksi CRA
in mm	lb/ft	in mm	80-85-90 ksi	95-100-105 ksi	110-115-120 ksi	125-130-135 ksi	80-85-90 ksi CRA	110-115-120 ksi CRA	125-130-135 ksi CRA
5 127.00	15.00	0.296	8 450						
			11 500						
	18.00	0.362	10 150	10 300	11 800	13 250	10 150	10 150	10 950
			13 800	14 000	16 000	18 000	13 800	13 800	14 900
	21.40	0.437	11 900	12 600	14 450	16 350	11 900	11 900	13 600
			16 200	17 100	19 600	22 200	16 200	16 400	18 500
	23.20	0.478	13 200	13 700	15 700	17 750	13 200	13 200	14 750
			17 900	18 600	21 300	24 100	17 900	17 900	20 000
	24.10	0.500	16 150	16 150	16 350	18 500	16 150	16 150	16 150
			21 950	21 950	22 200	25 100	21 950	21 950	21 950
5 1/2 139.70	17.00	0.304	8 400	8 750	10 000	11 350	8 400	8 400	9 400
			11 400	11 900	13 600	15 400	11 400	11 400	12 800
	20.00	0.361	10 900	11 650	13 350	15 000	10 900	10 900	12 450
			14 800	15 800	18 100	20 400	14 800	15 100	16 900
	23.00	0.415	13 400	14 500	16 650	18 800	13 400	13 400	15 600
			18 200	19 700	22 600	25 500	18 200	18 800	21 200
	26.00	0.476	15 400	15 700	17 950	20 350	15 400	15 400	17 000
			20 900	21 300	24 400	27 600	20 900	20 900	23 100
	26.80	0.50	16 300	16 400	18 850	21 300	16 300	16 300	17 800
			22 100	22 300	25 600	28 900	22 100	22 100	24 200
28.40	28.40	0.530	14 650	16 150	18 550	20 900	14 650	15 450	17 400
			19 900	21 950	25 150	28 400	19 900	21 000	23 600
	29.70	0.562	16 150	17 800	20 400	23 050	16 150	17 000	19 150
			21 900	24 200	27 700	31 300	21 900	23 100	26 000
5.528 140.41	23.00	0.415	13 400	14 500	16 650	18 800	13 400	13 850	15 600
			18 200	19 700	22 600	25 500	18 200	18 800	21 200
	26.00	0.476	15 400	15 700	17 950	20 350	15 400	15 400	17 000
			20 900	21 300	24 400	27 600	20 900	20 900	23 100

For data not displayed or for grades higher than 135 ksi contact Mr. Help.

VAM® 21 TORQUE VALUES (FIELD END ONLY)

Size (OD) in mm	Nominal weight lb/ft	Wall thickness in mm	VAM® 21 Make-up Torque 80-85-90 ksi ft.lb N.m			VAM® 21 Make-up Torque 95-135 ksi ft.lb N.m		
			Min.	Opti.	Max.	Min.	Opti.	Max.
6 152.40	18.60	0.304 7.72	7 850	8 500	9 100	7 850	8 500	9 100
			10 600	11 500	12 400	10 600	11 500	12 400
			16 900	18 300	19 650	16 900	18 300	19 650
6 5/8 168.28	23.20	0.330 8.38	9 300	10 050	10 800	9 300	10 050	10 800
			12 600	13 700	14 700	12 600	13 700	14 700
			10 300	11 100	11 850	10 300	11 100	11 850
24.00	8.94	0.352	13 900	15 000	16 100	13 900	15 000	16 100
			14 350	15 450	16 550	14 350	15 450	16 550
			19 400	21 000	22 500	19 400	21 000	22 500
28.00	0.417	0.475	18 100	19 550	21 000	18 100	19 550	21 000
			24 500	26 500	28 500	24 500	26 500	28 500
			19 550	21 100	22 600	19 550	21 100	22 600
34.50	0.525	13.34	26 500	28 600	30 700	26 500	28 600	30 700
			21 200	22 900	24 550	21 200	22 900	24 550
			28 700	31 000	33 300	28 700	31 000	33 300
36.70	0.562	14.27	28 700	31 000	33 300	28 700	31 000	33 300

Mill-end torque values may differ from field end. Mill end torque values are available in the VAM® TSLI or through Mr. Help.
For data not displayed or for grades higher than 135 ksi contact Mr. Help.

VAM® 21 TORQUE VALUES (FIELD END ONLY)

Size (OD)	Nominal weight	Wall thickness	VAM® 21 Max. Torque with Sealability (MTS)						
			80-85-90 ksi	95-100-105 ksi	110-115-120 ksi	125-130-135 ksi	80-85-90 ksi CRA	110-115-120 ksi CRA	125-130-135 ksi CRA
in mm	lb/ft	in mm	80-85-90 ksi	95-100-105 ksi	110-115-120 ksi	125-130-135 ksi	80-85-90 ksi CRA	110-115-120 ksi CRA	125-130-135 ksi CRA
6 152.40	18.60	0.304	9 100	9 550	10 950	12 450	9 100	9 250	10 400
		7.72	12 400	13 000	14 900	16 900	12 400	12 600	14 100
	30.90	0.519	19 650	21 300	24 450	27 700	19 650	20 500	23 050
		13.18	26 700	28 900	33 200	37 600	26 700	27 800	31 300
6.5/8 168.28	23.20	0.330	10 800	11 200	12 750	14 450	10 800	10 800	12 150
		8.38	14 700	15 200	17 300	19 600	14 700	14 700	16 500
	24.00	0.352	11 900	12 300	14 050	15 850	11 900	11 900	13 400
		8.94	16 200	16 700	19 100	21 500	16 200	16 200	18 200
	28.00	0.417	16 700	18 550	21 300	24 100	16 700	17 950	20 200
		10.59	22 700	25 200	28 900	32 700	22 700	24 400	27 400
	32.00	0.475	21 950	24 400	28 000	31 700	21 950	23 600	26 550
		12.07	29 800	33 100	38 000	43 000	29 800	32 000	36 000
	34.50	0.525	22 600	25 050	28 900	32 700	22 600	24 100	27 200
		13.34	30 700	34 000	39 200	44 400	30 700	32 700	36 900
	36.70	0.562	24 550	27 250	31 400	35 600	30 700	32 700	36 900
		14.27	33 300	37 000	42 600	48 300	30 700	32 700	36 900

For data not displayed or for grades higher than 135 ksi contact Mr. Help.

VAM® 21 TORQUE VALUES (FIELD END ONLY)

Size (OD)	Nominal weight	Wall thickness	VAM® 21			VAM® 21					
			Make-up	Min.	Opti.	Max.	Make-up	Min.	Opti.	Max.	
in	lb/ft	in	ft.lb	N.m	ft.lb	N.m	ft.lb	N.m	ft.lb	N.m	
7 177.80	23.00	0.317	10 000	10 750	11 500	10 000	10 750	11 500	10 000	10 750	11 500
	26.00	8.05	13 500	14 600	15 600	13 500	14 600	15 600	13 500	14 600	15 600
		0.362	11 100	12 000	12 900	11 100	12 000	12 900	11 100	12 000	12 900
	29.00	9.19	15 000	16 300	17 500	15 000	16 300	17 500	15 000	16 300	17 500
		0.408	13 150	14 200	15 250	13 150	14 200	15 250	13 150	14 200	15 250
	32.00	10.36	17 800	19 300	20 700	17 800	19 300	20 700	17 800	19 300	20 700
		0.453	16 600	17 950	19 300	16 600	17 950	19 300	16 600	17 950	19 300
	35.00	11.51	22 500	24 400	26 200	22 500	24 400	26 200	22 500	24 400	26 200
		0.498	20 400	22 000	23 600	20 400	22 000	23 600	20 400	22 000	23 600
	38.00	12.65	27 600	29 800	32 000	27 600	29 800	32 000	27 600	29 800	32 000
0.540		22 450	24 250	26 000	22 450	24 250	26 000	22 450	24 250	26 000	
41.00	13.72	30 400	32 900	35 300	30 400	32 900	35 300	30 400	32 900	35 300	
	0.590	24 600	26 550	28 500	24 600	26 550	28 500	24 600	26 550	28 500	
42.70	14.99	33 300	36 000	38 700	33 300	36 000	38 700	33 300	36 000	38 700	
	0.625	26 050	28 150	30 200	26 050	28 150	30 200	26 050	28 150	30 200	
49.00	15.88	35 300	38 200	41 000	35 300	38 200	41 000	35 300	38 200	41 000	
	0.408	13 150	14 200	15 250	13 150	14 200	15 250	13 150	14 200	15 250	
7.035 176.69	10.36	17 800	19 300	20 700	17 800	19 300	20 700	17 800	19 300	20 700	
	0.540	22 450	24 250	26 000	22 450	24 250	26 000	22 450	24 250	26 000	
7.518 193.68	13.72	30 400	32 900	35 300	30 400	32 900	35 300	30 400	32 900	35 300	
	0.375	12 800	13 800	14 800	12 800	13 800	14 800	12 800	13 800	14 800	
33.70	9.53	17 300	18 700	20 100	17 300	18 700	20 100	17 300	18 700	20 100	
	0.430	16 450	17 800	19 150	16 450	17 800	19 150	16 450	17 800	19 150	
35.80	10.92	22 300	24 200	26 000	22 300	24 200	26 000	22 300	24 200	26 000	
	0.465	18 850	20 350	21 800	18 850	20 350	21 800	18 850	20 350	21 800	
38.00	11.81	25 500	27 600	29 600	25 500	27 600	29 600	25 500	27 600	29 600	
	0.500	22 100	23 850	25 550	22 100	23 850	25 550	22 100	23 850	25 550	
47.10	12.70	29 900	32 300	34 700	29 900	32 300	34 700	29 900	32 300	34 700	
	0.625	30 100	32 550	35 000	30 100	32 550	35 000	30 100	32 550	35 000	
	15.88	40 800	44 200	47 500	40 800	44 200	47 500	40 800	44 200	47 500	

Mill-end torque values may differ from field end. Mill end torque values are available in the VAM® TSLI or through Mr. Help.
For data not displayed or for grades higher than 135 ksi contact Mr. Help.

VAM® 21 TORQUE VALUES (FIELD END ONLY)

Size (OD)		Nominal weight	Wall thickness	VAM® 21 Max. Torque with Sealability (MTS) ft.lb N.m						
in	mm	lb/ft	in	80-85-90 ksl	95-100-105 ksl	110-115- 120 ksl	125-130- 135 ksl	80-85-90 ksl CRA	110-115- 120 ksl CRA	125-130- 135 ksl CRA
7	177.80	23.00	0.317	11 500	12 300	14 150	16 000	11 500	11 650	13 200
			8.05	15 600	16 700	19 200	21 700	15 600	15 800	17 900
		26.00	0.362	12 900	12 950	14 800	16 700	12 900	12 900	13 850
			9.19	17 500	17 600	20 100	22 700	17 500	17 500	18 800
		29.00	0.408	15 250	15 550	17 750	20 050	15 250	15 250	16 550
			10.36	20 700	21 100	24 100	27 200	20 700	20 700	22 500
		32.00	0.453	19 300	21 200	24 300	27 650	19 300	20 100	22 700
			11.51	26 200	28 800	33 000	37 500	26 200	27 300	30 800
		35.00	0.498	23 650	27 250	31 300	35 550	23 650	25 850	29 200
			12.65	32 100	37 000	42 500	48 200	32 100	35 100	39 600
		38.00	0.540	26 100	29 050	33 450	38 050	26 100	27 500	31 100
			13.72	35 400	39 400	45 400	51 600	35 400	37 300	42 200
		41.00	0.590	28 500	31 550	36 350	41 300	28 500	29 900	33 850
			14.99	38 700	42 800	49 300	56 000	38 700	40 600	45 900
		42.70	0.625	30 200	33 400	38 400	43 550	30 200	31 600	35 750
			15.88	41 000	45 300	52 100	59 100	41 000	42 900	48 500
7.035	178.69	29.00	0.408	15 250	15 550	17 750	20 050	15 250	15 250	16 550
			10.36	20 700	21 100	24 100	27 200	20 700	20 700	22 500
		38.00	0.540	26 100	29 050	33 450	38 050	26 100	27 500	31 100
			13.72	35 400	39 400	45 400	51 600	35 400	37 300	42 200
7.518	193.68	29.70	0.375	14 800	15 900	18 100	20 500	14 800	15 150	17 000
			9.53	20 100	21 600	24 600	27 800	20 100	20 600	23 100
		33.70	0.430	19 500	21 500	24 700	27 850	19 500	20 550	23 150
			10.92	26 500	29 200	33 500	37 800	26 500	27 900	31 400
		35.80	0.465	22 700	25 050	28 750	32 450	22 700	23 850	26 900
			11.81	30 800	34 000	39 000	44 000	30 800	32 400	36 500
		39.00	0.500	27 250	30 200	34 650	39 200	27 250	28 800	32 450
			12.70	37 000	41 000	47 000	53 200	37 000	39 100	44 000
		47.10	0.625	37 800	42 100	48 450	54 850	37 800	39 900	45 050
			15.88	51 300	57 100	65 700	74 400	51 300	54 100	61 100

For data not displayed or for grades higher than 135 ksl contact Mr. Hep.

VAM® 21 TORQUE VALUES (FIELD END ONLY)

Size (OD)	Nominal weight	Wall thickness	VAM® 21			VAM® 21		
			lb/ft	in mm	Make-up Torque 80-85-90 ksi ft.lb N.m	Min.	Opti.	Max.
8 5/8 219,08	40.00	0.450	18 400	19 850	21 300	18 400	19 850	21 300
		11.43	24 900	26 900	28 900	24 900	26 900	28 900
	44.00	0.500	24 350	26 350	28 300	24 350	26 350	28 300
		12.70	33 000	35 700	38 400	33 000	35 700	38 400
	49.00	0.557	25 600	27 650	29 700	25 600	27 650	29 700
52.00		14.15	34 700	37 500	40 300	34 700	37 500	40 300
	52.00	0.595	28 850	31 150	33 450	28 850	31 150	33 450
		15.11	39 100	42 300	45 400	39 100	42 300	45 400
	40.00	0.395	21 050	23 350	25 650	21 050	23 350	25 650
		10.03	28 500	31 700	34 800	28 500	31 700	34 800
43.50	43.50	0.435	24 800	27 350	29 850	24 800	27 350	29 850
		11.05	33 600	37 100	40 500	33 600	37 100	40 500
	47.00	0.472	28 400	31 550	34 650	28 400	31 550	34 650
		11.99	38 500	42 800	47 000	38 500	42 800	47 000
	53.50	0.545	38 300	42 550	46 800	38 300	42 550	46 800
58.40		13.84	51 900	57 700	63 500	51 900	57 700	63 500
	58.40	0.595	39 350	43 700	48 050	39 350	43 700	48 050
		15.11	53 300	59 300	65 200	53 300	59 300	65 200

Mill-end torque values may differ from field end. Mill end torque values are available in the VAM® TSLI or through Mr. Help.

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VAM® 21 TORQUE VALUES (FIELD END ONLY)

Size (OD)	Nominal weight	Wall thickness	VAM® 21 Max. Torque with Sealability (MTS)									
			80-85-90 ksi	95-100-105 ksi	110-115-120 ksi	125-130-135 ksi	80-85-90 ksi CRA	110-115-120 ksi CRA	125-130-135 ksi CRA			
in mm	lb/ft	in mm	ft.lb	N.m	ft.lb	N.m	ft.lb	N.m	ft.lb	N.m	ft.lb	N.m
8 5/8 219.08	40.00	0.450	23 950	26 450	30 300	34 200	25 250	28 450	23 950	25 250	28 450	32 500
		11.43	32 500	35 900	41 100	46 400	34 300	38 600	32 500	34 300	38 600	43 200
	44.00	0.500	30 150	33 400	38 250	43 200	30 150	35 800	30 150	31 850	35 800	40 900
		12.70	40 900	45 300	51 900	58 600	40 900	48 600	40 900	43 200	48 600	51 900
	49.00	0.557	31 850	35 150	40 250	45 500	40 250	45 500	40 250	43 200	48 600	51 900
9 5/8 244.48	52.00	0.595	43 200	47 700	54 600	61 700	46 650	52 800	46 650	52 800	61 700	71 600
		15.11	50 000	55 300	63 300	71 600	63 300	71 600	63 300	71 600	81 600	91 600
	40.00	0.395	26 300	27 350	29 250	31 100	26 300	25 650	26 300	25 650	25 850	26 300
		10.03	35 700	37 100	39 700	42 200	35 700	34 800	35 700	34 800	35 100	35 700
	43.50	0.435	29 850	30 800	32 800	34 650	29 850	29 850	29 850	29 850	29 850	29 850
9 5/8 244.48	47.00	0.472	40 500	41 800	44 500	47 000	40 500	40 500	40 500	40 500	40 500	40 500
		11.99	47 000	48 800	52 200	55 400	47 000	47 000	47 000	47 000	47 000	47 000
	53.50	0.545	51 400	53 600	57 500	61 100	51 400	50 700	51 400	47 750	50 700	51 400
		13.84	69 700	72 700	78 000	82 900	69 700	68 800	69 700	64 800	68 800	69 700
	58.40	0.595	56 050	56 050	56 050	56 050	56 050	56 050	56 050	56 050	56 050	56 050
	15.11	76 000	76 000	76 000	76 000	76 000	76 000	76 000	76 000	76 000	76 000	

For data not displayed or for grades higher than 135 ksi contact Mr. Help.

VAM® 21 TORQUE VALUES (FIELD END ONLY)

Size (OD) in mm	Nominal weight lb/ft	Wall thickness in mm	VAM® 21 Make-up Torque 80-85-90 ksi ft.lb N.m			VAM® 21 Make-up Torque 95-135 ksi ft.lb N.m		
			Min.	Opti.	Max.	Min.	Opti.	Max.
9 7/8 250.83	62.80	0.625	40 350	44 900	49 400	40 350	44 900	49 400
		15.88	54 700	60 900	67 000	54 700	60 900	67 000
	65.30	0.650	41 350	45 950	50 550	41 350	45 950	50 550
		16.51	56 000	62 300	68 600	56 000	62 300	68 600
	66.40	0.661	41 750	46 450	51 100	41 750	46 450	51 100
9.900 251.46		16.79	56 600	63 000	69 300	56 600	63 000	69 300
	66.90	0.668	42 050	46 750	51 400	42 050	46 750	51 400
		16.97	57 000	63 400	69 700	57 000	63 400	69 700
	68.90	0.700	42 500	47 200	51 900	42 500	47 200	51 900
		17.78	57 600	64 000	70 400	57 600	64 000	70 400
9.924 252.07	66.40	0.661	41 750	46 450	51 100	41 750	46 450	51 100
		16.79	56 600	63 000	69 300	56 600	63 000	69 300
	66.90	0.668	42 050	46 750	51 400	42 050	46 750	51 400
		16.97	57 000	63 400	69 700	57 000	63 400	69 700
	68.90	0.700	42 500	47 200	51 900	42 500	47 200	51 900
9.974 253.34		17.78	57 600	64 000	70 400	57 600	64 000	70 400

Mill-end torque values may differ from field end. Mill end torque values are available in the VAM® TSLI or through Mr. Help.

For data not displayed or for grades higher than 135 ksi contact Mr. Help.

VAM® 21 TORQUE VALUES (FIELD END ONLY)

Size (OD)	Nominal weight	Wall thickness	VAM® 21 Max. Torque with Sealability (MTS)					
			80-85-90 ksi	95-100-105 ksi	110-115- 120 ksi	125-130- 135 ksi	80-85-90 ksi CRA	110-115- 120 ksi CRA	125-130- 135 ksi CRA
in mm	lb/ft	in mm	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m
9 7/8 250.83	62.80	0.625	57 450	57 450	57 450	57 450	57 450	57 450
	65.30	15.88	77 900	77 900	77 900	77 900	77 900	77 900
		16.51	57 500	57 500	57 500	57 500	57 500	57 500
66.40	66.40	0.661	57 500	57 500	57 500	57 500	57 500	57 500
		16.79	78 000	78 000	78 000	78 000	78 000	78 000
	66.90	0.668	57 500	57 500	57 500	57 500	57 500	57 500
68.90	68.90	0.700	57 500	57 500	57 500	57 500	57 500	57 500
		17.78	78 000	78 000	78 000	78 000	78 000	78 000
	66.40	0.661	57 500	57 500	57 500	57 500	57 500	57 500
251.46	16.79	78 000	78 000	78 000	78 000	78 000	78 000	
9.924	66.90	0.668	57 500	57 500	57 500	57 500	57 500	57 500
		16.97	78 000	78 000	78 000	78 000	78 000	78 000
9.974	68.90	0.700	57 500	57 500	57 500	57 500	57 500	57 500
		17.78	78 000	78 000	78 000	78 000	78 000	78 000

For data not displayed or for grades higher than 135 ksi contact Mr. Help.

VAM® 21 TORQUE VALUES (FIELD END ONLY)

Size (OD) in mm	Nominal weight lb/ft	Wall thickness in mm	VAM® 21 Make-up Torque 80-85-90 ksi ft.lb N.m			VAM® 21 Make-up Torque 95-135 ksi ft.lb N.m		
			Min.	Opti.	Max.	Min.	Opti.	Max.
10 3/4 273.05	45.50	0.400	23 650	26 250	28 800	23 650	26 250	28 800
		10.16	32 000	35 600	39 100	32 000	35 600	39 100
	51.00	0.450	28 000	31 050	34 100	28 000	31 050	34 100
		11.43	37 900	42 100	46 300	37 900	42 100	46 300
	55.50	0.495	35 650	39 650	43 650	35 650	39 650	43 650
		12.57	48 300	53 800	59 200	48 300	53 800	59 200
	60.70	0.545	38 650	42 950	47 250	38 650	42 950	47 250
		13.84	52 400	58 300	64 100	52 400	58 300	64 100
	65.70	0.595	39 500	43 850	48 200	39 500	43 850	48 200
		15.11	53 500	59 500	65 400	53 500	59 500	65 400
11 3/4 298.45	73.20	0.672	43 300	48 150	52 950	43 300	48 150	52 950
		17.07	58 700	65 300	71 800	58 700	65 300	71 800
	54.00	0.435	31 450	34 950	38 400	31 450	34 950	38 400
		11.05	42 600	47 400	52 100	42 600	47 400	52 100
	60.00	0.489	36 600	40 700	44 750	36 600	40 700	44 750
		12.42	49 600	55 200	60 700	49 600	55 200	60 700
	65.00	0.534	38 750	43 050	47 350	38 750	43 050	47 350
		13.56	52 500	58 400	64 200	52 500	58 400	64 200
	71.00	0.582	39 100	43 500	47 850	39 100	43 500	47 850
		14.78	53 000	59 000	64 900	53 000	59 000	64 900
11 7/8 301.63	67.80	0.550	40 150	44 650	49 100	40 150	44 650	49 100
		13.97	54 400	60 500	66 600	54 400	60 500	66 600
	71.80	0.582	40 500	45 050	49 550	40 500	45 050	49 550
	14.78	54 900	61 100	67 200	54 900	61 100	67 200	

Mill-end torque values may differ from field end. Mill end torque values are available in the VAM® TSLI or through Mr. Help.

For data not displayed or for grades higher than 135 ksi contact Mr. Help.

VAM® 21 TORQUE VALUES (FIELD END ONLY)

Size (OD)	Nominal weight	Wall thickness	VAM® 21 Max. Torque with Sealability (MTS)					
			80-85-90 ksi	95-100-105 ksi	110-115-120 ksi	125-130-135 ksi	80-85-90 ksi CRA	110-115-120 ksi CRA	125-130-135 ksi CRA
in mm	lb/ft	in mm	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m
10 3/4 273.05	45.50	0.400	29 350	29 350	40 500	41 400	29 350	29 350
		10.16	39 800	39 800	40 000	42 600	39 800	39 800
	51.00	0.450	34 100	34 100	34 100	35 600	34 100	34 700
		11.43	46 300	46 300	46 300	46 300	46 300	47 100
	55.50	0.495	44 750	44 750	45 650	48 800	44 750	47 550
		12.57	60 700	60 700	61 900	66 200	60 700	64 500
	60.70	0.545	55 300	56 750	57 950	62 800	55 300	58 000
11 7/8 301.63	65.70	0.595	57 500	60 750	63 100	64 300	57 500	59 200
		13.84	75 000	77 000	78 600	85 200	75 000	78 700
	73.20	0.672	75 800	82 400	85 600	87 200	78 000	80 300
		15.11	102 800	109 800	113 100	124 900	78 000	80 300
	54.00	0.435	42 000	42 000	42 000	44 100	42 000	42 000
		11.05	57 000	57 000	57 000	59 800	57 000	57 000
	60.00	0.489	48 800	48 800	49 600	52 650	48 800	48 800
11 7/8 301.63	65.00	0.534	55 900	59 700	63 100	67 750	48 800	48 800
		12.42	66 200	66 200	67 300	71 400	66 200	66 200
	71.00	0.582	62 450	65 600	66 950	72 100	66 200	66 200
		13.56	75 800	81 000	85 600	91 900	66 200	66 200
	67.80	0.550	59 300	63 850	68 550	74 300	66 200	66 200
		14.78	84 700	89 000	90 800	97 800	66 200	66 200
	71.80	0.582	63 650	66 850	68 400	75 350	66 200	66 200
	14.78	86 300	90 700	92 800	102 200	66 200	66 200	

For data not displayed or for grades higher than 135 ksi contact Mr. Help.

VAM® 21 TORQUE VALUES (FIELD END ONLY)

Size (OD)	Nominal weight	Wall thickness	VAM® 21			VAM® 21		
			lb/ft	in	Make-up Torque	ft.lb	Make-up Torque	ft.lb
in		in	Min.	Opti.	Max.	Min.	Opti.	Max.
mm		mm						
13 3/8 339.73	61.00	0.430	32 200	35 800	39 350	32 200	35 800	39 350
		10.92	43 600	48 500	53 400	43 600	48 500	53 400
		0.480	37 700	41 900	46 050	37 700	41 900	46 050
		12.19	51 100	56 800	62 500	51 100	56 800	62 500
72.00	0.514	0.514	39 400	43 800	48 150	39 400	43 800	48 150
		13.06	53 400	59 400	65 300	53 400	59 400	65 300
		0.550	39 550	43 950	48 300	39 550	43 950	48 300
		13.97	53 600	59 600	65 500	53 600	59 600	65 500
13 5/8 346.08	88.20	0.625	45 900	51 300	56 700	45 900	51 300	56 700
		15.88	62 200	69 600	76 900	62 200	69 600	76 900
14 355.60	82.50	0.562	32 700	36 350	40 000	32 700	36 350	40 000
		14.28	44 300	49 300	54 300	44 300	49 300	54 300
86.00	0.600	0.600	36 300	40 350	44 400	36 300	40 350	44 400
		15.24	49 200	54 700	60 200	49 200	54 700	60 200
93.00	0.650	0.650	40 900	45 400	49 900	40 900	45 400	49 900
		16.51	55 400	61 600	67 700	55 400	61 600	67 700
96.90	0.670	0.670	43 150	47 950	52 700	43 150	47 950	52 700
		17.02	58 500	65 000	71 500	58 500	65 000	71 500
100.00	0.700	0.700	46 550	51 700	56 850	46 550	51 700	56 850
		17.78	63 100	70 100	77 100	63 100	70 100	77 100
106.00	0.750	0.750	52 250	58 050	63 850	52 250	58 050	63 850
		19.05	70 800	78 700	86 600	70 800	78 700	86 600
114.00	0.800	0.800	57 700	64 100	70 500	57 700	64 100	70 500
		20.32	78 200	86 900	95 600	78 200	86 900	95 600
115.00	0.812	0.812	61 300	66 250	71 200	61 300	66 250	71 200
		20.62	83 100	89 900	96 600	83 100	89 900	96 600
116.00	0.820	0.820	62 150	67 150	72 100	62 150	67 150	72 100
		20.83	84 200	91 000	97 800	84 200	91 000	97 800

Mill-end torque values may differ from field end. Mill end torque values are available in the VAM® TSLI or through Mr. Help.
For data not displayed or for grades higher than 135 ksi contact Mr. Help.

VAM® 21 TORQUE VALUES (FIELD END ONLY)

Size (OD)	Nominal weight	Wall thickness	VAM® 21 Max. Torque with Sealability (MTS)									
			lb/ft	in	80-85-90 ksi	95-100-105 ksi	110-115- 120 ksi	125-130- 135 ksi	80-85-90 ksi CRA	110-115- 120 ksi CRA	125-130- 135 ksi CRA	
in	mm	mm										
13 3/8	61.00	0.430	43 550	43 550	59 100	59 100	43 550	43 550				
339.73		10.92	59 100	59 100	50 350	50 350	59 100	59 100				
	68.00	0.480	50 350	50 350	68 300	68 300	50 350	52 050				
		12.19	68 300	68 300	58 700	58 700	68 300	70 600				
	72.00	0.514	56 200	56 200	79 600	79 600	61 700	67 450				
		13.06	76 200	76 200	83 700	83 700	91 500	91 500				
	77.00	0.550	59 050	61 800	83 800	83 800	63 250	68 850				
		13.97	80 100	83 800	85 550	85 550	83 400	93 400				
13 5/8	88.20	0.625	85 550	85 550	116 000	116 000	85 550	85 550				
346.08		15.88	116 000	116 000	53 900	53 900	116 000	116 000				
14	82.50	0.562	52 550	53 900	74 700	74 700	55 050	60 150				
355.60		14.28	73 100	73 100	66 600	66 600	74 700	81 600				
	86.00	0.600	64 500	66 600	90 300	90 300	68 350	74 850				
		15.24	87 500	90 300	64 500	64 500	92 700	101 500				
	93.00	0.650	61 950	63 900	86 700	86 700	64 650	70 550				
		16.51	84 000	86 700	71 450	71 450	87 700	95 700				
	96.90	0.670	69 300	71 450	96 900	96 900	72 550	79 100				
		17.02	94 000	96 900	81 900	81 900	98 400	107 300				
	100.00	0.700	79 400	81 900	111 100	111 100	83 300	83 300				
		17.78	107 700	111 100	83 300	83 300	113 000	113 000				
	106.00	0.750	83 300	83 300	113 000	113 000	83 300	83 300				
		19.05	113 000	113 000	83 300	83 300	113 000	113 000				
	114.00	0.800	83 300	83 300	113 000	113 000	83 300	83 300				
		20.32	113 000	113 000	83 300	83 300	113 000	113 000				
	115.00	0.812	83 300	83 300	113 000	113 000	83 300	83 300				
		20.62	113 000	113 000	83 300	83 300	113 000	113 000				
	116.00	0.820	83 300	83 300	113 000	113 000	83 300	83 300				
		20.83	113 000	113 000	113 000	113 000	83 300	83 300				

For data not displayed or for grades higher than 135 ksi contact Mr. Hiepb.

VAM® 21 HT TORQUE VALUES (FIELD END ONLY)

Size (OD)	Nominal weight	Wall thickness	VAM® 21 HT Make-up Torque 80-85-90 ksi		VAM® 21 HT Make-up Torque 95-100-105 ksi		VAM® 21 HT Make-up Torque 110-115-120 ksi		VAM® 21 HT Make-up Torque 125 ksi	
			ft.lb	N.m	ft.lb	N.m	ft.lb	N.m	ft.lb	N.m
in	lb/ft	in	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
mm		mm								
4 1/2 114.30	12.60	0.271	5 100	5 475	5 500	5 900	5 750	6 175	5 750	6 175
			6 88	6 900	7 450	8 000	7 800	8 400	7 800	8 400
			13.50	5 600	6 000	6 175	6 600	6 350	6 775	6 350	6 775
5	15.10	0.337	7 37	7 600	8 150	8 350	8 600	8 950	8 600	9 200
			8.56	6 525	7 000	7 900	8 300	8 875	8 300	8 875
			18.00	8 650	9 500	10 700	11 500	11 250	12 050	11 250	12 050
5 1/2 139.70	17.00	0.362	9 450	10 150	9 450	10 150	8 400	8 400		
			9.19	12 800	13 800	12 800	13 800			
			21.40	11 100	11 900	11 100	11 900			
6	18.60	0.404	11 10	15 100	16 200	15 100	16 200			
			12.14	12 300	13 200	12 300	13 200			
			23.20	16 700	17 900	16 700	17 900			
6 1/2 165.10	20.00	0.437	7 850	8 400	7 850	8 400				
			7.72	10 600	11 400	10 600	11 400			
			23.00	10 200	10 900	10 200	10 900			
7	23.00	0.476	9 17	13 800	14 800	13 800	14 800			
			10.54	12 500	13 400	12 500	13 400			
			26.00	17 000	18 200	17 000	18 200			
7 1/2 190.50	26.80	0.500	14 350	15 400	14 350	15 400				
			12.09	19 500	20 900	19 500	20 900			
			28.80	20 600	22 100	20 600	22 100			
8	30.00	0.550	8 500	9 100	8 500	9 100				
			7.72	11 500	12 400	11 500	12 400			
			34.50	13 400	14 350	13 400	14 350			
8 1/2 214.30	34.50	0.600	10 16	18 200	19 500	18 200	19 500			
			10.16	13 800	14 750	13 800	14 750			
			38.00	18 700	20 000	18 700	20 000			

Mill-end torque values may differ from field end. Mill end torque values are available in the VAM® TSLI or through Mr. Help.

For data not displayed or for grades higher than 125 ksi contact Mr. Help.

VAM® 21 HT TORQUE VALUES (FIELD END ONLY)

Size (OD)	Nominal weight	Wall thickness	VAM® 21 HT Max. Torque with Sealability (MTS) ft.lb N.m						
			80-85-90 ksi	95-100-105 ksi	110-115-120 ksi	125 ksi	80-85-90 ksi CRA	110-115-120 ksi CRA	125ksi CRA
4 1/2 114.30	12.60	0.271	6 625	7 700	8 725	9 800	6 625	7 325	8 200
		6.88	9 000	10 450	11 850	13 300	9 000	9 950	11 150
	13.50	0.290	7 475	8 625	9 800	11 050	7 475	8 250	9 175
5	15.10	0.337	7 875	9 125	11 725	13 200	10 150	11 200	12 450
		8.56	10 700	12 400	15 900	17 900	10 700	13 300	14 900
	18.00	0.362	11 700	12 950	14 800	16 800	11 700	11 700	13 200
5 1/2 139.70	21.40	0.437	15 900	17 600	20 100	22 800	15 900	15 900	17 900
		11.10	18 100	24 700	28 300	32 000	18 100	22 300	25 100
	23.20	0.478	15 250	20 850	23 950	27 050	15 250	18 800	21 200
6	17.00	0.304	10 100	11 850	13 600	15 400	10 100	10 750	12 050
		7.72	13 700	16 100	18 500	20 900	13 700	14 600	16 400
	20.00	0.361	13 550	16 000	18 350	20 750	13 550	14 450	16 300
6	23.00	0.415	17 000	19 950	22 900	25 950	17 000	18 050	20 350
		10.54	23 100	27 100	31 100	35 200	23 100	24 500	27 600
	26.00	0.476	18 200	20 850	23 950	27 100	18 200	19 000	21 450
6	26.80	0.500	19 500	22 300	25 700	29 100	19 500	20 400	23 050
		12.70	26 500	30 300	34 900	39 500	26 500	27 700	31 300
	18.60	0.304	11 350	12 950	14 950	16 950	11 350	11 900	13 400
6	24.50	0.400	18 650	21 300	24 450	27 700	18 650	19 500	22 050
		10.16	25 300	28 900	33 200	37 600	25 300	26 500	29 900
	25.50	0.454	19 800	22 600	26 000	29 400	19 800	20 700	23 350
	10.54	26 900	30 700	35 300	39 900	26 900	28 100	31 700	

For data not displayed or for grades higher than 125 ksi contact Mr. Help.

VAM® 21 HT TORQUE VALUES (FIELD END ONLY)

Size (OD)	Nominal weight	Wall thickness	VAM® 21 HT Make-up Torque 80-85-90 ksi		VAM® 21 HT Make-up Torque 95-125 ksi	
			Min.	Max.	Min.	Max.
in mm	lb/ft	in mm	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m
6 5/8 168,28	23.20	0.330	10 050	10 800	10 050	10 800
		8.38	13 700	14 700	13 700	14 700
	24.00	0.352	11 100	11 850	11 100	11 850
		8.94	15 000	16 100	15 000	16 100
	28.00	0.417	15 450	16 550	15 450	16 550
		10.59	21 000	22 500	21 000	22 500
	32.00	0.475	19 550	21 000	19 550	21 000
		12.07	26 500	28 500	26 500	28 500
	34.50	0.525	21 100	22 600	21 100	22 600
		13.34	28 600	30 700	28 600	30 700
7 177,80	36.70	0.562	22 900	24 550	22 900	24 550
		14.27	31 000	33 300	31 000	33 300
	23.00	0.317	10 750	11 500	10 750	11 500
		8.05	14 600	15 600	14 600	15 600
	26.00	0.362	12 000	12 900	12 000	12 900
		9.19	16 300	17 500	16 300	17 500
	29.00	0.408	14 200	15 250	14 200	15 250
		10.36	19 300	20 700	19 300	20 700
	32.00	0.453	17 950	19 300	17 950	19 300
		11.51	24 400	26 200	24 400	26 200
35.00	0.498	22 000	23 600	22 000	23 600	
	12.65	29 800	32 000	29 800	32 000	
38.00	0.540	24 250	26 000	24 250	26 000	
	13.72	32 900	35 300	32 900	35 300	
41.00	0.590	26 550	28 500	26 550	28 500	
	14.99	36 000	38 700	36 000	38 700	
42.70	0.625	28 150	30 200	28 150	30 200	
	15.88	38 200	41 000	38 200	41 000	

Mill-end torque values may differ from field end. Mill end torque values are available in the VAM® TSLI or through Mr. Help.
For data not displayed or for grades higher than 125 ksi contact Mr. Help.

VAM® 21 HT TORQUE VALUES (FIELD END ONLY)

Size (OD)	Nominal weight	Wall thickness	VAM® 21 HT Max. Torque with Seatability (MTS)										
			80-85-90 ksi	95-100-105 ksi	110-115-120 ksi	125 ksi	80-85-90 ksi CRA	110-115-120 ksi CRA	125ksi CRA				
in mm	lb/ft	in mm	ksi	ksi	ksi	ft.lb N.m	ksi	ksi	ksi	ft.lb N.m	ksi	ksi	ksi
6 5/8 168,28	23.20	0.330	14 200	19 500	22 450	25 500	14 200	17 750	20 050				
		8.38	19 300	26 500	30 500	34 600	19 300	24 100	27 200				
	24.00	0.352	16 050	22 050	25 350	28 750	16 050	20 050	22 600				
		8.94	21 800	29 900	34 400	39 000	21 800	27 200	30 700				
	28.00	0.417	21 500	29 550	34 000	38 550	21 500	26 900	30 350				
		10.59	29 200	40 100	46 100	52 300	29 200	36 500	41 200				
	32.00	0.475	26 450	36 250	41 800	47 400	26 450	33 100	37 350				
		12.07	35 900	49 200	56 700	64 300	35 900	44 900	50 700				
	34.50	0.525	25 800	30 600	35 300	40 000	25 800	27 950	31 550				
		13.34	35 000	41 500	47 900	54 300	35 000	37 900	42 800				
36.70	0.562	28 650	34 000	39 200	44 500	28 650	31 050	35 100					
	14.27	38 900	46 100	53 200	60 400	38 900	42 100	47 600					
7 177,80	23.00	0.317	14 950	17 400	19 950	22 700	14 950	15 600	17 700				
		8.05	20 300	23 600	27 100	30 800	20 300	21 200	24 000				
	26.00	0.362	19 350	22 550	25 950	29 500	19 350	20 250	22 900				
		9.19	26 300	30 600	35 200	40 000	26 300	27 500	31 100				
	29.00	0.408	24 000	27 950	32 200	36 550	24 000	25 150	28 450				
		10.36	32 600	37 900	43 700	49 600	32 600	34 100	38 600				
	32.00	0.453	28 650	33 300	38 400	43 550	28 650	29 900	33 900				
		11.51	38 900	45 200	52 100	59 100	38 900	40 600	46 000				
	35.00	0.498	33 150	38 550	44 400	50 350	33 150	34 700	39 200				
		12.65	45 000	52 300	60 200	68 300	45 000	47 100	53 200				
38.00	0.540	32 500	38 400	44 300	50 300	32 500	34 500	39 050					
	13.72	44 100	52 100	60 100	68 200	44 100	46 800	53 000					
41.00	0.590	37 050	43 800	50 550	57 450	37 050	39 350	44 600					
	14.99	50 300	59 400	68 600	77 900	50 300	53 400	60 500					
42.70	0.625	40 150	47 450	54 850	62 300	40 150	42 700	48 350					
	15.88	54 500	64 400	74 400	84 500	54 500	57 900	65 600					

For data not displayed or for grades higher than 125 ksi contact Mr. Help.

VAM® 21 HT TORQUE VALUES (FIELD END ONLY)

Size (OD) in mm	Nominal weight lb/ft	Wall thickness in mm	VAM® 21 HT Make-up Torque 80- 85-90 ksi ft.lb N.m		VAM® 21 HT Make-up Torque 95- 125 ksi ft.lb N.m	
			Min.	Max.	Min.	Max.
7 5/8 193.68	29.70	0.375	13 800	14 800	13 800	14 800
		9.53	18 700	20 700	18 700	20 100
	33.70	0.430	17 800	19 150	17 800	19 150
		10.92	24 200	26 000	24 200	26 000
	35.80	0.465	20 350	21 800	20 350	21 800
9 5/8 244.48	39.00	11.81	27 600	29 600	27 600	29 600
		0.500	23 850	25 550	23 850	25 550
	40.00	12.70	32 300	34 700	32 300	34 700
		0.395	23 350	25 650	23 350	25 650
	43.50	10.03	31 700	34 800	31 700	34 800
10 3/4 273.05	47.00	11.05	37 100	40 500	37 100	40 500
		0.472	25 800	28 350	25 800	28 350
	53.50	11.99	35 000	38 500	35 000	38 500
		0.545	42 550	46 800	42 550	46 800
	58.40	13.84	57 700	63 500	57 700	63 500
		0.595	43 700	48 050	43 700	48 050
		15.11	59 300	65 200	59 300	65 200
	55.50	0.545	39 650	43 650		
		12.57	53 800	59 200		

Mill-end torque values may differ from field end. Mill end torque values are available in the VAM® TSU or through Mr. Help.

For data not displayed or for grades higher than 125 ksi contact Mr. Help.

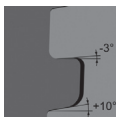
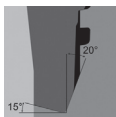
VAM[®] 21 HT TORQUE VALUES (FIELD END ONLY)

Size (OD)	Nominal weight	Wall thickness	VAM [®] 21 HT Max. Torque with Sealability (MTS)						
			80-85-90 ksi	95-100-105 ksi	110-115-120 ksi	125 ksi	80-85-90 ksi CRA	110-115-120 ksi CRA	125ksi CRA
in mm	lb/ft	in mm	80-85-90 ksi	95-100-105 ksi	110-115-120 ksi	125 ksi	80-85-90 ksi CRA	110-115-120 ksi CRA	125ksi CRA
7 5/8 193.68	29.70	0.375	17 700	23 450	27 050	30 650	17 700	21 300	24 000
		9.53	24 000	31 800	36 700	41 600	24 000	28 900	32 600
	33.70	0.430	22 700	25 250	29 100	33 100	22 700	23 150	26 100
		10.92	30 800	34 300	39 500	44 900	30 800	31 400	35 400
	35.80	0.465	26 000	28 950	33 400	37 800	26 000	26 450	29 850
		11.81	35 300	39 300	45 300	51 300	35 300	35 900	40 500
	39.00	0.500	29 250	32 600	37 450	42 450	29 250	29 750	33 600
		12.70	39 700	44 200	50 800	57 600	39 700	40 400	45 600
9 5/8 244.48	40.00	0.395	39 000	45 950	53 000	60 150			
		10.03	52 900	62 300	71 900	81 600			
	43.50	0.435	45 250	53 300	61 500	69 800			
		11.05	61 400	72 300	83 400	94 700			
	47.00	0.472	52 800	62 150	71 650	81 400			
		11.99	71 600	84 300	97 200	110 400			
	53.50	0.545	56 450	66 300	76 250	86 400			
		13.84	76 600	89 900	103 400	117 200			
	58.40	0.595	64 950	76 850	88 850	101 150			
		15.11	88 100	104 200	120 500	137 200			
10 3/4 273.05	55.50	0.545	57 300						
		12.57	77 700						

For data not displayed or for grades higher than 125 ksi contact Mr. Help.

3.2 VAM TOP®

Application



VAM TOP® is a Threaded and Coupled (T&C) connection for tubing, production casing, and intermediate casing strings applications.

It provides gas-tight sealing under the most severe conditions: VAM TOP® minimises the risks that results from combined loads induced by: gas pressure, temperature, bending and compression.

VAM TOP® product line covers a wide range of diameters and wall thicknesses, for API material as well as for proprietary corrosion resistant material (Sour Service and CRA materials)

VAM TOP®



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VAM TOP® is globally recognized as the industry reference for premium connections, since the 90's: it has been extensively tested and widely used. VAM TOP® is available to you, wherever you are: connections and accessories are supported throughout the world by the VAM® licensee network managed by VAM® Services.

VAM TOP® Tubing (2 3/8" to 4 1/2") is qualified over the full range as per ISO 13679 CAL IV, with 100% PBYS rating in tension and compression.

VAM TOP® Casing (5" to 16") has been validated as per older test protocols (NAM TEO/3, URC and Mobil procedures, API 5C5 Class II, etc), prior to the first release of ISO 13679. It is rated 60% PBYS in compression.

There are many derivative designs that have been developed to improve VAM TOP® casing performances:

- VAM TOP® HT / VAM TOP® HC: specific VAM TOP® designs are available for High Torque / High Compression applications. Please refer to the dedicated product descriptions for further details.

• VAM TOP[®] FE (/Fatigue Enhanced) has been developed for fatigue and riser applications. Please refer to the dedicated product descriptions for further details.

• Most used other enhanced designs are:

- VAM TOP[®] KS (9 5/8" and 10 3/4"),
- VAM TOP[®] -KA and -NA (9 7/8"),
- VAM TOP[®] -KX (11 3/4" to 13 3/8"),
- VAM TOP[®] -NA (13 5/8").
- VAM TOP[®] KB (14"), and
- VAM TOP[®] -ND and -NE (16")

These derivatives designs provide superior sealability (such as ISO 13679 CAL IV performance) and usually higher compression capacity. Note that VAM TOP[®] -KB in 14" and VAM TOP[®] -ND and -NE in 16" have been already standardized, instead of the VAM TOP[®] casing design.

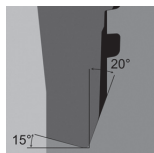
-K... suffix means it is compatible with the VAM TOP[®] standard design, while -N... means it is not.

- Optimized Metal-to-Metal Seal:

VAM TOP[®] metal-to-metal seal was optimized to improve sealability performances while preventing from any galling issue.

Sealing integrity remains constant despite repeated makeup and break-out, and combined loads cycling.

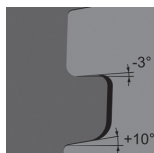
The performances of the metal-to-metal seal have been validated through more than 120 qualifications tests under the most demanding testing procedures.



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- Reverse Angle Torque Shoulder:

Torque shoulder provides a positive torque stop which allows accurate power tight make-up and minimizes hoop stresses in the connection. The wedge effect caused by the reverse angle gives the connection superior structural strength and energizes the metal-to-metal seal contact.



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- Hook thread profile:

VAM TOP[®] thread includes a negative load flank of -3°.

This specific feature provides, in addition to an improved tensile resistance, higher performances under external pressure, compression and bending. Optimized thread geometry also minimizes the risk of galling even when thread lubricants are poorly applied.

Options

- Special Clearance option: VAM TOP® -SC90 / VAM TOP® -SC80

These extra-clearance couplings offer 90% and 80% tensile efficiency respectively.

- GRE liner: the combination of a GRE (Glass Reinforced Epoxy) liner with a VAM TOP® connection has been tested and fully validated, from 2 3/8" up to 10 3/4".

Running VAM TOP - Dope quantities

Nominal OD (in)	Weight		Dope volume	
	(lb.ft)		(cm ³)	(in ³)
2 3/8	4,60 & 5,10		2	0,1
	5,80 to 7,35		3	0,2
2 7/8	6,40		3	0,2
	7,80 to 10,70		4	0,2
	11,50		5	0,3
	6,50 to 10,20		4	0,2
3 1/2	12,70 to 14,70		6	0,4
	15,70 to 18,35		7	0,4
	8,20 to 13,20		5	0,3
4	14,80 to 16,50		7	0,4
	18,90 & 22,20		8	0,5
	10,50 to 15,10		6	0,4
4 1/2	17,00 to 18,90		8	0,5
	21,50 & 23,70		9	0,5
	5		all weights	14	0,9
5 1/2	all weights		16	1
5 3/4	all weights		17	1,1
6 5/8	all weights		19	1,2
7	all weights		25	1,5
7 5/8	all weights		27	1,7
7 3/4	all weights		28	1,7
8 5/8	all weights		37	2,3
9 5/8	all weights		41	2,5
9 7/8	all weights		43	2,6
10	all weights		44	2,7
10 3/4	all weights		46	2,8
10 7/8	all weights		50	3,05
11 3/4	all weights		59	3,6
11 7/8	all weights		60	3,6
13 3/8	all weights		67	4,1
14	all weights		70	4,3
15	all weights		78	4,8
16	all weights		84	5,2

VAM TOP®

VAM TOP ® TECHNICAL DATA

Size (OD)	Nominal Weight	Wall Thickness		API Drift Diameter	Coupling OD (reg)	Coupling ID (reg)	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Regular Yield Strength (1000 lb)						
		in	mm									55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	140 ksi
2 3/8" <i>60.33</i>	4.60	0.190	4.83	1.901	2.677	1.957	2.444	5.910	1.304	1.330	0.654	104	117	124	143	163	183	196
	5.10	0.218	5.54	1.845	2.719	1.913	2.444	5.910	1.477	1.508	0.796	118	133	140	162	185	207	222
	5.80	0.254	6.45	1.773	2.747	1.827	2.891	6.770	1.692	1.727	0.889	135	152	161	186	212	237	254
	6.30	0.280	7.11	1.721	2.782	1.783	2.891	6.770	1.843	1.879	1.011	147	166	175	203	230	258	276
	6.60	0.295	7.49	1.691	2.802	1.760	2.891	6.770	1.928	1.967	1.081	154	173	183	212	241	270	289
7.35	0.336	8.53	1.609	2.853	1.693	2.891	6.770	2.152	2.195	1.262	172	194	204	237	269	301	323	
2 7/8" <i>73.03</i>	6.40	0.217	5.51	2.347	3.223	2.409	2.519	6.020	1.812	1.849	0.962	145	163	172	199	227	254	272
	7.80	0.276	7.01	2.229	3.275	2.271	3.180	7.360	2.254	2.299	1.178	180	203	214	248	282	316	338
	8.60	0.308	7.82	2.165	3.321	2.220	3.180	7.360	2.484	2.534	1.365	199	224	236	273	311	348	373
	9.35	0.340	8.64	2.101	3.364	2.169	3.180	7.360	2.708	2.762	1.549	217	244	257	298	339	379	406
	9.80	0.362	9.19	2.057	3.393	2.133	3.180	7.360	2.858	2.914	1.672	229	257	272	314	357	400	429
10.50	0.392	9.96	1.997	3.431	2.086	3.180	7.360	3.058	3.119	1.835	245	275	291	336	382	428	459	
10.70	0.405	10.29	1.971	3.447	2.066	3.180	7.360	3.143	3.207	1.905	251	283	299	346	393	440	471	
11.50	0.440	11.18	1.901	3.470	1.987	3.558	8.110	3.366	3.433	2.005	269	303	320	370	421	471	505	
3 1/2" <i>88.90</i>	6.50	0.170	4.32	3.035	3.771	3.104	3.032	7.050	1.778	1.814	0.787	142	160	169	196	222	249	267
	7.70	0.216	5.49	2.943	3.847	3.022	3.032	7.050	2.228	2.271	1.151	178	201	212	245	279	312	334
	9.20	0.254	6.45	2.867	3.908	2.959	3.032	7.050	2.590	2.643	1.448	207	233	246	285	324	363	389
	10.20	0.289	7.34	2.797	3.962	2.894	3.032	7.050	2.915	2.973	1.715	233	262	277	321	364	408	437
	12.70	0.375	9.53	2.625	4.044	2.707	3.820	8.620	3.662	3.756	2.127	295	331	350	405	460	515	552
13.70	0.413	10.49	2.549	4.095	2.648	3.820	8.620	4.005	4.086	2.393	320	360	380	441	501	561	601	
14.30	0.430	10.92	2.515	4.118	2.620	3.820	8.620	4.147	4.230	2.507	332	373	394	456	518	581	622	
14.70	0.449	11.40	2.477	4.143	2.589	3.820	8.620	4.304	4.391	2.637	344	387	409	473	538	603	646	
15.50	0.476	12.09	2.423	4.154	2.518	4.261	9.530	4.522	4.611	2.699	362	407	430	497	565	633	678	
16.70	0.510	12.95	2.355	4.196	2.467	4.261	9.530	4.791	4.889	2.919	383	431	455	527	599	671	719	
18.35	0.575	14.61	2.225	4.272	2.368	4.261	9.530	5.284	5.391	3.318	423	476	502	581	661	740	793	

VAM TOP ® TECHNICAL DATA

Size (OD)	Nominal Weight	Wall Thickness		API Drift Diameter	Coupling OD (reg)	Coupling ID (reg)	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Regular Yield Strength (1000 lb)						
		in	mm									55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	140 ksi
4" 101.60	8.20	0.190	4.83	3.495	4.300	3.567	3.159	7.320	2.274	2.320	1.056	182	205	216	250	284	318	341
	9.50	0.226	5.74	3.423	4.362	3.500	3.159	7.320	2.680	2.733	1.388	214	241	255	295	335	375	402
	10.90	0.262	6.65	3.351	4.420	3.437	3.077	7.320	3.077	3.137	1.713	246	277	292	338	385	431	462
	11.60	0.286	7.26	3.303	4.458	3.398	3.159	7.320	3.337	3.404	1.925	267	300	317	367	417	467	501
	12.10	0.299	7.59	3.277	4.478	3.374	3.159	7.320	3.476	3.545	2.037	278	313	330	382	435	487	521
	13.20	0.330	8.38	3.215	4.526	3.327	3.159	7.320	3.805	3.881	2.309	304	342	361	419	476	533	571
	14.80	0.380	9.65	3.115	4.552	3.189	4.041	9.090	4.322	4.408	2.457	346	389	411	475	540	605	648
	16.10	0.415	10.54	3.045	4.602	3.130	4.041	9.090	4.674	4.765	2.745	374	421	444	514	584	654	701
	16.50	0.430	10.92	3.015	4.623	3.106	4.041	9.090	4.823	4.920	2.866	386	434	458	531	603	675	723
	18.90	0.500	12.70	2.875	4.691	2.969	4.545	10.080	5.498	5.609	3.264	440	495	522	605	687	770	825
22.20	0.610	15.49	2.655	4.827	2.799	4.545	10.080	6.496	6.625	4.078	520	585	617	715	812	910	974	
4 1/2" 114.30	10.50	0.224	5.69	3.927	4.859	3.999	3.222	7.440	3.009	3.069	1.533	241	271	286	331	376	421	451
	11.60	0.250	6.35	3.875	4.903	3.952	3.222	7.440	3.338	3.407	1.803	267	300	317	367	417	467	501
	12.60	0.271	6.88	3.833	4.937	3.913	3.222	7.440	3.600	3.672	2.019	288	324	342	396	450	504	540
	13.50	0.290	7.37	3.795	4.968	3.877	3.222	7.440	3.836	3.914	2.212	307	345	364	422	480	537	575
	15.10	0.337	8.56	3.701	5.042	3.798	3.222	7.440	4.407	4.495	2.678	353	397	419	485	551	617	661
	17.00	0.380	9.65	3.615	5.063	3.680	4.041	9.090	4.918	5.016	2.811	393	443	467	541	615	689	738
	17.70	0.402	10.21	3.571	5.096	3.641	4.041	9.090	5.175	5.279	3.022	414	466	492	569	647	725	776
	18.90	0.430	10.92	3.515	5.137	3.586	4.041	9.090	5.498	5.608	3.285	440	495	522	605	687	770	825
	21.50	0.500	12.70	3.375	5.209	3.444	4.545	10.080	6.283	6.411	3.753	503	565	597	691	785	880	942
	23.70	0.560	14.22	3.255	5.289	3.350	4.545	10.080	6.932	7.070	4.281	555	624	659	763	867	970	1040

WARNING: 4 1/2" VAM TOP ® HC and VAM TOP ® HT are not compatible with 4 1/2" VAM TOP ® Tubing.

VAM TOP ®

VAM TOP® TECHNICAL DATA

Size (OD)	Nominal Weight	Wall Thickness		API Drift Diameter	Coupling OD (reg.)	Coupling ID (reg.)	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Regular Yield Strength (1000 lb)							
		in	mm									55 ksi	80 ksi	90 ksi	110 ksi	125 ksi	140 ksi	150 ksi	
in	lb/ft	in	mm	in	in	in	in	in	sq.in	sq.in	sq.in	sq.in	sq.in	sq.in	sq.in	sq.in	sq.in	sq.in	
5" 127.00	13.00	0.253	6.43	4.369	5.400	4.438	4.190	10.390	3.773	3.856	1.657	208	302	340	358	415	472	528	566
	15.00	0.296	7.52	4.283	5.471	4.391	4.190	10.390	4.374	4.462	2.135	241	350	394	416	481	547	612	656
	18.00	0.362	9.19	4.151	5.577	4.391	4.190	10.390	5.275	5.385	2.878	290	422	475	501	580	659	739	791
	20.30	0.408	10.36	4.059	5.648	4.307	4.190	10.390	5.886	6.009	3.379	324	471	530	559	647	736	824	883
	20.80	0.422	10.72	4.031	5.670	4.283	4.190	10.390	6.069	6.202	3.528	334	486	546	577	668	759	850	910
21.40	0.437	11.10	4.001	5.691	4.255	4.190	10.390	6.264	6.395	3.685	345	501	564	595	689	783	877	940	
23.20	0.478	12.14	3.919	5.750	4.181	4.190	10.390	6.791	6.925	4.109	374	543	611	645	747	849	951	1019	
24.10	0.500	12.70	3.875	5.782	4.141	4.190	10.390	7.069	7.211	4.334	389	566	636	672	778	884	990	1060	
5 1/2" 139.70	14.00	0.244	6.20	4.887	5.876	4.931	4.382	10.750	4.029	4.115	1.637	222	322	363	383	443	504	564	604
	15.50	0.275	6.99	4.825	5.930	4.895	4.382	10.750	4.514	4.608	2.030	248	361	406	429	497	564	632	677
	17.00	0.304	7.72	4.767	5.979	4.895	4.382	10.750	4.962	5.069	2.396	273	397	447	471	546	620	695	744
	20.00	0.361	9.17	4.653	6.071	4.895	4.382	10.750	5.828	5.944	3.100	321	466	525	554	641	729	816	874
	23.00	0.415	10.54	4.545	6.156	4.801	4.382	10.750	6.630	6.756	3.753	365	530	597	630	729	829	928	995
26.00	0.476	12.09	4.423	6.249	4.690	4.382	10.750	7.513	7.659	4.470	413	601	676	714	826	939	1052	1127	
26.80	0.500	12.70	4.375	6.284	4.647	4.382	10.750	7.854	8.007	4.746	432	628	707	746	864	982	1100	1178	
28.40	0.530	13.46	4.315	6.327	4.594	4.382	10.750	8.275	8.437	5.095	455	662	745	786	910	1034	1159	1241	
29.70	0.562	14.27	4.251	6.373	4.535	4.382	10.750	8.718	8.888	5.454	479	697	785	828	959	1090	1221	1308	
5 3/4" 146.05	18.10	0.304	7.72	5.017	6.264	5.173	3.772	9.530	5.201	5.298	2.782	286	416	468	494	572	650	728	780
	19.70	0.335	8.51	4.955	6.317	5.138	3.772	9.530	5.699	5.823	3.201	313	456	513	541	627	712	798	855
21.80	0.375	9.53	4.875	6.382	5.090	5.090	3.772	9.530	6.332	6.471	3.720	348	507	570	602	697	792	887	950
6 5/8" 168.28	20.00	0.288	7.32	5.924	7.081	6.049	4.427	10.870	5.734	5.845	2.664	315	459	516	545	631	717	803	860
	23.20	0.330	8.38	5.840	7.154	6.049	4.427	10.870	6.526	6.659	3.317	359	522	587	620	718	816	914	979
	24.00	0.352	8.94	5.796	7.191	6.049	4.427	10.870	6.937	7.080	3.650	382	555	624	659	763	867	971	1041
	28.00	0.417	10.59	5.666	7.298	5.931	4.427	10.870	8.133	8.289	4.615	447	651	732	773	895	1017	1139	1220
	32.00	0.475	12.07	5.550	7.390	5.824	4.427	10.870	9.177	9.357	5.474	505	734	826	872	1009	1147	1285	1377
36.70	0.562	14.27	5.376	7.524	5.669	4.427	10.870	10.705	10.924	6.729	589	856	963	1017	1178	1338	1489	1606	

VAM TOP ® TECHNICAL DATA

Size (OD)	In	mm	Nominal Weight	Wall Thickness		API Drift Diameter	Coupling OD (reg)	Coupling ID (reg)	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Regular Yield Strength (1000 lb)								
				in	mm									55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	140 ksi	150 ksi	
7" <i>177.80</i>			23.00	0.317	8.05	6.250 A	7.489	6.324	4.775	11.540	6.655	6.786	3.109	366	532	599	632	732	832	932	998	
			26.00	0.362	9.19	6.151	7.565	6.324	4.775	11.540	7.549	7.693	3.837	3.837	415	604	679	717	830	944	1057	1132
			29.00	0.408	10.36	6.059	7.644	6.324	4.775	11.540	8.449	8.634	4.922	4.922	465	676	760	803	929	1056	1183	1267
			32.00	0.453	11.51	6.000 A	7.717	6.242	4.775	11.540	9.317	9.512	5.296	5.296	512	745	839	885	1025	1165	1304	1398
			35.00	0.498	12.65	5.879	7.788	6.161	4.775	11.540	10.172	10.376	5.978	5.978	559	814	915	966	1119	1272	1424	1526
			38.00	0.540	13.72	5.795	7.853	6.086	4.775	11.540	10.959	11.172	6.617	6.617	603	877	986	1041	1206	1370	1534	1644
7 5/8" <i>193.68</i>			41.00	0.590	14.99	5.695	7.930	5.986	4.775	11.540	11.881	12.124	7.381	653	950	1069	1129	1307	1485	1663	1782	
			42.70	0.625	15.88	5.625	7.981	5.933	4.775	11.540	12.517	12.764	7.890	7.890	688	1001	1127	1189	1377	1565	1752	1878
			26.40	0.328	8.33	6.844	8.132	6.919	4.868	11.730	7.519	7.680	3.588	3.588	414	602	677	714	827	940	1053	1128
			29.70	0.375	9.53	6.750	8.213	6.919	4.868	11.730	8.541	8.716	4.400	4.400	470	683	769	811	940	1068	1196	1281
			33.70	0.430	10.92	6.640	8.306	6.919	4.868	11.730	9.720	9.917	5.355	5.355	535	778	875	923	1069	1215	1361	1458
			35.80	0.465	11.81	6.570	8.363	6.856	4.868	11.730	10.460	10.664	5.952	5.952	575	837	941	994	1151	1308	1464	1569
7 3/4" <i>196.85</i>			39.00	0.500	12.70	6.500	8.420	6.793	4.868	11.730	11.192	11.416	6.553	616	895	1007	1063	1231	1399	1567	1679	
			42.80	0.560	14.27	6.376	8.518	6.683	4.868	11.730	12.470	12.726	7.606	7.606	686	998	1122	1185	1372	1559	1746	1871
			45.30	0.595	15.11	6.310	8.569	6.622	4.868	11.730	13.141	13.412	8.154	8.154	723	1051	1183	1248	1446	1643	1840	1971
			47.10	0.625	15.88	6.250	8.615	6.566	4.868	11.730	13.744	14.023	8.640	8.640	756	1100	1237	1306	1512	1718	1924	2062
			46.10	0.595	15.11	6.500 A	8.693	6.750	4.915	11.850	13.374	13.642	8.268	8.268	736	1070	1204	1271	1471	1672	1872	2006
8 5/8" <i>219.08</i>			36.00	0.400	10.16	7.700	9.266	7.980	5.603	13.190	10.336	10.560	5.566	568	827	930	982	1137	1292	1447	1550	
			40.00	0.450	11.43	7.625 A	9.351	7.889	5.603	13.190	11.557	11.797	6.548	6.548	636	925	1040	1098	1271	1445	1618	1734
			44.00	0.500	12.70	7.500	9.434	7.799	5.603	13.190	12.763	13.017	7.528	7.528	702	1021	1149	1212	1404	1595	1787	1914
			49.00	0.557	14.15	7.386	9.526	7.696	5.603	13.190	14.118	14.395	8.636	8.636	776	1129	1271	1341	1553	1765	1977	2118
			52.00	0.595	15.11	7.310	9.587	7.629	5.603	13.190	15.010	15.311	9.368	9.368	826	1201	1351	1426	1651	1876	2101	2252
			36.00	0.352	8.94	8.765	10.188	8.998	5.589	13.190	10.254	10.466	5.168	5.168	564	820	923	974	1128	1282	1436	1538
9 5/8" <i>244.48</i>			40.00	0.395	10.03	8.750 A	10.264	8.998	5.589	13.190	11.454	11.699	6.157	630	916	1031	1088	1260	1432	1604	1718	
			43.50	0.435	11.05	8.599	10.333	8.925	5.589	13.190	12.559	12.814	7.050	691	1005	1130	1193	1381	1570	1758	1884	
			47.00	0.472	11.99	8.525	10.396	8.858	5.589	13.190	13.572	13.838	7.870	7.870	746	1086	1222	1289	1493	1697	1900	2036
			53.50	0.545	13.84	8.500 A	10.520	8.726	5.589	13.190	15.546	15.877	9.500	9.500	855	1244	1399	1477	1710	1943	2176	2332
			58.40	0.595	15.11	8.375 A	10.601	8.637	5.589	13.190	16.879	17.214	10.562	10.562	928	1350	1519	1604	1857	2110	2363	2532

VAM TOP ®

VAM TOP ® TECHNICAL DATA

Size (OD)	Nominal Weight	Wall Thickness		API Drift Diameter	Coupling OD (reg)	Coupling ID (reg)	Make-up Loss	Coupling Length	Pipe Body Section	Coupling COS	Coupling Face Area	Regular Yield Strength (1000 lb)							
		in	mm									80 ksi	90 ksi	110 ksi	125 ksi	140 ksi	150 ksi		
<i>mm</i>	<i>lb/ft</i>	<i>in</i>	<i>mm</i>	<i>in</i>	<i>in</i>	<i>(reg)</i>	<i>in</i>	<i>in</i>	<i>sq.in</i>	<i>sq.in</i>	<i>sq.in</i>	<i>55 ksi</i>	<i>80 ksi</i>	<i>90 ksi</i>	<i>110 ksi</i>	<i>125 ksi</i>	<i>140 ksi</i>	<i>150 ksi</i>	
9 7/8"	62.80	0.625	15.88	8.469	10.908	8.834	5.484	12.950	18.162	18.518	11.600	999	1453	1635	1725	1998	2270	2543	2724
<i>250.83</i>	65.30	0.650	16.51	8.419	10.949	8.789	5.484	12.950	18.838	19.228	12.177	1036	1507	1695	1790	2072	2355	2637	2826
	66.40	0.661	16.79	8.397	10.965	8.769	5.484	12.950	19.134	19.499	12.397	1052	1531	1722	1818	2105	2392	2679	2870
	66.90	0.668	16.97	8.383	10.979	8.757	5.484	12.950	19.322	19.736	12.576	1063	1546	1739	1836	2125	2415	2703	2898
	67.50	0.678	17.22	8.363	10.993	8.740	5.484	12.950	19.590	19.975	12.770	1077	1567	1763	1861	2155	2449	2743	2939
	68.00	0.694	17.63	8.331	11.018	8.710	5.484	12.950	20.017	20.417	13.129	1101	1601	1802	1902	2202	2502	2802	3003
	68.90	0.700	17.78	8.319	11.028	8.700	5.484	12.950	20.177	20.587	13.268	1110	1614	1816	1917	2219	2522	2825	3027
	70.50	0.720	18.29	8.279	11.060	8.663	5.484	12.950	20.708	21.134	13.698	1139	1657	1864	1967	2278	2589	2899	3106
	72.00	0.725	18.42	8.269	11.067	8.655	5.484	12.950	20.841	21.271	13.809	1146	1667	1876	1980	2293	2605	2918	3128
10"	67.20	0.672	17.07	8.500	11.117	8.866	5.484	12.950	19.693	20.099	12.908	1083	1575	1772	1871	2166	2462	2757	2954
<i>254.00</i>	68.70	0.688	17.48	8.468	11.142	8.838	5.484	12.950	20.127	20.547	13.271	1107	1610	1811	1912	2214	2516	2818	3019
	71.80	0.722	18.34	8.400	11.195	8.777	5.484	12.950	21.045	21.478	14.015	1157	1684	1894	1999	2315	2631	2946	3157
10 3/4"	45.50	0.400	10.16	9.875 A	11.400	10.122	5.634	13.270	13.006	13.273	7.006	715	1040	1171	1236	1431	1626	1821	1951
<i>273.05</i>	51.00	0.450	11.43	9.694	11.489	10.031	5.634	13.270	14.561	14.865	8.271	801	1165	1310	1383	1602	1820	2039	2184
	55.50	0.495	12.57	9.625 A	11.565	9.950	5.634	13.270	15.947	16.255	9.387	877	1276	1435	1515	1754	1993	2233	2392
	60.70	0.545	13.84	9.504	11.652	9.862	5.634	13.270	17.473	17.834	10.656	961	1398	1573	1660	1922	2184	2446	2621
	65.70	0.595	15.11	9.404	11.735	9.771	5.634	13.270	18.982	19.353	11.861	1044	1519	1708	1803	2088	2373	2657	2847
	71.10	0.650	16.51	9.294	11.825	9.671	5.634	13.270	20.625	21.027	13.208	1134	1650	1856	1959	2269	2578	2888	3094
	73.20	0.672	17.07	9.250	11.863	9.631	5.634	13.270	21.276	21.723	13.758	1170	1702	1915	2021	2340	2660	2979	3191
10 7/8"	72.00	0.656	16.66	9.407	11.951	9.751	5.843	13.700	21.060	21.500	13.368	1158	1685	1895	2001	2317	2633	2948	3159
<i>276.23</i>																			
11 3/4"	54.00	0.435	11.05	10.724	12.463	11.066	5.712	13.430	15.463	15.796	8.618	850	1237	1392	1469	1701	1933	2165	2319
<i>298.45</i>	60.00	0.489	12.42	10.625 A	12.558	10.970	5.712	13.430	17.300	17.653	10.096	952	1384	1557	1644	1903	2163	2422	2595
	65.00	0.534	13.56	10.625 A	12.636	10.889	5.712	13.430	18.816	19.211	11.346	1035	1505	1693	1788	2070	2352	2634	2822
	71.00	0.582	14.78	10.430	12.719	10.803	5.712	13.430	20.420	20.857	12.669	1123	1634	1838	1940	2246	2552	2859	3063
	67.80	0.550	13.97	10.619	12.788	10.986	5.712	13.430	19.588	19.941	11.879	1076	1585	1761	1859	2152	2446	2740	2935
11 7/8"	71.80	0.582	14.78	10.555	12.845	10.929	5.712	13.430	20.648	21.089	12.797	1136	1652	1858	1962	2271	2581	2891	3097
<i>301.63</i>																			

VAM TOP @ TECHNICAL DATA

Size (OD)	Nominal Weight	Wall Thickness		API Drift Diameter	Coupling OD (reg)	Coupling ID (reg)	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Regular Yield Strength (1000 lb)							
		in	mm									55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	140 ksi	150 ksi
13 3/8"	61.00	0.430	10.92	12.359	14.085	12.714	5.698	13.390	17.487	17.842	9.715	962	1399	1574	1661	1924	2186	2448	2623
339.73	68.00	0.480	12.19	12.259	14.176	12.624	5.698	13.390	19.445	19.851	11.313	1069	1556	1750	1847	2139	2431	2722	2917
	72.00	0.514	13.06	12.250 A	14.237	12.562	5.698	13.390	20.768	21.213	12.402	1142	1661	1869	1973	2284	2596	2908	3115
	77.00	0.550	13.97	12.119	14.300	12.498	5.698	13.390	22.160	22.625	13.531	1219	1773	1994	2105	2438	2770	3102	3324
	80.70	0.580	14.73	12.059	14.351	12.442	5.698	13.390	23.314	23.777	14.449	1282	1865	2098	2215	2565	2914	3264	3497
	85.00	0.608	15.44	12.003	14.400	12.393	5.698	13.390	24.386	24.888	15.353	1341	1951	2195	2317	2682	3048	3414	3658
	86.00	0.625	15.88	11.969	14.430	12.362	5.698	13.390	25.035	25.556	15.878	1377	2003	2253	2378	2754	3129	3505	3755
	92.00	0.672	17.07	11.875	14.510	12.277	5.698	13.390	26.818	27.390	17.351	1475	2145	2414	2548	2950	3352	3755	4023
13 5/8"	88.20	0.625	15.88	12.250 A	14.682	12.614	5.698	13.390	25.525	26.063	16.199	1404	2042	2297	2425	2808	3191	3574	3829
346.08																			
14"	82.20	0.560	14.22	12.693	14.878	13.098	6.945	15.910	23.645	24.130	13.278	1300	1892	2128	2246	2601	2956	3310	3547
355.60	82.50	0.562	14.27	12.689	14.882	13.096	6.945	15.910	23.726	24.223	13.353	1305	1898	2135	2254	2610	2966	3322	3559
	86.00	0.600	15.24	12.613	14.947	13.027	6.945	15.910	25.258	25.744	14.571	1389	2021	2273	2400	2778	3157	3536	3789
	93.00	0.650	16.51	12.513	15.034	12.937	6.945	15.910	27.261	27.764	16.191	1499	2181	2453	2590	2999	3408	3817	4089
	96.90	0.670	17.02	12.473	15.069	12.899	6.945	15.910	28.058	28.622	16.872	1543	2245	2525	2666	3086	3507	3928	4209
	100.00	0.700	17.78	12.413	15.121	12.846	6.945	15.910	29.248	29.836	17.839	1609	2340	2632	2779	3217	3656	4095	4387
	106.00	0.750	19.05	12.313	15.205	12.757	6.945	15.910	31.220	31.851	19.459	1717	2498	2810	2966	3434	3903	4371	4683
	114.00	0.800	20.32	12.213	15.282	12.667	6.945	15.910	33.175	33.689	20.915	1825	2654	2986	3152	3649	4147	4645	4976
	116.00	0.820	20.83	12.173	15.321	15.320	6.945	15.910	33.953	34.636	21.684	1867	2716	3056	3226	3735	4244	4753	5093
15"	92.50	0.580	14.73	13.653	15.985	14.076	5.528	13.070	26.275	26.798	16.516	1445	2102	2365	2496	2890	3284	3679	3941
387.00	107.00	0.675	17.15	13.463	16.162	13.905	5.528	13.070	30.377	30.377	18.890	1671	2430	2734	2886	3341	3797	4253	4557
16"	84.00	0.495	12.57	14.823	16.863	15.233	5.252	12.520	24.112	24.597	14.768	1326	1929	2170	2291	2652	3014	3376	3617
406.40	95.00	0.566	14.38	14.681	16.993	15.107	5.252	12.520	27.444	28.050	17.534	1509	2196	2470	2607	3019	3431	3842	4117

** VAM TOP @-KA

*** VAM TOP @-ND

* VAM TOP @-KB

VAM TOP ® TECHNICAL DATA (OPTIONS)

Size (OD)	Nominal Weight	Wall Thickness		Make-up Loss	Coupling Length	Pipe Body Section	SC80			SC90				
		in	mm				Coupling OD	Coupling Face Area	CCS	Coupling OD	Coupling Face Area	CCS		
In mm	lb/ft	in	mm	in	in	sq.in	in	sq.in	in	sq.in	in	sq.in	in	sq.in
2 3/8 60.33	4.60	0.190	4.83	2.444	5.910	1.304	2.608	1.043	0.425	2.640	1.173	0.527	2.640	1.173
	5.10	0.218	5.54	2.444	5.910	1.477	2.642	1.181	0.534	2.677	1.330	0.654	2.677	1.330
	5.80	0.254	6.45	2.891	6.770	1.692	2.659	1.355	0.590	2.699	1.524	0.725	2.699	1.524
	6.30	0.280	7.11	2.891	6.770	1.843	2.688	1.476	0.688	2.731	1.660	0.834	2.731	1.660
	6.80	0.295	7.49	2.891	6.770	1.928	2.703	1.542	0.742	2.749	1.736	0.896	2.749	1.736
	7.35	0.336	8.53	2.891	6.770	2.152	2.745	1.722	0.886	2.795	1.936	1.056	2.795	1.936
2 7/8 73.03	6.40	0.217	5.51	2.519	6.020	1.812	3.143	1.451	0.646	3.180	1.631	0.789	3.180	1.631
	7.80	0.276	7.01	3.180	7.360	2.254	3.178	1.803	0.781	3.223	2.029	0.962	3.223	2.029
	8.60	0.308	7.82	3.180	7.360	2.484	3.214	1.987	0.929	3.263	2.235	1.129	3.263	2.235
	9.35	0.340	8.64	3.180	7.360	2.708	3.250	2.167	1.072	3.302	2.437	1.290	3.302	2.437
	9.80	0.362	9.19	3.180	7.360	2.858	3.273	2.286	1.166	3.328	2.571	1.398	3.328	2.571
	10.50	0.392	9.96	3.180	7.360	3.058	3.304	2.446	1.298	3.362	2.751	1.541	3.362	2.751
3 1/2 89.90	10.70	0.405	10.29	3.180	7.360	3.143	3.317	2.514	1.352	3.377	2.829	1.600	3.377	2.829
	11.50	0.440	11.18	3.558	8.110	3.366	3.332	2.694	1.411	3.395	3.030	1.681	3.395	3.030
	6.50	0.170	4.32	3.032	7.050	1.778	3.714	1.480	0.519	3.734	1.601	0.617	3.734	1.601
	7.70	0.216	5.49	3.032	7.050	2.228	3.765	1.781	0.764	3.803	2.006	0.939	3.803	2.006
	9.20	0.254	6.45	3.032	7.050	2.590	3.814	2.072	0.992	3.857	2.330	1.199	3.857	2.330
	10.20	0.289	7.34	3.032	7.050	2.915	3.857	2.333	1.204	3.905	2.623	1.433	3.905	2.623
4 101.60	12.70	0.375	9.53	3.820	8.620	3.682	3.914	2.947	1.483	3.974	3.314	1.775	3.974	3.314
	13.70	0.413	10.49	3.820	8.620	4.005	3.956	3.204	1.690	4.020	3.605	2.011	4.020	3.605
	14.30	0.430	10.92	3.820	8.620	4.147	3.974	3.317	1.780	4.040	3.732	2.112	4.040	3.732
	14.70	0.449	11.40	3.820	8.620	4.304	3.994	3.443	1.880	4.062	3.873	2.224	4.062	3.873
	15.50	0.476	12.09	4.261	9.530	4.522	3.999	3.619	1.900	4.070	4.070	2.265	4.070	4.070
	16.70	0.510	12.95	4.261	9.530	4.791	4.033	3.832	2.072	4.108	4.314	2.455	4.108	4.314
4 101.60	18.35	0.575	14.61	4.261	9.530	5.284	4.095	4.230	2.388	4.178	4.766	2.819	4.178	4.766
	8.20	0.190	4.83	3.159	7.320	2.274	4.226	1.820	0.659	4.260	2.046	0.835	4.260	2.046
	9.50	0.226	5.74	3.159	7.320	2.680	4.275	2.144	0.916	4.314	2.412	1.131	4.314	2.412
10.90	0.262	6.65	3.159	7.320	3.077	4.322	2.461	1.169	4.367	2.768	1.415	4.367	2.768	

SC80 yield strength = 80 % yield strength VAM TOP ® Regular - SC90 yield strength = 90 % yield strength VAM TOP ® Regular

VAM TOP ® TECHNICAL DATA (OPTIONS)

Size (OD)	Nominal Weight	Wall Thickness		Make-up Loss	Coupling Length	Pipe Body Section	SC80			SC90			
		in	mm				Coupling OD	Coupling in	Face Area sq.in	Coupling OD	Coupling in	Face Area sq.in	Coupling OD	Coupling in	Face Area sq.in
4 <i>101.60</i>	11.60	0.286	7.26	3.159	7.320	3.337	4.352	2.671	1.338	4.401	3.004	1.602	
	12.10	0.289	7.59	3.159	7.320	3.476	4.369	2.782	1.426	4.419	3.129	1.708	
	13.20	0.330	8.38	3.159	7.320	3.805	4.406	3.043	1.635	4.461	3.424	1.942	
	14.80	0.380	9.65	4.041	9.090	4.322	4.417	3.458	1.686	4.479	3.689	2.043	
	16.10	0.415	10.54	4.041	9.090	4.674	4.458	3.740	1.919	4.524	4.207	2.298	
	16.50	0.430	10.92	4.041	9.090	4.823	4.475	3.856	2.015	4.543	4.338	2.400	
	18.90	0.500	12.70	4.545	10.080	5.498	4.524	4.399	2.298	4.601	4.948	2.733	
	22.20	0.610	15.49	4.545	10.080	6.496	4.635	5.197	2.936	4.724	5.848	3.454	
	4 1/2	10.50	0.224	5.69	3.222	7.440	3.009	4.771	2.407	1.007	4.812	2.709	1.248
	<i>114.30</i>	11.60	0.250	6.35	3.222	7.440	3.338	4.806	2.671	1.218	4.850	3.005	1.484
	12.60	0.271	6.88	3.222	7.440	3.600	4.834	2.880	1.381	4.881	3.240	1.674	
	13.50	0.290	7.37	3.222	7.440	3.836	4.859	3.069	1.533	4.909	3.452	1.840	
	15.10	0.337	8.56	3.222	7.440	4.407	4.918	3.525	1.902	4.975	3.965	2.250	
	17.00	0.380	9.65	4.041	9.090	4.918	4.925	3.935	1.945	4.988	4.425	2.337	
	17.70	0.402	10.21	4.041	9.090	5.175	4.952	4.140	2.106	5.018	4.658	2.520	
	18.90	0.430	10.92	4.041	9.090	5.498	4.985	4.397	2.312	5.054	4.948	2.754	
	21.50	0.500	12.70	4.545	10.080	6.283	5.037	5.025	2.646	5.116	5.653	3.144	
	23.70	0.560	14.22	4.545	10.080	6.932	5.102	5.546	3.060	5.188	6.240	3.616	
5 <i>127.00</i>	13.00	0.253	6.43	4.191	10.390	3.773	5.302	3.030	0.992	5.347	3.408	1.293	
	15.00	0.296	7.52	4.191	10.390	4.374	5.359	3.508	1.373	5.410	3.940	1.718	
	18.00	0.362	9.19	4.191	10.390	5.275	5.443	4.225	1.950	5.504	4.751	2.370	
	20.30	0.408	10.36	4.191	10.390	5.886	5.500	4.717	2.342	5.567	5.298	2.808	
	20.80	0.422	10.72	4.191	10.390	6.069	5.518	4.870	2.467	5.587	5.470	2.948	
	21.40	0.437	11.10	4.191	10.390	6.264	5.536	5.024	2.585	5.607	5.644	3.062	
	23.20	0.478	12.14	4.191	10.390	6.791	5.583	5.436	2.920	5.660	6.115	3.457	
	24.10	0.500	12.70	4.191	10.390	7.069	5.609	5.661	3.096	5.689	6.377	3.671	

SC80 yield strength = 80 % yield strength VAM TOP ® Regular - SC90 yield strength = 80 % yield strength VAM TOP ® Regular

VAM TOP ® TECHNICAL DATA (OPTIONS)

Size (OD)	Nominal Weight	Wall Thickness		Make-up Loss	Coupling Length	Pipe Body Section	SC80			SC90		
		in	mm				Coupling OD	in	Coupling Face Area	Coupling sq.in	CCS	sq.in	Coupling Face Area	CCS	sq.in
5 1/2 <i>139.70</i>	15.50	0.275	6.99	4.382	10.750	4.514	5.821	3.610	1.233	5.871	4.061	1.592
	17.00	0.304	7.72	4.382	10.750	4.962	5.861	3.971	1.519	5.916	4.481	1.926
	20.00	0.361	9.17	4.382	10.750	5.828	5.936	4.664	2.075	5.999	5.255	2.547
23.00	0.415	10.54	4.382	10.750	6.650	6.004	6.004	5.310	2.592	6.075	5.981	3.131
	26.00	0.476	12.09	4.382	10.750	7.513	6.079	6.020	3.162	6.158	6.777	3.761
	26.80	0.500	12.70	4.382	10.750	7.854	6.107	6.284	3.368	6.189	7.082	4.009
5 3/4 <i>146.05</i>	28.40	0.530	13.48	4.382	10.750	8.275	6.142	6.625	3.645	6.227	7.446	4.298
	29.70	0.562	14.27	4.382	10.750	8.718	6.180	6.986	3.932	6.268	7.852	4.628
	18.10	0.304	7.72	3.772	9.528	5.201	6.148	4.166	1.877	6.201	4.681	2.289
6 5/8 <i>163.28</i>	19.70	0.335	8.51	3.772	9.528	5.699	6.189	4.566	2.195	6.249	5.143	2.656
	21.80	0.375	9.53	3.772	9.528	6.335	6.241	5.065	2.593	6.306	5.706	3.106
	20.00	0.288	7.32	4.427	10.870	5.734	6.967	4.585	1.658	7.020	5.169	2.124
23.20	0.330	8.38	4.427	10.870	6.526	6.026	7.026	5.234	2.177	7.085	5.888	2.700
	24.00	0.352	8.94	4.427	10.870	6.937	7.056	5.560	2.453	7.119	6.262	2.994
	28.00	0.417	10.59	4.427	10.870	8.133	7.140	6.504	3.191	7.213	7.325	3.850
32.00	0.475	12.07	4.427	10.870	9.177	7.215	7.215	7.347	3.868	7.296	8.268	4.597
	36.70	0.562	14.27	4.427	10.870	10.705	7.321	8.561	4.836	7.414	9.632	5.688
	23.00	0.317	8.05	4.776	11.540	6.655	7.365	5.338	1.952	7.422	6.002	2.481
7 <i>177.80</i>	26.00	0.362	9.19	4.776	11.540	7.549	7.426	6.048	2.518	7.491	6.809	3.128
	29.00	0.408	10.36	4.776	11.540	8.449	7.487	6.763	3.090	7.560	7.623	3.780
	32.00	0.453	11.51	4.776	11.540	9.317	7.546	7.460	3.647	7.625	8.398	4.400
35.00	0.498	12.65	4.776	11.540	10.172	7.603	8.139	4.190	4.190	7.688	9.154	5.006
	38.00	0.540	13.72	4.776	11.540	10.959	7.656	8.776	4.707	7.747	9.870	5.578
	41.00	0.590	14.99	4.776	11.540	11.881	7.717	9.512	5.297	7.815	10.714	6.253
42.70	0.625	15.88	4.776	11.540	12.517	7.758	10.015	5.695	7.861	11.270	6.696	

SC80 yield strength = 80 % yield strength VAM TOP ® Regular - SC90 yield strength = 80 % yield strength VAM TOP ® Regular

VAM TOP ® TECHNICAL DATA (OPTIONS)

Size (OD)	Nominal Weight	Wall Thickness		Make-up Loss	Coupling Length	Pipe Body Section	SC80			SC90		
		in	mm				Coupling OD	Coupling CCS	Coupling Face Area	Coupling OD	Coupling CCS	Coupling Face Area
mm	lb/ft.	in	mm	in	in	sq.in	in	sq.in	sq.in	in	sq.in	sq.in
7 5/8 <i>193.68</i>	26.40	0.328	8.33	4.868	11.730	7.519	8.002	6.034	2.250	8.062	6.780	2.846
	29.70	0.375	9.53	4.868	11.730	8.541	8.067	6.854	2.907	8.134	7.705	3.589
	33.70	0.430	10.92	4.868	11.730	9.720	8.140	7.781	3.650	8.217	8.767	4.441
	35.80	0.465	11.81	4.868	11.730	10.460	8.188	8.387	4.132	8.268	9.430	4.970
	39.00	0.500	12.70	4.868	11.730	11.192	8.233	8.971	4.596	8.317	10.070	5.480
7 3/4 <i>196.85</i>	42.80	0.562	14.27	4.868	11.730	12.470	8.312	9.994	5.417	8.406	11.234	6.415
	45.30	0.595	15.11	4.868	11.730	13.141	8.353	10.535	5.847	8.451	11.834	6.892
	47.10	0.625	15.88	4.868	11.730	13.744	8.388	11.000	6.225	8.493	12.385	7.328
	46.10	0.595	15.11	4.915	11.850	13.374	8.477	10.723	5.927	8.575	12.040	6.987
	36.00	0.400	10.16	5.604	13.190	10.336	9.109	8.286	3.742	9.180	9.305	4.558
8 5/8 <i>219.08</i>	40.00	0.450	11.43	5.604	13.190	11.557	9.176	9.247	4.511	9.256	10.416	5.449
	44.00	0.500	12.70	5.604	13.190	12.763	9.243	10.216	5.287	9.331	11.509	6.325
	49.00	0.557	14.15	5.604	13.190	14.118	9.317	11.306	6.161	9.414	12.726	7.291
	52.00	0.595	15.11	5.604	13.190	15.010	9.367	12.028	6.736	9.467	13.513	7.932
	36.00	0.352	8.94	5.589	13.190	10.254	10.046	8.213	3.362	10.111	9.241	4.186
9 5/8 <i>244.48</i>	40.00	0.395	10.03	5.589	13.190	11.454	10.107	9.179	4.135	10.178	10.308	5.040
	43.50	0.435	11.05	5.589	13.190	12.559	10.162	10.056	4.835	10.241	11.318	5.848
	47.00	0.472	11.99	5.589	13.190	13.572	10.213	10.876	5.501	10.298	12.239	6.583
	53.50	0.545	13.84	5.589	13.190	15.546	10.312	12.462	6.785	10.406	14.000	8.001
	58.40	0.595	15.11	5.589	13.190	16.879	10.376	13.518	7.609	10.479	15.195	8.946
9 7/8 <i>250.83</i>	62.80	0.625	15.88	5.484	12.950	18.162	10.674	14.548	8.427	10.782	16.373	9.883
	65.30	0.650	16.51	5.484	12.950	18.838	10.705	15.077	8.857	10.817	16.974	10.372
	66.40	0.661	16.79	5.484	12.950	19.134	10.719	15.309	9.045	10.833	17.241	10.589
	66.90	0.668	16.97	5.484	12.950	19.322	10.729	15.475	9.167	10.843	17.410	10.725
	67.50	0.678	17.22	5.484	12.950	19.590	10.741	15.674	9.329	10.857	17.644	10.903
68.00	0.694	17.63	5.484	12.950	20.017	10.762	16.039	9.626	10.878	18.014	11.203	
68.90	0.700	17.78	5.484	12.950	20.177	10.768	16.139	9.707	10.888	18.182	11.340	
70.50	0.720	18.26	5.484	12.950	20.708	10.794	16.573	10.046	10.916	18.654	11.710	
72.00	0.725	18.42	5.484	12.950	20.841	10.800	16.673	10.127	10.922	18.755	11.792	

SC80 yield strength = 80 % yield strength VAM TOP ® Regular - SC90 yield strength = 90 % yield strength VAM TOP ® Regular

VAM TOP ® TECHNICAL DATA (OPTIONS)

Size (OD)	Nominal Weight	Wall Thickness		Make-up Loss	Coupling Length	Pipe Body Section	SC80				SC90				
		in	mm				Coupling OD	Coupling Face Area	Coupling sq.in	Coupling sq.in	Coupling OD	Coupling Face Area	Coupling sq.in	Coupling sq.in	
10	67.20	0.672	17.07	5.484	12.953	19.683	10.867	15.784	9.455	10.981	17.743	11.019	10.981	17.743	11.019
<i>254.00</i>	68.70	0.688	17.48	5.484	12.953	20.127	10.886	16.120	9.728	11.002	18.116	11.323	11.002	18.116	11.323
	71.80	0.722	18.34	5.484	12.953	21.045	10.950	16.861	10.317	11.052	18.969	12.002	11.052	18.969	12.002
10 3/4	45.50	0.400	10.16	5.634	13.270	13.006	11.239	10.402	4.701	11.313	11.727	5.764	11.313	11.727	5.764
<i>273.05</i>	51.00	0.450	11.43	5.634	13.270	14.561	11.310	11.658	5.707	11.392	13.132	6.891	11.392	13.132	6.891
	55.50	0.495	12.57	5.634	13.270	15.947	11.373	12.780	6.605	11.461	14.369	7.882	11.461	14.369	7.882
	60.70	0.545	13.84	5.634	13.270	17.473	11.439	13.978	7.565	11.538	15.754	8.980	11.538	15.754	8.980
	65.70	0.595	15.11	5.634	13.270	18.982	11.506	15.185	8.531	11.613	17.115	10.071	11.613	17.115	10.071
	71.10	0.650	16.51	5.634	13.270	20.625	11.579	16.504	9.590	11.691	18.555	11.228	11.691	18.555	11.228
	73.20	0.672	17.07	5.634	13.270	21.276	11.609	17.042	10.013	11.725	19.172	11.713	11.725	19.172	11.713
11 3/4	54.00	0.435	11.05	5.713	13.425	15.463	12.288	12.391	5.881	12.367	13.914	7.105	12.367	13.914	7.105
<i>298.45</i>	60.00	0.489	12.42	5.713	13.425	17.300	12.363	13.838	7.043	12.453	15.602	8.462	12.453	15.602	8.462
	65.00	0.534	13.56	5.713	13.425	18.816	12.426	15.064	8.024	12.522	16.954	9.544	12.522	16.954	9.544
	71.00	0.582	14.78	5.713	13.425	20.420	12.491	16.335	9.042	12.595	18.391	10.881	12.595	18.391	10.881
11 7/8	67.80	0.550	13.97	5.713	13.425	19.588	12.573	15.666	8.470	12.672	17.617	10.024	12.672	17.617	10.024
<i>301.63</i>	71.80	0.582	14.78	5.713	13.430	20.648	12.617	16.523	9.150	12.721	18.598	10.806	12.721	18.598	10.806
13 3/8	61.00	0.430	10.92	5.698	13.390	17.487	13.910	13.990	6.619	13.991	15.759	8.039	13.991	15.759	8.039
<i>339.73</i>	68.00	0.480	12.19	5.698	13.390	19.445	13.963	15.585	7.898	14.071	17.537	9.467	14.071	17.537	9.467
	72.00	0.514	13.06	5.698	13.390	20.768	14.030	16.625	8.743	14.125	18.713	10.406	14.125	18.713	10.406
	77.00	0.550	13.97	5.698	13.390	22.160	14.081	17.755	9.644	14.182	19.983	11.420	14.182	19.983	11.420
	80.70	0.580	14.73	5.698	13.390	23.314	14.123	18.670	10.371	14.227	20.993	12.223	14.227	20.993	12.223
	85.00	0.608	15.44	5.698	13.390	24.386	14.162	19.544	11.064	14.270	21.962	13.011	14.270	21.962	13.011
	86.00	0.625	15.88	5.698	13.390	25.035	14.184	20.026	11.455	14.296	22.537	13.459	14.296	22.537	13.459
13 5/8	88.20	0.625	15.88	5.698	13.390	25.525	14.436	20.437	11.698	14.548	22.991	13.738	14.548	22.991	13.738
<i>346.08</i>															

SC90 yield strength = 80 % yield strength VAM TOP ® Regular - SC90 yield strength = 80 % yield strength VAM TOP ® Regular

VAM TOP ® TORQUE VALUES

Size (OD) in	Nominal Weight lb/ft	Wall Thickness in	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi					
			min.	opti.	max.	min.	opti.	max.	min.	opti.	max.	min.	opti.	max.	min.	opti.	max.			
mm	mm	mm	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m		
2 3/8" 60.33	4.60	0.190	-	960	1 010	1 060	1 110	1 160	1 210	1 260	1 310	1 360	1 410	1 460	1 510	1 560	1 610	1 660	1 710	
	5.10	0.218	-	1 300	1 370	1 440	1 480	1 570	1 650	1 730	1 810	1 890	1 970	2 050	2 130	2 210	2 290	2 370	2 450	2 530
	5.80	0.254	-	1 620	1 700	1 780	1 850	1 940	2 030	2 120	2 210	2 300	2 390	2 480	2 570	2 660	2 750	2 840	2 930	3 020
	6.30	0.280	-	2 120	2 230	2 340	2 270	2 380	2 510	2 630	2 770	2 910	3 050	3 190	3 330	3 470	3 610	3 750	3 890	4 030
	6.60	0.285	-	2 420	2 550	2 680	2 630	2 770	2 910	3 050	3 190	3 330	3 470	3 610	3 750	3 890	4 030	4 170	4 310	4 450
	7.35	0.336	-	2 580	2 720	2 860	2 820	2 970	3 120	3 270	3 420	3 570	3 720	3 870	4 020	4 170	4 320	4 470	4 620	4 770
	7.80	0.376	-	3 080	3 250	3 410	3 370	3 550	3 730	3 910	4 090	4 270	4 450	4 630	4 810	4 990	5 170	5 350	5 530	5 710
	8.60	0.405	-	2 080	2 190	2 300	2 260	2 510	2 760	3 010	3 260	3 510	3 760	4 010	4 260	4 510	4 760	5 010	5 260	5 510
	9.35	0.440	-	2 170	2 280	2 390	2 360	2 620	2 880	3 140	3 400	3 660	3 920	4 180	4 440	4 700	4 960	5 220	5 480	5 740
	2 7/8" 73.03	8.60	0.308	-	2 510	2 640	2 770	2 750	3 050	3 350	3 650	3 950	4 250	4 550	4 850	5 150	5 450	5 750	6 050	6 350	6 650
9.35		0.340	-	3 400	3 580	3 760	3 730	4 140	4 550	4 960	5 370	5 780	6 190	6 600	7 010	7 420	7 830	8 240	8 650	9 060
9.80		0.362	-	2 890	3 040	3 190	3 150	3 490	3 830	4 170	4 510	4 850	5 190	5 530	5 870	6 210	6 550	6 890	7 230	7 570
10.50		0.392	-	3 920	4 120	4 320	4 270	4 740	5 210	5 680	6 150	6 620	7 090	7 560	8 030	8 500	8 970	9 440	9 910	10 380
10.70		0.405	-	3 120	3 280	3 440	3 420	3 800	4 180	4 560	4 940	5 320	5 700	6 080	6 460	6 840	7 220	7 600	7 980	8 360
11.50		0.440	-	4 220	4 440	4 660	4 700	5 200	5 700	6 200	6 700	7 200	7 700	8 200	8 700	9 200	9 700	10 200	10 700	11 200
11.80		0.440	-	3 440	3 620	3 800	3 780	4 180	4 600	5 020	5 440	5 860	6 280	6 700	7 120	7 540	7 960	8 380	8 800	9 220
12.00		0.450	-	4 650	4 900	5 150	5 100	5 700	6 300	6 900	7 500	8 100	8 700	9 300	9 900	10 500	11 100	11 700	12 300	12 900
12.50		0.475	-	3 520	3 700	3 880	3 900	4 330	4 760	5 190	5 620	6 050	6 480	6 910	7 340	7 770	8 200	8 630	9 060	9 490
13.00		0.500	-	4 750	5 000	5 250	5 300	5 900	6 500	7 100	7 700	8 300	8 900	9 500	10 100	10 700	11 300	11 900	12 500	13 100
13.50	0.525	-	3 970	4 170	4 370	4 200	4 680	5 120	5 560	6 000	6 440	6 880	7 320	7 760	8 200	8 640	9 080	9 520	9 960	10 400
14.00	0.550	-	5 300	5 600	5 900	5 700	6 300	6 900	7 500	8 100	8 700	9 300	9 900	10 500	11 100	11 700	12 300	12 900	13 500	

VAM TOP®

VAM TOP ® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
In mm	lb/ft	In mm	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m
2 3/8" 60.33	4.60	0.190	1 310	1 450	1 590	1 340	1 490	1 620	1 350	1 500	1 650
		4.83	1 770	1 970	2 170	1 810	2 010	2 210	1 840	2 040	2 240
	5.10	0.218	1 960	1 730	1 900	1 990	1 760	1 930	1 620	1 790	1 960
		5.54	2 110	2 340	2 570	2 150	2 390	2 630	2 190	2 430	2 670
	5.80	0.254	2 050	2 270	2 490	2 120	2 350	2 580	2 180	2 420	2 660
		6.45	2 270	3 080	3 390	2 870	3 190	3 510	2 960	3 290	3 620
	6.30	0.280	2 340	2 600	2 860	2 430	2 690	2 950	2 510	2 780	3 050
		7.11	3 180	3 530	3 880	3 280	3 650	4 020	3 390	3 770	4 150
	6.60	0.295	2 520	2 790	3 060	2 600	2 880	3 160	2 680	2 970	3 260
		7.49	3 410	3 790	4 170	3 510	3 900	4 290	3 630	4 030	4 430
7.35	0.336	2 980	3 310	3 640	3 070	3 410	3 750	3 170	3 520	3 870	
	8.53	4 040	4 490	4 940	4 170	4 630	5 090	4 300	4 780	5 260	
2 7/8" 73.03	6.40	0.217	1 920	2 130	2 340	1 980	2 170	2 380	1 990	2 210	2 430
	5.51	2 590	2 880	3 170	2 650	2 940	3 230	2 690	2 990	3 290	
7.80	0.276	3 000	3 330	3 660	3 060	3 390	3 720	3 110	3 450	3 790	
	7.01	4 060	4 510	4 960	4 140	4 600	5 060	4 210	4 680	5 150	
8.60	0.308	3 480	3 860	4 240	3 540	3 930	4 320	3 600	4 000	4 400	
	7.82	4 700	5 200	5 700	4 800	5 300	5 800	4 900	5 400	5 900	
9.35	0.340	3 960	4 390	4 820	4 040	4 480	4 920	4 110	4 560	5 010	
	8.64	5 400	6 000	6 600	5 500	6 100	6 700	5 600	6 200	6 800	
9.80	0.362	4 290	4 760	5 230	4 370	4 850	5 330	4 450	4 940	5 430	
	9.19	5 800	6 500	7 200	5 900	6 600	7 300	6 000	6 700	7 400	
10.50	0.392	4 750	5 270	5 790	4 840	5 370	5 900	4 930	5 470	6 010	
	9.96	6 400	7 100	7 800	6 600	7 300	8 000	6 700	7 400	8 100	
10.70	0.405	4 940	5 480	6 020	5 040	5 590	6 140	5 130	5 690	6 250	
	10.29	6 700	7 400	8 100	6 800	7 600	8 400	6 900	7 700	8 500	
11.50	0.440	5 580	6 190	6 800	5 760	6 400	7 040	5 950	6 610	7 270	
	11.18	7 600	8 400	9 200	7 800	8 700	9 600	8 100	9 000	9 900	

VAM TOP ® TORQUE VALUES

Size (OD) In mm	Nominal Weight lb/ft	Wall Thickness In mm	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi		
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
			ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	
3 1/2" 89.0	6.50	0.170	-	1 290	1 360	1 410	1 380	1 530	1 680	1 440	1 590	1 740	1 500	1 660	1 820		
		4.32	-	1 730	1 820	1 910	1 860	2 070	2 280	1 940	2 160	2 380	2 020	2 250	2 480		
	7.70	0.216	-	2 040	2 140	2 240	2 040	2 260	2 480	2 130	2 360	2 590	2 220	2 460	2 700		
		5.49	-	2 760	2 900	3 040	2 750	3 060	3 370	2 860	3 200	3 520	3 000	3 330	3 660		
	9.20	0.254	-	2 630	2 760	2 890	2 610	2 900	3 180	2 720	3 020	3 320	2 860	3 170	3 480		
		6.45	-	3 560	3 740	3 920	3 540	3 930	4 320	3 690	4 100	4 510	3 870	4 300	4 730		
	10.20	0.289	-	3 210	3 370	3 530	3 200	3 550	3 900	3 330	3 700	4 070	3 500	3 890	4 280		
		7.34	-	4 340	4 570	4 800	4 320	4 820	5 320	4 500	5 000	5 500	4 800	5 300	5 800		
	12.70	0.375	-	4 960	4 900	5 140	4 960	5 500	6 050	5 310	5 890	6 470	5 510	6 120	6 730		
		9.53	-	6 250	6 600	6 950	6 700	7 500	8 300	7 200	8 000	8 800	7 500	8 300	9 100		
13.70	0.413	-	5 200	5 470	5 740	5 610	6 230	6 860	6 020	6 660	7 340	6 230	6 920	7 610			
	10.49	-	7 050	7 400	7 750	7 600	8 500	9 400	8 200	9 100	10 000	8 500	9 400	10 300			
14.30	0.430	-	5 440	5 720	6 000	5 900	6 550	7 200	6 340	7 040	7 740	6 570	7 300	8 030			
	10.92	-	7 400	7 800	8 200	8 000	8 900	9 800	8 500	9 500	10 500	8 900	9 900	10 900			
14.70	0.449	-	5 700	6 000	6 300	6 210	6 890	7 570	6 660	7 430	8 170	6 930	7 700	8 470			
	11.40	-	7 700	8 100	8 500	8 400	9 300	10 200	9 100	10 100	11 100	9 400	10 400	11 400			
15.50	0.476	-	6 020	6 330	6 640	6 670	7 410	8 150	7 310	8 120	8 930	7 790	8 650	9 510			
	12.09	-	8 150	8 600	9 050	9 000	10 000	11 000	9 900	11 000	12 100	10 600	11 800	13 000			
16.70	0.510	-	6 470	6 810	7 150	7 160	7 950	8 740	7 880	8 750	9 620	8 420	9 350	10 280			
	12.95	-	8 750	9 200	9 650	9 700	10 800	11 900	10 700	11 900	13 100	11 400	12 700	14 000			
18.35	0.575	-	6 800	7 680	8 450	8 040	8 930	9 820	9 040	10 040	11 040	9 610	10 680	11 750			
	14.61	-	9 350	10 400	11 450	10 900	12 110	13 320	12 240	13 600	14 960	13 050	14 500	15 950			
4" 101.60	8.20	0.180	-	1 940	2 040	2 140	2 020	2 240	2 460	2 110	2 340	2 570	2 190	2 430	2 670		
	4.83	-	2 630	2 770	2 910	2 740	3 040	3 340	2 860	3 180	3 500	2 970	3 300	3 630			
9.50	0.226	-	2 670	2 810	2 950	2 660	2 950	3 240	2 780	3 060	3 360	2 950	3 270	3 560			
	5.74	-	3 610	3 800	3 990	3 600	4 000	4 400	3 760	4 180	4 600	3 960	4 430	4 870			
10.90	0.262	-	3 390	3 560	3 730	3 380	3 750	4 120	3 520	3 910	4 300	3 740	4 150	4 560			
	6.65	-	4 570	4 820	5 070	4 600	5 100	5 600	4 800	5 300	5 800	5 000	5 600	6 200			
11.60	0.286	-	3 660	4 060	4 460	3 850	4 280	4 710	4 010	4 460	4 910	4 260	4 730	5 200			
	7.28	-	4 950	5 500	6 050	5 220	5 800	6 380	5 450	6 050	6 650	5 770	6 410	7 050			
12.10	0.299	-	4 140	4 350	4 560	4 130	4 580	5 030	4 310	4 780	5 250	4 570	5 070	5 570			
	7.59	-	5 600	5 900	6 200	5 600	6 200	6 800	5 800	6 500	7 200	6 200	6 900	7 600			

VAM TOP ®

VAM TOP ® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in mm	lb/ft	in mm	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m
3 1/2" 88.90	6.50	0.170	1 540	1 710	1 880	1 570	1 740	1 910	1 620	1 800	1 980
		4.32	2 080	2 310	2 540	2 120	2 360	2 600	2 200	2 440	2 680
	7.70	0.216	2 350	2 610	2 870	2 440	2 710	2 980	2 630	2 910	3 080
		5.49	3 190	3 540	3 890	3 310	3 660	4 050	3 430	3 810	4 190
	9.20	0.254	3 030	3 380	3 680	3 160	3 490	3 830	3 280	3 620	3 960
		6.45	4 100	4 560	5 020	4 260	4 730	5 200	4 400	4 900	5 400
	10.20	0.269	3 710	4 120	4 530	3 680	4 280	4 700	3 980	4 430	4 870
		7.34	5 000	5 600	6 200	5 200	5 800	6 400	5 400	6 000	6 600
	12.70	0.375	5 680	6 310	6 940	5 800	6 440	7 080	5 900	6 550	7 200
		9.53	7 700	8 600	9 500	7 800	8 700	9 600	8 000	8 900	9 800
13.70	0.413	6 440	7 150	7 860	6 570	7 290	8 010	6 680	7 420	8 160	
	10.49	8 700	9 700	10 700	8 900	9 900	10 900	9 100	10 100	11 100	
14.30	0.430	6 790	7 540	8 290	6 920	7 680	8 440	7 040	7 820	8 600	
	10.92	9 200	10 200	11 200	9 400	10 400	11 400	9 500	10 600	11 700	
14.70	0.449	7 170	7 960	8 750	7 300	8 110	8 920	7 440	8 260	9 080	
	11.40	9 700	10 800	11 900	9 900	11 000	12 100	10 100	11 200	12 300	
15.50	0.476	8 060	8 950	9 840	8 240	9 150	10 060	8 370	9 300	10 230	
	12.09	10 800	12 100	13 300	11 200	12 400	13 600	11 300	12 600	13 900	
16.70	0.510	8 890	9 850	10 810	8 950	9 950	10 750	9 000	10 000	11 000	
	12.95	11 800	13 100	14 400	12 100	13 400	14 700	12 200	13 600	15 000	
18.35	0.575	9 930	11 030	12 130	10 130	11 250	12 400	10 300	11 450	12 600	
	14.61	13 460	14 950	16 450	13 700	15 250	16 800	13 950	15 500	17 050	
8.20	0.190	2 260	2 510	2 760	2 350	2 610	2 870	2 440	2 710	2 980	
	4.83	3 060	3 400	3 740	3 190	3 540	3 890	3 300	3 670	4 040	
9.50	0.226	3 140	3 480	3 820	3 260	3 620	3 980	3 380	3 750	4 120	
	5.74	4 250	4 720	5 190	4 400	4 900	5 400	4 600	5 100	5 600	
10.90	0.262	3 980	4 420	4 860	4 140	4 600	5 060	4 300	4 770	5 240	
	6.65	5 400	6 000	6 600	5 600	6 200	6 800	5 800	6 500	7 200	
11.60	0.286	4 530	5 030	5 530	4 710	5 230	5 750	4 890	5 430	5 970	
	7.26	6 150	6 830	7 510	6 380	7 090	7 800	6 620	7 360	8 100	
12.10	0.299	4 860	5 400	5 940	5 060	5 610	6 170	5 240	5 820	6 400	
	7.59	6 600	7 300	8 000	6 800	7 500	8 200	7 100	7 900	8 700	
4" 101.60											

VAM TOP ® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in	lb/ft	in	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	
4" 101.60	13.20	0.330	-	4 750	4 980	5 230	4 730	5 250	5 770	4 940	5 480	6 020	5 220	5 790	6 360	6 930	
			-	6 450	6 800	7 150	6 400	7 100	7 800	6 700	7 400	8 100	7 100	7 900	8 700	9 500	
	14.80	0.380	-	5 910	6 220	6 530	6 250	6 630	7 030	6 800	7 250	7 670	6 770	7 520	8 270	9 020	
			-	8 000	8 400	8 800	8 500	9 400	10 300	8 800	9 800	10 800	9 200	10 200	11 200	12 200	
	16.10	0.415	-	6 850	6 980	7 330	7 070	7 850	8 630	7 380	8 190	9 000	7 850	8 500	9 350	10 200	
			-	9 000	9 500	10 000	9 500	10 600	11 700	10 000	11 100	12 200	10 300	11 500	12 700	14 000	
	16.50	0.430	-	6 820	7 280	7 640	7 400	8 220	9 040	7 740	8 600	9 480	8 010	8 900	9 790	10 700	
			-	9 400	9 900	10 400	10 100	11 200	12 300	10 400	11 600	12 800	10 900	12 100	13 300	14 600	
	18.90	0.500	-	8 030	8 450	8 870	9 000	9 900	10 800	9 800	10 800	11 800	10 150	11 250	12 350	13 500	
			-	10 850	11 400	11 950	12 100	13 400	14 700	13 200	14 700	16 200	13 700	15 200	16 700	18 200	
22.20	0.610	-	9 800	10 400	10 900	11 000	12 200	13 400	12 300	13 700	15 100	13 100	14 500	15 900	17 400		
		-	13 400	14 100	14 800	14 800	16 500	18 200	16 600	18 400	20 200	17 600	19 600	21 600	23 600		
4 1/2" 114.30	10.50	0.224	-	2 890	3 040	3 190	2 890	3 210	3 530	3 150	3 490	3 830	3 390	3 760	4 130	4 500	
			-	3 930	4 130	4 340	3 910	4 350	4 790	4 260	4 730	5 200	4 600	5 100	5 600	6 100	
	11.60	0.250	-	3 440	3 620	3 800	3 500	3 880	4 280	3 800	4 220	4 640	4 080	4 540	4 990	5 450	
			-	4 650	4 900	5 150	4 800	5 300	5 800	5 100	5 700	6 300	5 600	6 200	6 800	7 400	
	12.60	0.271	-	3 890	4 080	4 290	4 000	4 440	4 880	4 340	4 820	5 300	4 680	5 200	5 720	6 240	
			-	5 200	5 500	5 800	5 400	6 000	6 600	5 800	6 500	7 200	6 300	7 000	7 700	8 400	
	13.50	0.290	-	4 370	4 600	4 830	4 450	4 940	5 430	4 830	5 360	5 890	5 200	5 770	6 340	6 910	
			-	5 800	6 200	6 600	6 000	6 700	7 400	6 600	7 300	8 000	7 000	7 800	8 600	9 400	
	15.10	0.337	-	5 490	5 770	6 060	5 550	6 160	6 770	6 010	6 670	7 330	6 460	7 170	7 880	8 590	
			-	7 400	7 800	8 200	7 500	8 300	9 100	8 100	9 000	9 900	8 700	9 700	10 700	11 700	
17.00	0.380	-	6 880	7 240	7 600	6 820	7 350	8 080	7 140	7 830	8 720	7 650	8 500	9 350	10 200		
		-	9 300	9 800	10 300	9 000	10 000	11 000	9 600	10 700	11 800	10 300	11 500	12 700	13 900		
17.70	0.402	-	7 500	7 890	8 280	7 190	7 980	8 770	7 740	8 600	9 480	8 280	9 200	10 120	11 040		
		-	10 150	10 700	11 250	9 700	10 800	11 900	10 500	11 700	12 900	11 200	12 500	13 800	15 100		
18.90	0.430	-	8 270	8 700	9 140	7 920	8 800	9 690	8 550	9 600	10 450	9 200	10 200	11 200	12 200		
		-	11 200	11 800	12 400	10 800	12 000	13 200	11 600	12 900	14 200	12 400	13 800	15 200	16 600		
21.50	0.500	-	10 100	10 600	11 100	9 950	11 050	12 150	10 400	11 600	12 800	11 160	12 360	13 560	14 760		
		-	13 700	14 400	15 100	13 500	15 000	16 500	14 000	15 600	17 200	15 000	16 700	18 400	20 100		
23.70	0.580	-	11 350	11 900	12 450	11 450	12 650	13 850	11 750	13 050	14 350	12 600	14 000	15 400	16 800		
		-	15 300	16 100	16 900	15 400	17 100	18 800	15 900	17 700	19 500	17 100	19 000	20 900	22 800		



VAM TOP ® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
In mm	lb/ft	In mm	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m
4" 101.60	13.20	0.330	5 550	6 160	6 770	5 760	6 400	7 040	5 970	6 630	7 280
		8.38	7 600	8 400	9 200	7 800	8 700	9 600	8 100	9 000	9 900
	14.80	0.380	7 000	7 770	8 540	7 130	7 920	8 710	7 320	8 130	8 940
		9.65	9 400	10 500	11 600	9 600	10 700	11 800	9 900	11 000	12 100
	16.10	0.415	7 880	8 750	9 620	8 060	8 950	9 840	8 240	9 150	10 060
		10.54	10 700	11 900	13 100	10 900	12 100	13 300	11 200	12 400	13 600
	16.50	0.430	8 280	9 200	10 120	8 420	9 350	10 280	8 640	9 600	10 560
		10.92	11 200	12 500	13 800	11 400	12 700	14 000	11 700	13 000	14 300
	18.90	0.500	10 500	11 600	12 700	10 700	11 800	12 900	10 850	12 050	13 250
		12.70	14 100	15 700	17 300	14 400	16 000	17 600	14 700	16 300	17 900
22.20	0.610	13 550	14 950	16 350	13 750	15 250	16 750	14 000	15 500	17 000	
	15.49	18 300	20 300	22 300	18 600	20 700	22 800	18 900	21 000	23 100	
4 1/2" 114.30	10.50	0.224	3 620	4 020	4 420	3 780	4 200	4 620	3 940	4 370	4 800
		5.69	4 900	5 500	6 100	5 100	5 700	6 300	5 300	5 900	6 500
	11.60	0.250	4 380	4 860	5 340	4 570	5 070	5 570	4 780	5 280	5 800
		6.35	5 900	6 600	7 300	6 200	6 900	7 600	6 500	7 200	7 900
	12.60	0.271	5 010	5 560	6 110	5 220	5 800	6 390	5 430	6 030	6 630
		6.88	6 700	7 500	8 300	7 100	7 900	8 700	7 400	8 200	9 000
	13.50	0.290	5 560	6 170	6 780	5 790	6 430	7 070	6 030	6 680	7 350
		7.37	7 600	8 400	9 200	7 800	8 700	9 600	8 200	9 100	10 000
	15.10	0.337	6 890	7 650	8 410	7 180	7 970	8 760	7 470	8 290	9 110
		8.56	9 400	10 400	11 400	9 700	10 800	11 900	10 100	11 200	12 300
17.00	0.380	8 150	9 050	9 950	8 460	9 400	10 340	8 780	9 750	10 720	
	9.65	11 000	12 200	13 400	11 400	12 700	14 000	11 900	13 200	14 500	
17.70	0.402	8 900	9 800	10 700	9 200	10 200	11 200	9 650	10 650	11 650	
	10.21	12 000	13 300	14 600	12 400	13 800	15 200	12 900	14 300	15 700	
18.90	0.430	9 850	10 850	11 850	10 150	11 250	12 350	10 550	11 650	12 750	
	10.92	13 200	14 700	16 200	13 600	15 300	16 800	14 200	15 800	17 400	
21.50	0.500	11 800	13 100	14 400	12 300	13 600	14 900	12 650	14 050	15 450	
	12.70	16 000	17 800	19 600	16 600	18 400	20 200	17 200	19 100	21 000	
23.70	0.560	13 450	14 850	16 250	13 950	15 450	16 950	14 400	16 000	17 600	
	14.22	18 200	20 200	22 200	18 800	20 900	23 000	19 500	21 700	23 900	

VAM TOP ® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi		
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
in	lb/ft	in	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	
5" 127.00	13.00	0.263	3000	3330	3660	3 330	3 890	4 050	4 120	4 530	4 230	4 700	5 170	4 560	5 060	5 660	
		6.43	4060	4510	4960	4 500	5 000	5 500	5 000	5 600	6 200	5 800	6 400	7 000	6 200	6 900	7 600
	15.00	0.298	3810	4340	4770	4 230	4 700	5 170	4 860	5 060	5 560	5 220	5 790	6 360	5 960	6 510	7 160
		7.52	5300	5900	6500	6 800	7 400	8 000	7 000	7 600	8 200	7 000	7 600	8 200	8 800	9 400	10 000
	18.00	0.362	4560	5060	5560	4 880	5 420	5 960	5 220	5 790	6 360	5 540	6 150	6 760	6 180	6 870	7 650
		9.19	6200	6900	7600	6 700	7 400	8 100	7 000	7 800	8 600	7 500	8 300	9 100	8 400	9 300	10 200
	20.30	0.408	5540	6150	6760	5 960	6 510	7 160	6 510	7 230	7 950	7 170	7 960	8 750	8 150	9 050	9 950
		10.36	7500	8300	9100	7 900	8 800	9 700	8 800	9 800	10 800	9 700	10 800	11 900	11 100	12 300	13 500
	20.90	0.422	5860	6510	7160	6 510	7 230	7 950	7 170	7 960	8 750	7 830	8 700	9 570	8 780	9 750	10 720
		10.72	7900	8800	9700	8 800	9 800	10 800	8 800	10 800	11 900	10 600	11 800	13 000	11 900	13 200	14 500
21.40	0.437	6190	6870	7550	6 840	7 590	8 340	7 470	8 300	9 130	8 460	9 400	10 340	9 150	10 150	11 150	
	11.10	8400	9300	10200	9 300	10 300	11 300	10 200	11 300	12 400	11 400	12 700	14 000	12 300	13 700	15 100	
23.20	0.478	7170	7960	8750	8 150	9 050	9 950	8 780	9 750	10 720	9 500	10 500	11 500	10 850	11 950	13 050	
	12.14	9700	10800	11900	11 100	12 300	13 500	11 900	13 200	14 500	12 800	14 200	15 600	14 600	16 200	17 800	
24.10	0.500	8010	8900	9790	8 730	9 700	10 670	9 900	11 000	12 100	11 050	12 250	13 450	12 300	13 600	14 900	
	12.70	10800	12000	13200	11 900	13 200	14 500	13 400	14 900	16 400	14 900	16 600	18 300	16 600	18 400	20 200	
5 1/2" 139.70	14.00	0.244	3190	3540	3890	3 590	3 980	4 370	4 040	4 480	4 040	4 480	4 920	4 560	5 060	5 660	
	6.20	4330	4810	5290	4 900	5 400	5 900	5 500	6 100	6 700	6 200	6 900	7 600	6 800	7 600	8 400	
15.50	0.275	3590	3980	4370	4 230	4 700	5 170	4 660	5 060	5 560	5 220	5 790	6 360	5 860	6 510	7 160	
	6.99	4800	5400	5900	5 800	6 400	7 000	6 200	6 900	7 600	7 000	7 800	8 600	7 900	8 800	9 700	
17.00	0.304	3810	4340	4770	4 560	5 060	5 560	4 880	5 420	5 960	5 540	6 150	6 760	6 180	6 870	7 650	
	7.72	5300	5900	6500	6 200	6 900	7 600	6 700	7 400	8 100	7 500	8 300	9 100	8 400	9 300	10 200	
20.00	0.361	4880	5420	5960	5 220	5 790	6 360	5 860	6 510	7 160	6 510	7 230	7 950	6 840	7 590	8 340	
	9.17	6700	7400	8100	7 000	7 800	8 600	7 900	8 800	9 700	8 800	9 800	10 800	9 300	10 300	11 300	
23.00	0.415	6190	6870	7550	6 840	7 590	8 340	7 470	8 300	9 130	8 150	9 050	9 950	9 500	10 500	11 500	
	10.54	8400	9300	10200	9 300	10 300	11 300	10 200	11 300	12 400	11 100	12 300	13 500	12 800	14 200	15 600	
26.00	0.478	7830	8700	9570	8 780	9 750	10 720	9 850	10 850	11 850	10 850	11 950	13 050	12 450	13 750	15 050	
	12.09	10600	11800	13000	11 900	13 200	14 500	13 200	14 700	16 200	14 600	16 200	17 800	16 700	18 600	20 500	
28.80	0.500	8730	9700	10670	9 700	10 700	11 700	11 000	12 200	13 400	12 400	13 700	15 000	13 700	15 200	16 700	
	12.70	11900	13200	14500	13 000	14 500	16 000	14 800	16 500	18 200	16 700	18 600	20 500	18 500	20 600	22 700	
28.40	0.530	9750	10750	11750	10 750	11 850	12 850	12 200	13 500	14 800	13 650	15 150	16 650	15 250	16 850	18 450	
	13.46	13100	14600	16100	14 400	16 000	17 600	16 500	18 300	20 100	18 500	20 600	22 700	20 600	22 900	25 200	
28.70	0.562	10800	11700	12800	11 750	13 050	14 350	13 500	14 900	16 300	15 200	16 800	18 400	16 850	18 650	20 450	
	14.27	14300	15900	17500	15 900	17 700	19 500	18 200	20 200	22 200	20 500	22 800	25 100	22 800	25 300	27 800	

VAM TOP • TORQUE VALUES

Size (OD)	Nominal Weight lb/ft	Wall Thickness in mm	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
			ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m
6" 127.00	13.00	0.263	5 220	5 790	6 360	5 540	6 150	6 760	5 860	6 510	7 160
		6.43	7 000	7 900	8 600	7 500	8 300	9 100	7 900	8 600	9 700
	15.00	0.296	6 510	7 230	7 950	6 840	7 590	8 340	7 170	7 960	8 750
		7.52	8 800	9 800	10 800	9 300	10 300	11 300	9 700	10 800	11 900
	18.00	0.362	6 840	7 590	8 340	7 170	7 960	8 750	7 830	8 700	9 570
		9.19	9 300	10 300	11 300	9 700	10 800	11 900	10 600	11 800	13 000
	20.30	0.408	8 790	9 750	10 720	9 500	10 500	11 500	10 100	11 200	12 300
		10.36	11 900	13 200	14 500	12 800	14 200	15 600	13 700	15 200	16 700
	20.80	0.422	9 500	10 500	11 500	10 450	11 550	12 650	11 100	12 300	13 500
		10.72	12 800	14 200	15 600	14 100	15 700	17 300	15 000	16 700	18 400
	21.40	0.437	9 850	10 850	11 850	10 850	11 950	13 050	11 700	13 000	14 300
		11.10	13 200	14 700	16 200	14 600	16 200	17 800	15 900	17 700	19 500
23.20	0.478	12 100	13 400	14 700	12 700	14 100	15 500	13 700	15 200	16 700	
	12.14	16 300	18 100	19 900	17 200	19 100	21 000	18 500	20 600	22 700	
24.10	0.500	13 500	14 900	16 300	14 400	16 000	17 600	15 400	17 100	18 800	
	12.70	18 200	20 200	22 200	19 500	21 700	23 900	20 900	23 200	25 500	
6 1/2" 139.70	14.00	0.244	5 670	6 290	6 910	6 120	6 800	7 480	6 510	7 230	7 950
		6.20	7 600	8 500	9 400	8 300	9 200	10 100	8 800	9 800	10 800
	15.50	0.275	6 510	7 230	7 950	7 170	7 960	8 750	7 470	8 300	9 130
		6.99	8 800	9 800	10 800	9 700	10 800	11 900	10 200	11 300	12 400
	17.00	0.304	6 840	7 590	8 340	7 470	8 300	9 130	7 830	8 700	9 570
		7.72	9 300	10 300	11 300	10 200	11 300	12 400	10 600	11 800	13 000
	20.00	0.361	7 470	8 300	9 130	8 150	9 050	9 950	8 460	9 400	10 340
		9.17	10 200	11 300	12 400	11 100	12 300	13 500	11 400	12 700	14 000
	23.00	0.415	10 100	11 200	12 300	11 100	12 300	13 500	11 700	13 000	14 300
		10.54	13 700	15 200	16 700	15 000	16 700	18 400	15 900	17 700	19 500
	26.00	0.476	13 700	15 200	16 700	15 050	16 650	18 250	15 650	17 350	19 050
		12.09	18 500	20 600	22 700	20 300	22 600	24 900	21 100	23 500	25 900
26.80	0.500	15 200	16 800	18 400	16 300	18 100	19 900	17 500	19 400	21 300	
	12.70	20 400	22 700	25 000	22 000	24 500	27 000	23 700	26 300	28 900	
26.40	0.550	16 800	18 600	20 400	18 050	20 050	22 050	19 400	21 500	23 600	
	13.46	22 700	25 200	27 700	24 500	27 900	30 200	26 200	29 100	32 000	
28.70	0.562	18 600	20 600	22 600	20 000	22 200	24 400	20 850	23 150	25 450	
	14.27	25 100	27 900	30 700	27 100	30 100	33 100	28 300	31 400	34 500	

VAM TOP ® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	
In mm	lb/ft	In mm	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m		
5 3/4" 146.05	18.10	0.304	4370	4850	5330	5 540	6 150	6 760	6 250	6 940	7 630	7 170	7 960	8 750	7 830	8 700	9 570	
			7.72	5900	6600	7300	7 500	8 300	9 100	8 500	9 400	10 300	9 700	10 800	11 900	10 600	11 800	13 000
			0.335	5040	5610	6170	5 590	6 210	6 830	6 430	7 150	7 860	7 280	8 100	8 910	8 170	9 080	9 980
			8.51	6800	7600	8400	7 600	8 400	9 300	8 700	9 700	10 700	9 900	11 000	12 100	11 100	12 300	13 500
			0.375	5980	6650	7310	6 620	7 360	8 090	7 630	8 480	9 320	8 640	9 610	10 570	9 670	10 750	11 820
6 5/8" 168.28	20.00	0.288	4230	4700	5170	4 880	5 420	5 960	5 540	6 150	6 760	6 190	6 870	7 550	7 170	7 960	8 750	
			7.32	5800	6400	7000	6 700	7 400	8 100	7 500	8 300	9 100	8 400	9 300	10 200	9 700	10 800	11 900
			0.330	4560	5060	5560	5 220	5 780	6 360	5 860	6 510	7 160	6 610	7 230	7 950	7 470	8 300	9 130
			8.38	6200	6900	7600	7 000	7 800	8 600	7 900	8 800	9 700	8 800	9 800	10 800	10 200	11 300	12 400
			0.362	4680	5420	5960	5 540	6 150	6 760	6 190	6 870	7 550	6 840	7 590	8 340	7 630	8 700	9 570
7	23.00	0.317	5540	6150	6760	6 190	6 870	7 550	6 840	7 590	8 340	7 470	8 300	9 130	8 460	9 400	10 340	
			8.05	7500	8300	9100	8 400	9 300	10 200	9 300	10 300	11 300	10 200	11 300	12 400	11 400	12 700	14 000
			0.362	6190	6870	7550	6 840	7 590	8 340	7 470	8 300	9 130	8 150	9 050	9 950	9 150	10 150	11 150
			9.19	8400	9300	10200	9 300	10 300	11 300	10 200	11 300	12 400	11 100	12 300	13 500	12 300	13 700	15 100
			0.408	7170	7960	8750	7 630	8 700	9 570	8 460	9 400	10 340	9 150	10 150	11 150	10 460	11 550	12 680
32.00	0.475	0.417	8790	9750	10720	9 500	10 500	11 500	10 850	11 950	13 050	11 700	13 000	14 300	13 050	14 450	15 850	
			12.07	11900	13200	14500	12 800	14 200	15 600	14 600	16 200	17 800	15 900	17 700	19 500	17 600	19 600	21 600
			0.562	11700	13000	14300	12 700	14 100	15 500	14 400	15 900	17 400	16 000	17 700	19 400	17 660	19 550	21 450
			14.27	15900	17700	19500	17 200	19 100	21 000	19 400	21 600	23 800	21 600	24 000	26 400	23 800	26 500	29 200
			0.562	11700	13000	14300	12 700	14 100	15 500	14 400	15 900	17 400	16 000	17 700	19 400	17 660	19 550	21 450
177.80	38.00	0.540	11460	12680	13860	12 700	14 100	15 500	14 050	15 560	17 050	15 680	17 360	19 050	17 000	18 800	20 600	
			13.72	15500	17200	18900	17 200	19 100	21 000	19 000	21 100	23 200	21 100	23 500	25 900	22 900	25 500	28 100
			0.590	13050	14450	15850	15 050	16 650	18 250	16 300	18 100	19 900	18 250	20 250	22 250	19 600	21 700	23 800
			14.99	17600	19600	21600	20 300	22 600	24 900	22 000	24 500	27 000	24 700	27 500	30 300	26 500	29 400	32 300
			0.625	15050	16650	18250	16 300	18 100	19 900	18 250	20 250	22 250	20 850	23 150	25 450	20 850	23 150	25 450
7	42.70	0.625	20300	22600	24900	22 000	24 500	27 000	24 700	27 500	30 300	28 300	31 400	34 500	28 300	31 400	34 500	
			20300	22600	24900	22 000	24 500	27 000	24 700	27 500	30 300	28 300	31 400	34 500	28 300	31 400	34 500	



VAM TOP ® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
In mm	lb/ft	In mm	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m
5 3/4" 146.05	18.10	0.304	8 480	9 400	10 340	8 780	9 750	10 720	9 150	10 150	11 150
			11 400	12 700	14 000	11 900	13 200	14 500	12 300	13 700	15 100
	19.70	0.335	9 040	10 050	11 050	9 810	10 800	11 800	10 500	11 700	12 800
			12 300	13 600	15 000	13 300	14 800	16 300	14 200	15 900	17 400
	21.80	0.375	10 750	11 950	13 140	11 610	12 900	14 190	12 500	13 900	15 200
		14 600	16 200	17 800	15 700	17 500	19 200	16 900	18 800	20 600	
6 5/8" 168.28	20.00	0.288	7 830	8 700	9 570	8 480	9 400	10 340	9 150	10 150	11 150
			10 600	11 800	13 000	11 400	12 700	14 000	12 300	13 700	15 100
	23.20	0.330	8 150	9 050	9 950	8 780	9 750	10 720	9 500	10 500	11 500
			11 100	12 300	13 500	11 900	13 200	14 500	12 800	14 200	15 600
	24.00	0.352	8 480	9 400	10 340	9 150	10 150	11 150	9 850	10 850	11 850
		11 400	12 700	14 000	12 300	13 700	15 100	13 200	14 700	16 200	
7"	28.00	0.417	11 100	12 300	13 500	11 700	13 000	14 300	12 450	13 750	15 050
			15 000	16 700	18 400	15 900	17 700	19 500	16 700	18 600	20 500
	32.00	0.475	14 400	15 900	17 400	15 300	17 000	18 700	16 300	18 100	19 900
			19 400	21 600	23 800	20 700	23 000	25 300	22 000	24 500	27 000
	36.70	0.562	19 600	21 700	23 800	20 850	23 150	25 450	20 850	23 150	25 450
		26 500	29 400	32 300	28 300	31 400	34 500	28 300	31 400	34 500	
7" 177.80	23.00	0.317	9 150	10 150	11 150	10 100	11 200	12 300	10 850	11 950	13 050
			12 300	13 700	15 100	13 700	15 200	16 700	14 600	16 200	17 800
	26.00	0.362	9 850	10 850	11 850	10 850	11 950	13 050	11 450	12 650	13 850
			13 200	14 700	16 200	14 600	16 200	17 800	15 500	17 200	18 900
	29.00	0.408	11 100	12 300	13 500	11 700	13 000	14 300	12 450	13 750	15 050
		15 000	16 700	18 400	15 900	17 700	19 500	16 700	18 600	20 500	
8"	32.00	0.463	13 400	14 800	16 200	14 400	15 900	17 400	15 050	16 650	18 250
			18 100	20 100	22 100	19 400	21 600	23 800	20 300	22 600	24 900
	35.00	0.498	16 300	18 100	19 900	17 600	19 500	21 400	18 900	21 000	23 100
			22 000	24 500	27 000	23 800	26 500	29 200	25 600	28 400	31 200
	38.00	0.540	16 900	21 000	23 100	20 200	22 400	24 600	20 850	23 150	25 450
		25 600	28 400	31 200	27 400	30 400	33 400	28 300	31 400	34 500	
9"	41.00	0.590	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	44.00	0.640	24 500	27 400	30 300	24 500	27 400	30 300	24 500	27 400	30 300
			31 400	34 500	37 600	31 400	34 500	37 600	31 400	34 500	37 600
	47.00	0.695	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
		37 600	40 700	43 800	37 600	40 700	43 800	37 600	40 700	43 800	

VAM TOP ® TORQUE VALUES

Size (OD) in mm	Nominal Weight lb/ft	Wall Thickness in mm	55 ksi			65 ksi			75-80 ksi			90-95-100 ksi			105-110-115 ksi			
			min.	opti.	max.	min.	opti.	max.	min.	opti.	max.	min.	opti.	max.	min.	opti.	max.	
			ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m			
7 5/8" 193.68	26.40	0.328	6510	7230	7950	7 170	7 960	8 750	8 150	9 050	9 950	9 150	10 150	11 150	10 450	11 550	12 650	
		8.33	6800	9800	10800	9 700	10 800	11 900	11 100	12 300	13 500	12 300	13 700	15 100	14 100	15 700	17 300	
	29.70	0.375	7170	7960	8750	7 830	8 700	9 570	8 460	9 400	10 340	9 850	10 850	11 850	11 100	12 300	13 500	
		9.53	9700	10800	11900	10 600	11 800	13 000	11 400	12 700	14 000	13 200	14 700	16 200	15 000	16 700	18 400	
	33.70	0.430	7830	8700	9570	8 460	9 400	10 340	9 150	10 150	11 150	10 450	11 550	12 650	11 700	13 000	14 300	
		10.92	10600	11800	13000	11 400	12 700	14 000	12 300	13 700	15 100	14 100	15 700	17 300	15 900	17 700	19 500	
	35.80	0.465	9150	10150	11150	10 100	11 200	12 300	11 100	12 300	13 500	12 450	13 750	15 050	13 700	15 200	16 700	
		11.81	12300	13700	15100	13 700	15 200	16 700	15 000	16 700	18 400	16 700	18 600	20 500	18 500	20 600	22 700	
	39.00	0.500	10450	11550	12650	11 700	13 000	14 300	13 050	14 450	15 850	14 400	15 900	17 400	16 300	18 100	19 900	
		12.70	14100	15700	17300	15 900	17 700	19 500	17 600	19 600	21 600	19 400	21 600	23 800	22 000	24 500	27 000	
7 3/4" 196.85	42.80	0.562	13700	15200	16700	14 950	16 250	17 850	17 000	18 800	20 800	18 900	21 000	23 100	20 850	23 150	25 450	
		14.27	18500	20600	22700	19 900	22 100	24 300	22 900	25 500	28 100	25 600	28 400	31 200	28 300	31 400	34 500	
	45.30	0.595	15050	16650	18250	16 300	18 100	19 900	18 900	21 000	23 100	20 850	23 150	25 450	20 850	23 150	25 450	
		15.11	20300	22600	24900	22 000	24 500	27 000	25 600	28 400	31 200	28 300	31 400	34 500	28 300	31 400	34 500	
	47.10	0.625	16500	18100	19900	18 000	19 900	21 800	20 200	22 400	24 600	20 850	23 150	25 450	20 850	23 150	25 450	
		15.88	22000	24500	27000	24 300	27 000	29 700	27 400	30 400	33 400	28 300	31 400	34 500	28 300	31 400	34 500	
	48.10	0.595	15050	16650	18250	17 000	18 800	20 600	18 250	20 250	22 250	20 850	23 150	25 450	20 850	23 150	25 450	
		15.11	20300	22600	24900	22 900	25 500	28 100	24 700	27 500	30 300	28 300	31 400	34 500	28 300	31 400	34 500	
	8 5/8" 219.08	36.00	0.400	7170	7960	8750	7 470	8 300	9 130	8 150	9 050	9 950	9 150	10 150	11 150	9 850	10 850	11 850
			10.16	9700	10800	11900	10 200	11 300	12 400	11 100	12 300	13 500	12 300	13 700	15 100	13 200	14 700	16 200
40.00		0.450	9150	10150	11150	10 450	11 550	12 650	11 100	12 300	13 500	12 450	13 750	15 050	13 700	15 200	16 700	
		11.43	12300	13700	15100	14 100	15 700	17 300	15 000	16 700	18 400	16 700	18 600	20 500	18 500	20 600	22 700	
44.00		0.500	11700	13000	14300	13 400	14 800	16 200	15 050	16 650	18 250	16 300	18 100	19 900	18 250	20 250	22 250	
		12.70	15900	17700	19500	18 100	20 100	22 100	20 200	22 600	25 000	22 000	24 500	27 000	24 700	27 500	30 300	
48.00		0.557	15050	16650	18250	17 000	18 800	20 600	18 900	21 000	23 100	20 200	22 400	24 600	20 850	23 150	25 450	
		14.15	20300	22600	24900	22 900	25 500	28 100	25 600	28 400	31 200	27 400	30 400	33 400	28 300	31 400	34 500	
52.00		0.595	17000	18800	20600	18 900	21 000	23 100	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450	
		15.11	22900	25500	28100	25 600	28 400	31 200	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	

VAM TOP[®]

VAM TOP ® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	ft.lb N/m	max.	min.	ft.lb N/m	max.	min.	ft.lb N/m	max.
In mm	lb/ft	In mm	min.	ft.lb N/m	max.	min.	ft.lb N/m	max.	min.	ft.lb N/m	max.
7 5/8" 193.68	26.40	0.328	11 450	12 650	13 850	12 450	13 750	15 050	13 450	14 850	16 250
			15 500	17 200	18 900	16 700	18 600	20 500	18 100	20 100	22 100
	29.70	0.375	11 700	13 000	14 300	12 700	14 100	15 500	13 700	15 200	16 700
			15 900	17 700	19 500	17 200	19 100	21 000	18 500	20 600	22 700
	33.70	0.430	12 450	13 750	15 050	13 400	14 800	16 200	14 400	15 900	17 400
			16 700	18 600	20 500	18 100	20 100	22 100	19 400	21 600	23 800
	35.80	0.465	15 050	16 650	18 250	16 300	18 100	19 900	17 800	19 500	21 400
			20 300	22 600	24 900	22 000	24 500	27 000	23 800	26 500	29 200
	39.00	0.500	18 250	20 250	22 250	19 600	21 700	23 800	20 850	23 150	25 450
			24 700	27 500	30 300	26 500	29 400	32 300	28 300	31 400	34 500
7 3/4" 196.85	42.80	0.562	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	45.30	0.595	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	47.10	0.625	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	48.10	0.595	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	49.65	0.511	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
			34 500	37 600	40 700	34 500	37 600	40 700	34 500	37 600	40 700
8 5/8" 219.08	36.00	0.400	10 450	11 550	12 650	11 100	12 300	13 500	11 700	13 000	14 300
			14 100	15 700	17 300	15 000	16 700	18 400	15 900	17 700	19 500
	40.00	0.450	15 050	16 650	18 250	16 300	18 100	19 900	17 800	19 500	21 400
			20 300	22 600	24 900	22 000	24 500	27 000	23 800	26 500	29 200
	44.00	0.500	19 600	21 700	23 800	20 850	23 150	25 450	20 850	23 150	25 450
			26 500	29 400	32 300	28 300	31 400	34 500	28 300	31 400	34 500
	49.00	0.557	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	52.00	0.595	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500

VAM TOP ® TORQUE VALUES

Size (OD) in mm	Nominal Weight lb/ft	Wall Thickness in mm		55 ksi			65 ksi			75-80 ksi			90-95-100 ksi			105-110-115 ksi							
		min.	max.	ft.lb N/m	min.	max.	opti.	ft.lb N/m	min.	max.	opti.	ft.lb N/m	min.	max.	opti.	ft.lb N/m	min.	max.	opti.	ft.lb N/m			
9 5/8" 244.48	36.00	0.352	7170	7960	8750	7 830	8 700	9 570	8 460	9 400	10 340	9 150	10 150	11 150	10 450	11 550	12 650	14 100	15 700	17 300	18 850		
			8.84	9700	10800	11900	10 600	11 800	13 000	11 400	12 700	14 000	12 300	13 700	15 100	14 100	15 700	17 300					
			0.395	7170	7960	8750	7 830	8 700	9 570	8 460	9 400	10 340	9 150	10 150	11 150	10 450	11 550	12 650					
			10.03	9700	10800	11900	10 600	11 800	13 000	11 400	12 700	14 000	12 300	13 700	15 100	14 100	15 700	17 300					
			0.435	9850	10850	11850	10 450	11 550	12 650	11 700	13 000	14 300	15 650	13 050	14 450	15 850	14 100	15 900	17 400				
			11.05	13200	14700	16200	14 100	15 700	17 300	15 900	17 700	19 500	17 600	19 600	21 600	19 400	21 600	23 800					
			0.472	11700	13000	14300	13 050	14 450	15 850	14 400	15 900	17 400	15 850	17 350	19 050	18 250	20 250	22 250					
			11.99	15900	17700	19500	17 600	19 600	21 600	19 400	21 600	23 800	21 100	23 500	25 900	24 700	27 500	30 300					
			0.545	16300	18100	19900	18 250	20 250	22 250	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450					
			13.84	22000	24500	27000	24 700	27 500	30 300	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500					
9 7/8" 250.83	58.40	0.595	19600	21700	23800	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450						
			15.11	26500	29400	32300	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500					
			0.625	20850	23150	25450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450					
			15.88	28300	31400	34500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500					
			0.650	20850	23150	25450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450					
			16.51	28300	31400	34500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500					
			0.661	20850	23150	25450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450					
			16.79	28300	31400	34500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500					
			0.668	20850	23150	25450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450					
			16.97	28300	31400	34500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500					
9 7/8" 250.83	62.80	0.678	22800	25300	27800	22 800	25 300	27 800	22 800	25 300	27 800	22 800	25 300	27 800	22 800	25 300	27 800						
			17.22	30900	34300	37700	30 900	34 300	37 700	30 900	34 300	37 700	30 900	34 300	37 700	30 900	34 300	37 700					
			0.694	24800	27500	30200	24 800	27 500	30 200	24 800	27 500	30 200	24 800	27 500	30 200	24 800	27 500	30 200					
			17.63	33600	37300	41000	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000					
			0.700	24800	27500	30200	24 800	27 500	30 200	24 800	27 500	30 200	24 800	27 500	30 200	24 800	27 500	30 200					
			17.78	33600	37300	41000	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000					
			0.720	27000	30000	33000	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000					
			18.29	36600	40700	44800	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800					
			0.725	27000	30000	33000	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000					
			18.42	36600	40700	44800	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800					

VAM TOP ® TORQUE VALUES

Size (OD) in mm	Nominal Weight lb/ft	Wall Thickness in mm	55 ksi			65 ksi			75-80 ksi			90-95-100 ksi			105-110-115 ksi		
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
			ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	
10" 254.00	67.20	0.672	25400	28200	31000	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
			34400	38200	42000	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
			26700	29650	32600	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
10 3/4" 273.05	71.80	0.722	27000	30000	33000	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
			36800	40700	44800	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
			7830	8700	9570	8 780	9 750	10 720	9 850	10 850	11 850	10 450	11 550	12 650	11 700	13 000	14 300
10 1/2" 273.05	60.70	0.545	10800	11800	13000	11 900	13 200	14 500	13 200	14 700	16 200	14 100	15 700	17 300	15 900	17 700	19 500
			11600	12300	13500	13 050	14 450	15 850	14 400	15 900	17 400	15 650	17 350	19 050	17 600	19 500	21 400
			15000	16700	18400	17 600	19 600	21 600	19 400	21 600	23 800	21 100	23 500	25 900	23 800	26 500	29 200
10 3/4" 273.05	65.50	0.495	14400	15900	17400	16 300	19 100	19 900	18 250	20 250	22 250	20 850	23 150	25 450	20 850	23 150	25 450
			19400	21600	23800	22 000	24 500	27 000	24 700	27 500	30 300	28 300	31 400	34 500	28 300	31 400	34 500
			18250	20250	22250	20 200	22 400	24 600	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
10 1/2" 273.05	65.70	0.595	24700	27500	30300	27 400	30 400	33 400	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
			20850	23150	25450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			28300	31400	34500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
10 1/2" 273.05	71.10	0.650	20850	23150	25450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			28300	31400	34500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
			16 511	18 300	20 100	16 511	18 300	20 100	16 511	18 300	20 100	16 511	18 300	20 100	16 511	18 300	20 100
10 1/2" 273.05	73.20	0.672	27000	30000	33000	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
			36600	40700	44800	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
			29300	32550	35800	29 300	32 550	35 800	29 300	32 550	35 800	29 300	32 550	35 800	29 300	32 550	35 800
10 1/2" 273.05	72.00	0.656	39700	44100	48500	39 700	44 100	48 500	39 700	44 100	48 500	39 700	44 100	48 500	39 700	44 100	48 500
			16 666	18 666	20 666	16 666	18 666	20 666	16 666	18 666	20 666	16 666	18 666	20 666	16 666	18 666	20 666
			11100	12300	13500	12 450	13 750	15 050	13 700	15 200	16 700	15 050	16 650	18 250	17 000	18 850	20 600
11 3/4" 298.45	54.00	0.435	15000	16700	18400	16 700	18 600	20 500	18 500	20 600	22 700	20 300	22 600	24 900	22 900	25 500	28 100
			15050	16650	18250	17 600	19 500	21 400	19 600	21 700	23 800	20 850	23 150	25 450	20 850	23 150	25 450
			20300	22600	24900	23 800	26 500	29 200	26 500	29 400	32 300	28 300	31 400	34 500	28 300	31 400	34 500
11 3/4" 298.45	65.00	0.534	18900	21000	23100	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			25600	28400	31200	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
			20850	23150	25450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
11 3/4" 298.45	71.00	0.582	28300	31400	34500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
			14 778	16 778	18 778	14 778	16 778	18 778	14 778	16 778	18 778	14 778	16 778	18 778	14 778	16 778	18 778
			20850	23150	25450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450



VAM TOP ® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
In mm	lb/ft	In mm	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m
10" 254.00	67.20	0.672	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
		17.07	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
	66.70	0.688	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
		17.48	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
	71.80	0.722	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
	18.34	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800	
10 3/4" 273.05	46.50	0.400	13 050	14 450	15 850	13 700	15 200	16 700	20 850	23 150	25 450
		10.16	17 600	19 600	21 600	18 500	20 600	22 700	28 300	31 400	34 500
	51.00	0.450	19 800	21 700	23 800	20 200	22 400	24 600	20 850	23 150	25 450
		11.43	26 500	29 400	32 300	27 400	30 400	33 400	28 300	31 400	34 500
	56.50	0.495	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
	12.57	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	
60.70	60.70	0.545	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
		13.84	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	66.70	0.595	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
		15.11	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	71.10	0.650	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
	16.51	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	
75.20	75.20	0.672	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
		17.07	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
	72.00	0.656	29 300	32 550	35 800	29 300	32 550	35 800	29 300	32 550	35 800
		16.66	39 700	44 100	48 500	39 700	44 100	48 500	39 700	44 100	48 500
	84.00	0.435	18 900	21 000	23 100	20 200	22 400	24 600	20 850	23 150	25 450
	11.05	25 600	28 400	31 200	27 400	30 400	33 400	28 300	31 400	34 500	
60.00	60.00	0.489	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
		12.42	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	66.00	0.534	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
		13.56	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	71.00	0.582	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
	14.78	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	

VAM TOP ® TORQUE VALUES

Size (OD) in mm	Nominal Weight lb/ft	Wall Thickness in mm	55 ksi		65 ksi		75-80 ksi		90-95-100 ksi		105-110-115 ksi			
			min.	optl. ft.lb N/m	max.	min.	optl. ft.lb N/m	max.	min.	optl. ft.lb N/m	max.	min.	optl. ft.lb N/m	max.
11 7/8" 301.63	67.80	0.550	20850	23150	25450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			28300	31400	34500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
			20850	23150	25450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
13 3/8" 339.73	61.00	0.430	28300	31400	34500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
			11700	13000	14300	13 050	14 450	15 850	15 050	16 650	18 250	17 000	18 800	20 600
			15900	17700	19500	17 600	19 600	21 600	20 300	22 600	24 900	22 900	25 500	28 100
15 1/2" 393.70	66.00	0.480	22900	25600	28100	25 600	28 400	31 200	28 300	31 400	34 500	28 300	31 400	34 500
			17000	18800	20600	18 900	21 000	23 100	20 850	23 150	25 450	20 850	23 150	25 450
			19600	21700	23800	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
17 1/2" 442.90	72.00	0.514	26500	29400	32300	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
			20850	23150	25450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			28300	31400	34500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
19 1/2" 495.10	77.00	0.550	28300	31400	34500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
			20850	23150	25450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			28300	31400	34500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
21 1/2" 544.30	80.70	0.590	28300	31400	34500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
			20850	23150	25450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			28300	31400	34500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
23 1/2" 593.50	85.00	0.608	28300	31400	34500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
			20850	23150	25450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			28300	31400	34500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
25 1/2" 642.70	86.00	0.625	28300	31400	34500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
			20850	23150	25450	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			28300	31400	34500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
27 1/2" 691.90	92.00	0.672	45000	50000	55000	45 000	50 000	55 000	45 000	50 000	55 000	45 000	50 000	55 000
			61000	67800	74600	61 000	67 800	74 600	61 000	67 800	74 600	61 000	67 800	74 600
			27000	30000	33000	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
30 1/2" 774.50	118.20	0.850	36600	40700	44800	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
			27000	30000	33000	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
			36600	40700	44800	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
33 1/2" 854.25	118.20	0.850	36600	40700	44800	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
			27000	30000	33000	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
			36600	40700	44800	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800

VAM-TOP[®]

VAM TOP ® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
in	lb/ft	in	ft.lb N.m			ft.lb N.m			ft.lb N.m		
mm		mm									
11 7/8" 301.63	67.80	0.550	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
			20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
13 3/8" 339.73	61.00	0.430	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
			20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
13 5/8" 346.08	68.00	0.480	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
			20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
13 5/8" 346.08	72.00	0.514	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
			20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
13 5/8" 346.08	77.00	0.550	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
			20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
13 5/8" 346.08	80.70	0.580	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
			20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
13 5/8" 346.08	85.00	0.608	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
			20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
13 5/8" 346.08	86.00	0.625	20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
			28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
			20 850	23 150	25 450	20 850	23 150	25 450	20 850	23 150	25 450
13 5/8" 346.08	92.00	0.672	45 000	50 000	55 000	45 000	50 000	55 000	45 000	50 000	55 000
			61 000	67 800	74 600	61 000	67 800	74 600	61 000	67 800	74 600
			27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
13 5/8" 346.08	86.20	0.625	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
			27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
			36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
13 5/8" 346.08	118.20	0.850	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
			36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
			27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
13 5/8" 346.08	118.20	0.850	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
			27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
			36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800

VAM TOP ® TORQUE VALUES

Size (OD) in mm	Nominal Weight lb/ft	Wall Thickness in mm	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi		
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
			ft.lb N.m			ft.lb N.m			ft.lb N.m			ft.lb N.m			ft.lb N.m		
14" 355.60 VAM TOP-KB	82.20	0.560	-	-	-	25 750	28 550	31 350	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
		14.22	-	-	-	34 800	38 700	42 600	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
	82.50	0.562	20200	22400	24600	26 050	28 950	31 850	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
		14.28	27400	30400	33400	35 300	39 200	43 100	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
	86.00	0.600	-	-	-	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
15" 381.00 VAM TOP-KA	93.00	0.650	-	-	-	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
		16.51	-	-	-	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
	96.90	0.670	-	-	-	27 000	33 000	36 300	27 000	33 000	36 300	27 000	33 000	36 300	27 000	33 000	36 300
		17.02	-	-	-	36 600	44 800	49 200	36 600	44 800	49 200	36 600	44 800	49 200	36 600	44 800	49 200
	100.00	0.700	-	-	-	32 400	36 000	39 600	32 400	36 000	39 600	32 400	36 000	39 600	32 400	36 000	39 600
16" 406.40 VAM TOP-ND	106.00	0.750	-	-	-	43 900	48 800	53 700	43 900	48 800	53 700	43 900	48 800	53 700	43 900	48 800	53 700
		19.05	-	-	-	39 700	44 100	48 500	39 700	44 100	48 500	39 700	44 100	48 500	39 700	44 100	48 500
	114.00	0.800	-	-	-	53 800	59 800	65 800	53 800	59 800	65 800	53 800	59 800	65 800	53 800	59 800	65 800
		20.32	-	-	-	41 400	46 000	50 600	41 400	46 000	50 600	41 400	46 000	50 600	41 400	46 000	50 600
	92.50	0.580	-	-	-	56 100	62 400	68 600	56 100	62 400	68 600	56 100	62 400	68 600	56 100	62 400	68 600
16" 406.40 VAM TOP-ND	107.00	0.675	-	-	-	30 000	33 300	36 600	30 000	33 300	36 600	30 000	33 300	36 600	30 000	33 300	36 600
		17.15	-	-	-	40 600	45 100	49 600	40 600	45 100	49 600	40 600	45 100	49 600	40 600	45 100	49 600
	84.00	0.495	25400	28200	31000	30 000	33 300	36 600	30 000	33 300	36 600	30 000	33 300	36 600	30 000	33 300	36 600
		12.57	34400	38200	42000	40 600	45 100	49 600	40 600	45 100	49 600	40 600	45 100	49 600	40 600	45 100	49 600
	95.00	0.566	36100	40100	44100	45 000	50 000	55 000	45 000	50 000	55 000	45 000	50 000	55 000	45 000	50 000	55 000
16" 406.40 VAM TOP-ND	97.00	0.575	37600	41750	45900	45 000	50 000	55 000	45 000	50 000	55 000	45 000	50 000	55 000	45 000	50 000	55 000
		14.61	50900	56600	62300	61 000	67 800	74 600	61 000	67 800	74 600	61 000	67 800	74 600	61 000	67 800	74 600
	104.00	0.625	37600	41750	45900	45 000	50 000	55 000	45 000	50 000	55 000	45 000	50 000	55 000	45 000	50 000	55 000
		15.88	50900	56600	62300	61 000	67 800	74 600	61 000	67 800	74 600	61 000	67 800	74 600	61 000	67 800	74 600
						61 000	67 800	74 600	61 000	67 800	74 600	61 000	67 800	74 600	61 000	67 800	74 600

VAM-TOP®

VAM TOP @ TORQUE VALUES

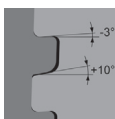
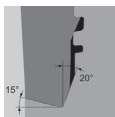
Size (OD)	Nominal Weight	Wall Thickness	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
In mm	lb/ft	In mm	ft.lb Nm	ft.lb Nm	ft.lb Nm	ft.lb Nm	ft.lb Nm	ft.lb Nm	ft.lb Nm	ft.lb Nm	ft.lb Nm
14" 355.60 VAM TOP-KB	82.20	0.560	27 000	30 000	33 000	-	-	-	-	-	-
		14.22	36 600	40 700	44 800	-	-	-	-	-	-
	82.50	0.562	27 000	30 000	33 000	-	-	-	-	-	-
		14.28	36 600	40 700	44 800	-	-	-	-	-	-
	86.00	0.600	27 000	30 000	33 000	-	-	-	-	-	-
		15.24	36 600	40 700	44 800	-	-	-	-	-	-
	93.00	0.650	27 000	30 000	33 000	-	-	-	-	-	-
		16.51	36 600	40 700	44 800	-	-	-	-	-	-
	96.90	0.670	27 000	33 000	36 300	-	-	-	-	-	-
		17.02	36 600	44 800	49 200	-	-	-	-	-	-
100.00	100.00	0.700	32 400	36 000	39 600	-	-	-	-	-	-
		17.80	43 900	48 800	53 700	-	-	-	-	-	-
	106.00	0.750	39 700	44 100	48 500	-	-	-	-	-	-
		19.05	53 800	59 800	65 800	-	-	-	-	-	-
	114.00	0.800	41 400	46 000	50 600	-	-	-	-	-	-
15"		20.32	56 100	62 400	68 600	-	-	-	-	-	-
	92.50	0.580	30 000	33 300	36 600	-	-	-	-	-	-
		14.73	40 600	45 100	49 600	-	-	-	-	-	-
	107.00	0.675	36 400	40 500	44 600	-	-	-	-	-	-
		17.15	49 400	54 900	60 400	-	-	-	-	-	-
16"	84.00	0.495	30 000	33 300	36 600	-	-	-	-	-	-
		12.57	40 600	45 100	49 600	-	-	-	-	-	-
	95.00	0.566	45 000	50 000	55 000	-	-	-	-	-	-
		14.38	61 000	67 800	74 600	-	-	-	-	-	-
	97.00	0.575	45 000	50 000	55 000	-	-	-	-	-	-
104.00		14.61	61 000	67 800	74 600	-	-	-	-	-	-
	104.00	0.625	45 000	50 000	55 000	-	-	-	-	-	-
	15.88	61 000	67 800	74 600	-	-	-	-	-	-	

3.3 VAM TOP® HT & VAM TOP® HC

Application



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VAM TOP® HC (High Compression) and **VAM TOP® HT** (High Torque) are Threaded and Coupled (T&C) connections for tubing and production casing applications where it is necessary to apply respectively high compressive loads and high torque to the string.

VAM TOP® HC and VAM TOP® HT have been designed based on the main features of the VAM TOP® product line, with improvements made to pass ISO 13679 CAL IV testing, the most severe protocol for Premium connections, and to provide higher torque and compression performance.

VAM TOP® HC has 100% PBYS rating in compression, while VAM TOP® HT has 80% PBYS rating in compression, with higher torque performance.

VAM TOP®, VAM TOP® HC and VAM TOP® HT are interchangeable, except 4 ½" size where 4 ½" VAM TOP® tubing is not compatible with 4 ½" VAM TOP® HC; please refer to the dedicated rules for further details on performances.

Make-up torques

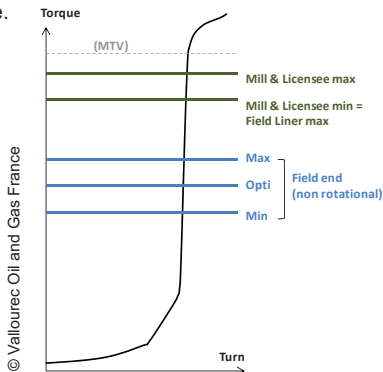
VAM TOP® HC

VAM TOP® HC make-up torques are the same for mill and field end. VAM TOP® HC has a standard torque table as other premium connections.

VAM TOP® HT

VAM TOP® HT has a higher torque capacity. It is designed to be suitable for rotating liner application. For this reason, mill ends are made up at high torque, and the minimum mill torque has been set equal to the maximum Field Liner torque. For rotating liner applications, it is also recommended to

apply as high a torque as possible on the drill floor, to ensure there is no movement of connections during rotation downhole afterwards. The field torque target value should therefore be as close as possible to the max Liner Torque value.



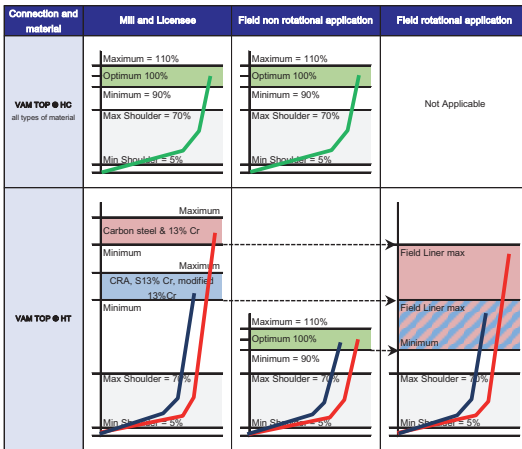
The torque values are available in the VAM® Book, Connection Data Sheets and VAM® Services Library. Always check the online data rather than paper copies in case of change.

In case VAM TOP® HT is used for non rotating applications, lower torque values can be applied since the standard performances can still be achieved at a lower torque. These torques are the “Field end for non rotation” min-opti-max values in the table. Note that these torques are the ones for VAM TOP® HC (field and mill).

The table below gives an example of 7" x 29 lb/ft L80 13%Cr VAM TOP® HT torque values depending on application.

Application	Parameter	Logic	Calculation ft.lb	Result ft.lb
Mill & Licensee make-up (these torques do not apply at the rig site)	Maximum	Lookup Mill & Licensee Maximum		24 250
	Target torque	Calculate mid point between Mill & Licensee Max. and Min.	$(22050+24250)/2$	23 150
	Minimum	Lookup Mill & Licensee Minimum		22 050
	Max. Shoulder	Calculate 70% of the Optimum field value	14850×0.70	10 395
	Min. Shoulder	Calculate 5% of the Optimum value	14850×0.05	742
Rig site make-up Liners applications (rotational application)	Maximum	Lookup Field Liner Maximum		22 050
	Target torque	Select a value just below Field Liner Maximum to ensure no overtorque based on equipment	(Suggest)	21 500
	Optimum	Lookup Optimum		14 850
	Minimum	Lookup Minimum		13 450
	Max. Shoulder	Calculate 70% of the Optimum value	14850×0.70	10 395
Rig site make-up for non-rotational application	Min. Shoulder	Calculate 5% of the Optimum value	14850×0.05	742
	Maximum	Lookup Maximum		16 250
	Optimum	Lookup Optimum		14 850
	Minimum	Lookup Minimum		13 450
	Max. Shoulder	Calculate 70% of the Optimum value	14850×0.70	10 395

Type of Material	VAM TOP HT Field end for non-rotation	VAM TOP HT (Mill & Licensee, Rotational application)	
		Carbon Steel; 13% Cr	Cold Worked CRA; modified 13% Cr; S13% Cr
API (Carbon)	✓	✓	
API (13% Cr)	✓	✓	
1% Chromium	✓	✓	
High Collapse	✓	✓	
Sour Service	✓	✓	
High Collapse and Sour Service	✓	✓	
Low Temperature	✓	✓	
Martensitic Stainless Steel (13% Cr)	✓	✓	
13% Chromium modified & Martensitic Stainless Steel (Super 13%Cr) & 17% Cr	VM 13CRSS (95 - 110 ksi)		✓
	SM 13CRM (95 - 110 ksi)	✓	✓
	SM 13CRS (95 - 110 ksi)	✓	✓
	SM 17CRS (110 - 125 ksi)	✓	✓
Duplex and Super Duplex Stainless Steel	✓		✓
Super Austenitic and Nickel Based Alloy	✓		✓



• Difference between the mill & licensee and field torques:

Mill & licensee: To be applied outside the rig floor. The optimum torque shall be taken into account to set up the shouldering torque in the make-up software.

Field Torques: This torque shall be only applied in the rig site and the maximum torque will be depending on the application.

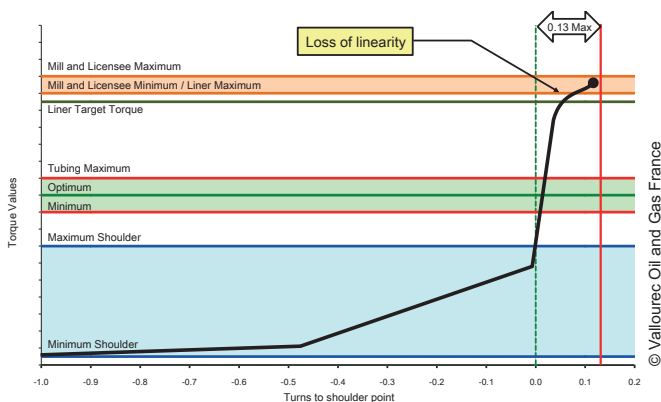
- For Liner (rotational) applications. – Recommended Make-up should be close to “Field Liner max” torque value, but shall never exceed this value.
- For non-rotational applications. – Recommended make-up torque range is defined by the “Field min” and “Field max for non-rotation”.

As shown in torque table hereafter, different mill torques and Field liner max values apply for some high alloyed grades:

- Super 13% Cr, Modified 13% Cr for Yield strength ≥ 90 ksi, and Cold worked CRA (Austenitic, Duplex, Super Duplex, Nickel based alloys) with Yield Strength ≥ 100 ksi) have different torques, due to specific mechanical properties.

Since very high torque values are used for VAM TOP[®] HT (e.g. rotating liner applications), a loss of linearity may be observed on the torque/turn graph at the end of the make-up as shown below. There is an acceptance criteria for carbon and 13% Cr grades only: there shall be 0.13 turn max after shouldering. Performance of the connection when this happens has been validated by R&D tests.

If this 0.13 turn after shouldering is exceeded, the connection shall be rejected.



This criteria applies only to mill & licensee torques and Field Liner max of VAM TOP[®] HT, for carbon grades and 13% Cr only.

Any loss of linearity at the end of make-up is strictly forbidden with Proprietary Cold worked CRA, Super 13%Cr and Modified 13% Cr grades.

• Thread Compound Quantities

It is important that the correct volume of thread compound is used for VAM® connections. The wrong quantity will lead to make-up problems or contamination of the well. The values given below are minimum values. To put these into perspective a plastic cup, like those used on a drill floor are normally about 200 ml. So 1 cup will be sufficient thread compound for 8 of 7" make-ups (that is 16 threaded ends).

Nominal OD (in)	Thread compound volume	
	ml	US fluid ounce
4 1/2	10	0.34
5	14	0.47
5 1/2	16	0.54
6 5/8	19	0.64
7	25	0.85
7 5/8	28	0.91

Equally it is important that the compound is applied correctly. See the section on thread compounds for this information. For mill make-ups and assemblies it is acceptable to apply the thread compound to the box end only.

Note: when making-up VAM TOP® HT with Bakerlock, it is mandatory to always apply the “mill and licensee” torques whatever will be the application (“mill and licensee” or “field end” make up).

VAM TOP ® HT / VAM TOP ® HC TECHNICAL DATA

Size (OD)	Nominal Weight	Wall Thickness		API Drift Diameter	Coupling OD (reg)	Coupling ID (reg)	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Yield Strength (1000 lb)				
		in	mm									80 ksi	90 ksi	95 ksi	110 ksi	125 ksi
4 1/2 114.30 NOT COMPATIBLE*	10.50	0.224	5.69	3.927	4.827	3.970	3.661	9.330	3.009	3.077	1.345	241	271	286	331	376
	11.60	0.250	6.35	3.875	4.871	3.918	3.661	9.330	3.338	3.407	1.607	267	300	317	367	417
	12.60	0.271	6.88	3.833	4.906	3.876	3.661	9.330	3.600	3.678	1.828	288	324	342	396	450
	13.50	0.290	7.37	3.795	4.938	3.838	3.661	9.330	3.836	3.922	2.019	307	345	364	422	480
	15.10	0.337	8.56	3.701	5.012	3.763	3.661	9.330	4.407	4.507	2.488	353	397	419	485	551
	17.00	0.380	9.65	3.615	5.077	3.677	3.661	9.330	4.918	5.022	2.900	393	443	467	541	615
	17.70	0.402	10.21	3.571	5.111	3.633	3.661	9.330	5.175	5.289	3.112	414	466	492	569	647
	18.90	0.430	10.92	3.515	5.152	3.577	3.661	9.330	5.498	5.622	3.382	440	495	522	605	687
	21.50	0.500	12.70	3.375	5.249	3.437	3.661	9.330	6.283	6.411	4.010	503	565	597	691	785
	23.70	0.560	14.22	3.255	5.329	3.317	3.661	9.330	6.932	7.080	4.548	555	624	659	763	867
5 127.00	15.00	0.296	7.52	4.283	5.471	4.345	4.190	10.390	4.374	4.462	2.135	350	394	416	481	547
	18.00	0.362	9.19	4.151	5.577	4.213	4.190	10.390	5.275	5.385	2.878	422	475	501	580	659
	20.30	0.408	10.36	4.059	5.648	4.121	4.190	10.390	5.886	6.009	3.379	471	530	559	647	736
	20.80	0.422	10.72	4.031	5.670	4.093	4.190	10.390	6.069	6.202	3.528	486	546	577	668	759
5 1/2 139.70	21.40	0.437	11.10	4.001	5.691	4.063	4.190	10.390	6.264	6.395	3.685	501	564	595	689	783
	23.20	0.478	12.14	3.919	5.750	3.981	4.190	10.390	6.791	6.925	4.109	543	611	645	747	849
	17.00	0.304	7.72	4.767	5.979	4.810	4.382	10.750	4.962	5.069	2.396	397	447	471	546	620
	20.00	0.361	9.17	4.653	6.071	4.715	4.382	10.750	5.828	5.944	3.100	466	525	554	641	729
23.00	0.415	10.54	4.545	6.156	4.607	4.382	10.750	6.630	6.756	3.753	530	597	630	729	829	
	26.00	0.476	12.09	4.423	6.249	4.485	4.382	10.750	7.513	7.659	4.470	601	676	714	826	939
29.70	0.562	14.27	4.251	6.373	4.334	4.382	10.750	8.719	8.888	5.454	698	785	828	959	1090	

* WARNING: 4 1/2" VAM TOP ® HC and VAM TOP ® HT are not compatible with 4 1/2" VAM TOP ® Tubing.

Since 4 1/2" VAM TOP ® Tubing has equivalent or superior performance (ISO13879 CAL IV qualified with 100% PBYS compression rating), VAM® strongly recommends to select 4 1/2" VAM TOP ® tubing for all needs, and not 4 1/2" VAM TOP ® HC and VAM TOP ® HT, to avoid mixing errors (accessories, repair, ...) that would have catastrophic consequences for the well integrity.

VAM TOP ® HT / VAM TOP ® HC TECHNICAL DATA

Size (OD)	Nominal Weight	Wall Thickness		API Drift Diameter	Coupling OD (reg)	Coupling ID (reg)	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Coupling Face Area	Yield Strength (1000 lb)				
		in	mm									80 ksi	90 ksi	95 ksi	110 ksi	125 ksi
in	lb/ft	in	mm	in	in	in	in	in	sq.in	sq.in	sq.in	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi
6 5/8 <i>168.28</i>	23.20	0.330	8.38	5.840	7.154	5.883	4.427	10.870	6.526	6.659	3.317	522	587	620	718	816
	24.00	0.352	8.94	5.796	7.191	5.839	4.427	10.870	6.937	7.080	3.650	555	624	659	763	867
	28.00	0.417	10.59	5.666	7.298	5.725	4.427	10.870	8.133	8.289	4.615	651	732	773	895	1017
	32.00	0.475	12.07	5.550	7.390	5.609	4.427	10.870	9.177	9.357	5.474	734	826	872	1009	1147
7 <i>177.80</i>	36.70*	0.562	14.27	5.376	7.524	5.453	4.427	10.870	10.705	10.924	6.729	856	963	1017	1178	1338
	26.00	0.362	9.19	6.151	7.565	6.210	4.775	11.540	7.549	7.693	3.837	604	679	717	830	944
	29.00	0.408	10.36	6.059	7.644	6.118	4.775	11.540	8.449	8.634	4.592	676	760	803	929	1056
	32.00	0.453	11.51	6.000 A	7.717	6.059	4.775	11.540	9.317	9.512	5.296	745	839	885	1025	1165
7 5/8 <i>193.68</i>	35.00	0.498	12.65	5.879	7.788	5.941	4.775	11.540	10.172	10.376	5.978	814	915	966	1119	1272
	38.00	0.540	13.72	5.795	7.853	5.857	4.775	11.540	10.959	11.172	6.617	877	986	1041	1205	1370
	41.00	0.590	14.99	5.695	7.930	5.757	4.775	11.540	11.881	12.124	7.381	950	1069	1129	1307	1485
	29.70	0.375	9.53	6.750	8.213	6.809	4.868	11.730	8.541	8.716	4.400	683	769	811	940	1068
7 7/8 <i>199.68</i>	33.70	0.430	10.92	6.640	8.306	6.699	4.868	11.730	9.720	9.917	5.355	778	875	923	1069	1215
	35.80	0.465	11.81	6.570	8.363	6.644	4.868	11.730	10.460	10.664	5.952	837	941	994	1151	1308
	39.00	0.500	12.70	6.500	8.420	6.589	4.868	11.730	11.192	11.416	6.553	895	1007	1063	1231	1399
	42.80	0.562	14.27	6.376	8.518	6.479	4.868	11.730	12.470	12.726	7.606	998	1122	1185	1372	1559
8 <i>206.68</i>	45.30	0.595	15.11	6.310	8.569	6.424	4.868	11.730	13.141	13.412	8.154	1051	1183	1248	1446	1643
	47.10	0.625	15.88	6.250	8.615	6.372	4.868	11.730	13.744	14.023	8.640	1100	1237	1306	1512	1718

*VAM TOP ® HT only

VAM TOP ® HT / VAM TOP ® HC TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	65 ksi										75 - 80 - 85 ksi											
			All materials					All materials					All materials					All materials						
			Max. Torque Shoulder (70% of Optl.)	VAM TOP ® HT Field end for non rotation & VAM TOP ® HC			VAM TOP ® HT only		Min.	Optl.	Max.	Min.	Optl.	Max.	Min.	Optl.	Max.	Min.	Optl.	Max.	Min.	Optl.	Max.	
ft.lb <i>N.m</i>	ft.lb <i>N.m</i>	ft.lb <i>N.m</i>	ft.lb <i>N.m</i>	ft.lb <i>N.m</i>	ft.lb <i>N.m</i>	ft.lb <i>N.m</i>	ft.lb <i>N.m</i>	ft.lb <i>N.m</i>	ft.lb <i>N.m</i>	ft.lb <i>N.m</i>	ft.lb <i>N.m</i>	ft.lb <i>N.m</i>	ft.lb <i>N.m</i>	ft.lb <i>N.m</i>	ft.lb <i>N.m</i>	ft.lb <i>N.m</i>	ft.lb <i>N.m</i>	ft.lb <i>N.m</i>	ft.lb <i>N.m</i>	ft.lb <i>N.m</i>	ft.lb <i>N.m</i>			
4 1/2* 1 14.30	10.50	0.22	1722	2220	2460	2700	2890	3170	3440	3670	3820	4300	4674	2540	2820	3100	3470	3810	4170	4530	4890	5260	5630	
	11.60	0.25	2338	3010	3340	3670	3920	4300	4674	5050	5390	5760	2674	3440	3820	4200	4700	5200	5700	6300	6900	7500	8100	
	12.60	0.27	2177	2800	3110	3420	3760	4130	4500	4840	5100	5600	3430	4410	4900	5390	6200	6800	7400	8000	8600	9200	9800	
	13.50	0.29	2534	3260	3620	3980	4410	4850	5300	5760	6200	6600	3884	5000	5600	6200	7300	8100	8700	9300	9900	10500	11100	
	15.10	0.34	3430	4410	4800	5390	6000	6600	7200	7700	8200	8800	3920	5000	5600	6200	7300	8100	8700	9300	9900	10500	11100	
	17.00	0.38	2894	3710	4120	4530	5060	5560	6241	6740	7240	7840	4170	5300	5900	6500	7600	8400	9000	9600	10200	10800	11400	
	17.70	0.40	3920	5000	5600	6200	6900	7500	8241	8840	9440	10100	5700	7000	7600	8300	9400	10200	10800	11400	12000	12600	13200	
	18.90	0.43	4950	6300	7000	7700	8600	9500	10400	11300	12200	13100	8600	10300	11000	11700	13400	14100	14800	15500	16200	16900	17600	
	21.50	0.50	5880	7600	8400	9200	10200	11200	12200	13200	14200	15200	12200	14800	15500	16200	18400	19100	19800	20500	21200	21900	22600	
	23.70	0.56	6335	8150	9050	9950	10950	11950	13000	14000	15000	16000	14600	17800	18500	19200	21800	22500	23200	23900	24600	25300	26000	
		14.22	7105	9150	10150	11150	12320	13500	14800	16100	17400	18700	16000	19800	20500	21200	24200	25000	25800	26600	27400	28200	29000	
			9660	12400	13800	15200	16700	18200	20000	21800	23600	25400	21340	26200	27000	27800	31800	32600	33400	34200	35000	35800	36600	37400

**VAM TOP ® HT only. Not compatible with VAM TOP ®.

VAM TOP ® HT / VAM TOP ® HC TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	65 ksi										75 - 80 - 85 ksi																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
			All materials					All materials					All materials					All materials																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
			Max. Torque Shoulder (70% of Opt.)	min.	opti.	max.	VAM TOP ® HT Field end for non rotation & VAM TOP ® HC	ft.lb N.m	Min. & Field Liner max	Mill & license see min. max.	VAM TOP ® HT only	Max. Torque Shoulder (70% of Opt.)	min.	opti.	max.	VAM TOP ® HT Field end for non rotation & VAM TOP ® HC	ft.lb N.m	Min. & Field Liner max	Mill & license see min. max.	VAM TOP ® HT only																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
5	15.00	0.30	3 395	4 370	4 850	5 330	5 930	6 510	7 090	7 800	8 500	9 200	9 900	10 600	11 300	12 000	12 700	13 400	14 100	14 800	15 500	16 200	16 900	17 600	18 300	19 000	19 700	20 400	21 100	21 800	22 500	23 200	23 900	24 600	25 300	26 000	26 700	27 400	28 100	28 800	29 500	30 200	30 900	31 600	32 300	33 000	33 700	34 400	35 100	35 800	36 500	37 200	37 900	38 600	39 300	40 000	40 700	41 400	42 100	42 800	43 500	44 200	44 900	45 600	46 300	47 000	47 700	48 400	49 100	49 800	50 500	51 200	51 900	52 600	53 300	54 000	54 700	55 400	56 100	56 800	57 500	58 200	58 900	59 600	60 300	61 000	61 700	62 400	63 100	63 800	64 500	65 200	65 900	66 600	67 300	68 000	68 700	69 400	70 100	70 800	71 500	72 200	72 900	73 600	74 300	75 000	75 700	76 400	77 100	77 800	78 500	79 200	79 900	80 600	81 300	82 000	82 700	83 400	84 100	84 800	85 500	86 200	86 900	87 600	88 300	89 000	89 700	90 400	91 100	91 800	92 500	93 200	93 900	94 600	95 300	96 000	96 700	97 400	98 100	98 800	99 500	100 200	100 900	101 600	102 300	103 000	103 700	104 400	105 100	105 800	106 500	107 200	107 900	108 600	109 300	110 000	110 700	111 400	112 100	112 800	113 500	114 200	114 900	115 600	116 300	117 000	117 700	118 400	119 100	119 800	120 500	121 200	121 900	122 600	123 300	124 000	124 700	125 400	126 100	126 800	127 500	128 200	128 900	129 600	130 300	131 000	131 700	132 400	133 100	133 800	134 500	135 200	135 900	136 600	137 300	138 000	138 700	139 400	140 100	140 800	141 500	142 200	142 900	143 600	144 300	145 000	145 700	146 400	147 100	147 800	148 500	149 200	149 900	150 600	151 300	152 000	152 700	153 400	154 100	154 800	155 500	156 200	156 900	157 600	158 300	159 000	159 700	160 400	161 100	161 800	162 500	163 200	163 900	164 600	165 300	166 000	166 700	167 400	168 100	168 800	169 500	170 200	170 900	171 600	172 300	173 000	173 700	174 400	175 100	175 800	176 500	177 200	177 900	178 600	179 300	180 000	180 700	181 400	182 100	182 800	183 500	184 200	184 900	185 600	186 300	187 000	187 700	188 400	189 100	189 800	190 500	191 200	191 900	192 600	193 300	194 000	194 700	195 400	196 100	196 800	197 500	198 200	198 900	199 600	200 300	201 000	201 700	202 400	203 100	203 800	204 500	205 200	205 900	206 600	207 300	208 000	208 700	209 400	210 100	210 800	211 500	212 200	212 900	213 600	214 300	215 000	215 700	216 400	217 100	217 800	218 500	219 200	219 900	220 600	221 300	222 000	222 700	223 400	224 100	224 800	225 500	226 200	226 900	227 600	228 300	229 000	229 700	230 400	231 100	231 800	232 500	233 200	233 900	234 600	235 300	236 000	236 700	237 400	238 100	238 800	239 500	240 200	240 900	241 600	242 300	243 000	243 700	244 400	245 100	245 800	246 500	247 200	247 900	248 600	249 300	250 000	250 700	251 400	252 100	252 800	253 500	254 200	254 900	255 600	256 300	257 000	257 700	258 400	259 100	259 800	260 500	261 200	261 900	262 600	263 300	264 000	264 700	265 400	266 100	266 800	267 500	268 200	268 900	269 600	270 300	271 000	271 700	272 400	273 100	273 800	274 500	275 200	275 900	276 600	277 300	278 000	278 700	279 400	280 100	280 800	281 500	282 200	282 900	283 600	284 300	285 000	285 700	286 400	287 100	287 800	288 500	289 200	289 900	290 600	291 300	292 000	292 700	293 400	294 100	294 800	295 500	296 200	296 900	297 600	298 300	299 000	299 700	300 400	301 100	301 800	302 500	303 200	303 900	304 600	305 300	306 000	306 700	307 400	308 100	308 800	309 500	310 200	310 900	311 600	312 300	313 000	313 700	314 400	315 100	315 800	316 500	317 200	317 900	318 600	319 300	320 000	320 700	321 400	322 100	322 800	323 500	324 200	324 900	325 600	326 300	327 000	327 700	328 400	329 100	329 800	330 500	331 200	331 900	332 600	333 300	334 000	334 700	335 400	336 100	336 800	337 500	338 200	338 900	339 600	340 300	341 000	341 700	342 400	343 100	343 800	344 500	345 200	345 900	346 600	347 300	348 000	348 700	349 400	350 100	350 800	351 500	352 200	352 900	353 600	354 300	355 000	355 700	356 400	357 100	357 800	358 500	359 200	359 900	360 600	361 300	362 000	362 700	363 400	364 100	364 800	365 500	366 200	366 900	367 600	368 300	369 000	369 700	370 400	371 100	371 800	372 500	373 200	373 900	374 600	375 300	376 000	376 700	377 400	378 100	378 800	379 500	380 200	380 900	381 600	382 300	383 000	383 700	384 400	385 100	385 800	386 500	387 200	387 900	388 600	389 300	390 000	390 700	391 400	392 100	392 800	393 500	394 200	394 900	395 600	396 300	397 000	397 700	398 400	399 100	399 800	400 500	401 200	401 900	402 600	403 300	404 000	404 700	405 400	406 100	406 800	407 500	408 200	408 900	409 600	410 300	411 000	411 700	412 400	413 100	413 800	414 500	415 200	415 900	416 600	417 300	418 000	418 700	419 400	420 100	420 800	421 500	422 200	422 900	423 600	424 300	425 000	425 700	426 400	427 100	427 800	428 500	429 200	429 900	430 600	431 300	432 000	432 700	433 400	434 100	434 800	435 500	436 200	436 900	437 600	438 300	439 000	439 700	440 400	441 100	441 800	442 500	443 200	443 900	444 600	445 300	446 000	446 700	447 400	448 100	448 800	449 500	450 200	450 900	451 600	452 300	453 000	453 700	454 400	455 100	455 800	456 500	457 200	457 900	458 600	459 300	460 000	460 700	461 400	462 100	462 800	463 500	464 200	464 900	465 600	466 300	467 000	467 700	468 400	469 100	469 800	470 500	471 200	471 900	472 600	473 300	474 000	474 700	475 400	476 100	476 800	477 500	478 200	478 900	479 600	480 300	481 000	481 700	482 400	483 100	483 800	484 500	485 200	485 900	486 600	487 300	488 000	488 700	489 400	490 100	490 800	491 500	492 200	492 900	493 600	494 300	495 000	495 700	496 400	497 100	497 800	498 500	499 200	499 900	500 600	501 300	502 000	502 700	503 400	504 100	504 800	505 500	506 200	506 900	507 600	508 300	509 000	509 700	510 400	511 100	511 800	512 500	513 200	513 900	514 600	515 300	516 000	516 700	517 400	518 100	518 800	519 500	520 200	520 900	521 600	522 300	523 000	523 700	524 400	525 100	525 800	526 500	527 200	527 900	528 600	529 300	530 000	530 700	531 400	532 100	532 800	533 500	534 200	534 900	535 600	536 300	537 000	537 700	538 400	539 100	539 800	540 500	541 200	541 900	542 600	543 300	544 000	544 700	545 400	546 100	546 800	547 500	548 200	548 900	549 600	550 300	551 000	551 700	552 400	553 100	553 800	554 500	555 200	555 900	556 600	557 300	558 000	558 700	559 400	560 100	560 800	561 500	562 200	562 900	563 600	564 300	565 000	565 700	566 400	567 100	567 800	568 500	569 200	569 900	570 600	571 300	572 000	572 700	573 400	574 100	574 800	575 500	576 200	576 900	577 600	578 300	579 000	579 700	580 400	581 100	581 800	582 500	583 200	583 900	584 600	585 300	586 000	586 700	587 400	588 100	588 800	589 500	590 200	590 900	591 600	592 300	593 000	593 700	594 400	595 100	595 800	596 500	597 200	597 900	598 600	599 300	600 000	600 700	601 400	602 100	602 800	603 500	604 200	604 900	605 600	606 300	607 000	607 700	608 400	609 100	609 800	610 500	611 200	611 900	612 600	613 300	614 000	614 700	615 400	616 100	616 800	617 500	618 200	618 900	619 600	620 300	621 000	621 700	622 400	623 100	623 800	624 500	625 200	625 900	626 600	627 300	628 000	628 700	629 400	630 100	630 800	631 500	632 200	632 900	633 600	634 300	635 000	635 700	636 400	637 100	637 800	638 500	639 200	639 900	640 600	641 300	642 000	642 700	643 400	644 100	644 800	645 500	646 200	646 900	647 600	648 300	649 000	649 700	650 400	651

VAM TOP ® HT / VAM TOP ® HC TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	65 ksi						75 - 80 - 85 ksi					
			All materials			All materials			All materials			All materials		
			Max. Torque Shoulder (70% of Optl.)	VAM TOP ® HT Field end for non rotation & VAM TOP ® HC	VAM TOP ® HT only	Min.	Optl.	Max.	Min.	Optl.	Max.	Min.	Optl.	Max.	Mill & licensee & Field Liner max
ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	
<i>N/m</i>	<i>N/m</i>	<i>N/m</i>	<i>N/m</i>	<i>N/m</i>	<i>N/m</i>	<i>N/m</i>	<i>N/m</i>	<i>N/m</i>	<i>N/m</i>	<i>N/m</i>	<i>N/m</i>	<i>N/m</i>	<i>N/m</i>	<i>N/m</i>
7 5/8	29.70	0.38	8 610	11 100	12 300	13 500	14 500	16 000	10 115	13 050	14 450	15 850	17 600	19 500
193,68	33.70	9.53	11 690	15 000	16 700	18 400	19 700	21 700	13 720	17 600	19 600	21 600	23 900	26 400
		0.43	11 130	14 400	15 900	17 400	18 600	20 700	12 915	16 650	18 450	20 250	22 700	25 100
		10.92	15 120	19 400	21 600	23 600	25 200	28 100	17 500	22 500	25 000	27 500	30 800	34 000
		0.47	12 390	16 000	17 700	19 400	20 100	22 300	14 420	18 600	20 600	22 600	24 400	27 100
		11.81	16 800	21 600	24 000	26 400	27 300	30 200	19 530	25 100	27 900	30 700	33 100	36 700
		0.50	13 685	17 650	19 550	21 450	21 500	23 800	15 960	20 600	22 800	25 000	26 000	28 900
		12.70	18 550	23 800	26 500	29 200	29 100	32 300	21 630	27 800	30 900	34 000	35 200	39 200
		0.56	16 205	20 850	23 150	25 450	25 450	27 800	16 205	20 850	23 150	25 450	30 500	33 800
		14.27	21 980	28 300	31 400	34 500	34 500	37 700	21 980	28 300	31 400	34 500	41 400	45 800
		0.60	16 205	20 850	23 150	25 450	26 400	29 200	16 205	20 850	23 150	25 450	32 300	35 800
		15.11	21 980	28 300	31 400	34 500	35 800	39 600	16 205	20 850	23 150	25 450	43 800	48 500
		0.63	16 205	20 850	23 150	25 450	26 400	29 200	16 205	20 850	23 150	25 450	33 300	36 900
		15.88	21 980	28 300	31 400	34 500	35 800	39 600	16 205	20 850	23 150	25 450	45 100	50 000

VAM TOP[®] HT / VAM TOP[®] HC TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	90 - 95 - 100 ksi										105 - 110 - 115 ksi													
			All materials					Carbon & 13% Cr					All materials					Carbon & 13% Cr								
			Max. Torque Shoulder (70% of Opt.)	min.	opt.	max.	VAM TOP [®] HT Field end for non rotation & VAM TOP [®] HC	VAM TOP [®] HT only	Mill & licensee min.	Field & Liner max	Mill & licensee max.	CRA: S13% Cr & 13% Cr modified	Max. Torque Shoulder (70% of Opt.)	min.	opt.	max.	VAM TOP [®] HT Field end for non rotation & VAM TOP [®] HC	VAM TOP [®] HT only	Mill & licensee min.	Field & Liner max	Mill & licensee max.	CRA: S13% Cr & 13% Cr modified				
ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m	ft.lb N.m					
4 1/2" 114.30	10.50	0.22	2 177	2 800	3 110	3 420	4 120	4 550	3 620	3 980	2 429	3 130	3 470	3 810	4 770	5 240	4 120	4 530	2 429	3 130	3 470	3 810	4 770	5 240	4 120	4 530
		5.69	2 954	3 800	4 220	4 640	5 600	6 100	4 900	5 400	3 290	4 230	4 700	5 170	6 500	7 100	5 600	6 100	3 290	4 230	4 700	5 170	6 500	7 100	5 600	6 100
	11.60	0.25	2 835	3 650	4 050	4 450	5 350	5 880	4 560	5 010	3 136	4 040	4 480	4 920	6 150	6 760	5 280	5 800	3 136	4 040	4 480	4 920	6 150	6 760	5 280	5 800
		6.35	3 650	5 000	5 500	6 100	7 300	8 000	6 200	6 800	4 270	5 500	6 100	6 700	8 300	9 200	7 200	7 900	4 270	5 500	6 100	6 700	8 300	9 200	7 200	7 900
	12.60	0.27	3 192	4 110	4 560	5 010	6 370	7 000	5 420	5 980	3 542	4 560	5 060	5 560	7 310	8 040	6 220	6 840	3 542	4 560	5 060	5 560	7 310	8 040	6 220	6 840
		6.88	4 340	5 600	6 200	6 800	8 600	9 500	7 300	8 100	4 830	6 200	6 800	7 600	9 900	10 900	8 400	9 300	4 830	6 200	6 800	7 600	9 900	10 900	8 400	9 300
	13.50	0.29	3 647	4 690	5 210	5 730	7 230	7 950	6 220	6 840	4 053	5 220	5 790	6 360	8 300	9 130	7 090	7 790	4 053	5 220	5 790	6 360	8 300	9 130	7 090	7 790
		7.37	4 970	6 400	7 100	7 800	9 800	10 800	8 400	9 300	5 460	7 000	7 800	8 600	11 300	12 400	9 600	10 600	5 460	7 000	7 800	8 600	11 300	12 400	9 600	10 600
	15.10	0.34	4 557	5 860	6 510	7 160	9 060	9 960	7 740	8 510	5 012	6 450	7 160	7 870	10 400	11 400	8 900	9 790	5 012	6 450	7 160	7 870	10 400	11 400	8 900	9 790
		8.56	6 160	7 900	8 800	9 700	12 300	13 500	10 500	11 500	6 790	8 700	9 700	10 700	14 100	15 500	12 100	13 300	6 790	8 700	9 700	10 700	14 100	15 500	12 100	13 300
	17.00	0.38	5 572	7 170	7 960	8 750	9 550	10 600	9 350	10 280	6 090	7 830	8 700	9 570	10 870	12 150	10 650	11 650	6 090	7 830	8 700	9 570	10 870	12 150	10 650	11 650
		9.65	7 560	9 700	10 800	11 900	12 900	14 400	12 700	13 900	8 260	10 600	11 800	13 000	14 900	16 500	14 400	15 800	8 260	10 600	11 800	13 000	14 900	16 500	14 400	15 800
	17.70	0.40	6 090	7 830	8 700	9 570	10 450	11 590	10 050	11 050	6 580	8 460	9 400	10 340	12 000	13 300	11 550	12 650	6 580	8 460	9 400	10 340	12 000	13 300	11 550	12 650
		10.21	8 260	10 600	11 800	13 000	14 200	15 700	13 600	15 000	8 890	11 400	12 700	14 000	16 300	18 000	15 700	17 200	8 890	11 400	12 700	14 000	16 300	18 000	15 700	17 200
	18.90	0.43	6 580	8 460	9 400	10 340	11 580	12 800	11 050	12 150	7 350	9 500	10 500	11 500	13 250	14 700	12 650	13 850	7 350	9 500	10 500	11 500	13 250	14 700	12 650	13 850
		10.92	8 890	11 400	12 700	14 000	15 700	17 400	15 000	16 500	9 940	12 800	14 200	15 600	17 900	19 700	17 200	18 900	9 940	12 800	14 200	15 600	17 900	19 700	17 200	18 900
	21.50	0.50	8 365	10 850	11 950	13 050	14 250	15 850	13 250	14 550	9 100	11 700	13 000	14 300	15 800	17 500	15 200	16 700	9 100	11 700	13 000	14 300	15 800	17 500	15 200	16 700
		12.70	11 340	14 600	16 200	17 600	19 300	21 500	18 000	19 700	12 320	15 800	17 600	19 400	21 400	23 700	20 600	22 600	12 320	15 800	17 600	19 400	21 400	23 700	20 600	22 600
	23.70	0.56	9 390	12 100	13 400	14 700	16 100	17 850	14 700	16 000	10 640	13 700	15 200	16 700	17 900	19 850	18 400	18 400	10 640	13 700	15 200	16 700	17 900	19 850	18 400	18 400
		14.22	12 740	16 400	18 200	20 000	21 800	24 200	19 900	21 700	14 420	18 500	20 600	22 700	24 300	26 900	22 800	24 900	14 420	18 500	20 600	22 700	24 300	26 900	22 800	24 900

* VAM TOP[®] HT only. Not compatible with VAM TOP[®].

VAM TOP ® HT / VAM TOP ® HC TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	90 - 95 - 100 ksi												105 - 110 - 115 ksi											
			All materials						Carbon & 13 % Cr			GRA: S13% Cr & 13% Cr modified			All materials						Carbon & 13% Cr			GRA: S13% Cr & 13% Cr modified		
			Max. Torque Shoulder (70% of Opt.)		VAM TOP ® HT Field end for non rotation & VAM TOP ® HC		VAM TOP ® HT only		VAM TOP ® HT Field end for non rotation & VAM TOP ® HC		VAM TOP ® HT only		VAM TOP ® HT only		VAM TOP ® HT Field end for non rotation & VAM TOP ® HC		VAM TOP ® HT only		VAM TOP ® HT Field end for non rotation & VAM TOP ® HC		VAM TOP ® HT only		VAM TOP ® HT Field end for non rotation & VAM TOP ® HC		VAM TOP ® HT only	
min.	opt.	max.	min.	max.	Mill & licensee	min.	max.	Field & Liner max	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m		
6 5/8	23.20	0.33	10 100	11 200	12 300	17 350	19 100	13 500	14 800	8 855	11 450	12 650	13 850	20 250	22 300	15 500	17 000	18 900	20 250	22 300	15 500	17 000	18 900	20 250	22 300	
168,28	24.00	0.35	13 700	15 200	16 700	23 500	25 900	19 300	20 100	12 040	13 050	14 450	15 850	27 500	29 100	15 500	17 200	18 900	27 500	30 200	15 500	17 200	18 900	27 500	30 200	
	28.00	0.42	15 500	17 200	18 900	26 400	29 100	20 200	22 100	13 720	14 650	15 850	17 250	30 900	34 000	17 600	19 600	21 600	30 900	34 000	17 600	19 600	21 600	30 900	34 000	
	32.00	0.48	18 500	20 600	22 700	34 700	39 200	25 000	27 500	15 400	19 800	22 000	24 200	40 100	44 300	19 800	22 000	24 200	40 100	44 300	19 800	22 000	24 200	40 100	44 300	
	36.70	0.56	22 100	24 500	27 000	43 500	47 900	29 400	32 300	18 900	20 800	23 100	25 400	50 400	55 400	24 300	27 000	29 700	50 400	55 400	24 300	27 000	29 700	50 400	55 400	
	26.00	0.36	21 630	27 800	30 900	46 400	51 400	34 400	37 800	16 205	20 850	23 150	25 450	37 700	41 800	21 980	28 300	31 400	34 500	51 100	56 700	21 980	28 300	31 400	34 500	
7	29.00	0.41	12 450	13 750	15 050	20 600	22 700	15 700	17 200	13 930	15 200	16 700	18 200	26 400	28 600	13 700	15 200	16 700	26 400	28 600	13 700	15 200	16 700	26 400	28 600	
177,80	32.00	0.45	16 800	18 600	20 500	27 900	30 800	21 300	23 200	14 420	16 000	17 700	19 400	31 400	33 050	16 800	18 600	20 500	31 400	33 050	16 800	18 600	20 500	31 400	33 050	
	35.00	0.50	20 700	23 000	25 300	35 300	38 800	25 500	27 900	16 800	18 800	20 800	22 900	44 800	48 600	16 800	19 000	21 200	44 800	48 600	16 800	19 000	21 200	44 800	48 600	
	38.00	0.54	16 000	17 700	19 400	31 400	33 050	20 900	22 900	17 500	19 500	21 500	23 500	50 400	55 400	17 500	19 500	21 500	50 400	55 400	17 500	19 500	21 500	50 400	55 400	
	41.00	0.59	21 600	24 000	26 400	42 600	46 800	28 300	31 000	18 205	20 850	23 150	25 450	37 700	41 800	18 205	20 850	23 150	37 700	41 800	18 205	20 850	23 150	37 700	41 800	
			28 300	31 400	34 500	49 000	54 000	35 300	38 800	21 980	28 300	31 400	34 500	56 700	62 400	21 980	28 300	31 400	56 700	62 400	21 980	28 300	31 400	56 700	62 400	
			20 850	23 150	25 450	39 650	43 950	28 000	30 800	16 205	20 850	23 150	25 450	44 050	48 850	16 205	20 850	23 150	44 050	48 850	16 205	20 850	23 150	44 050	48 850	
			28 300	31 400	34 500	53 800	59 600	38 000	41 800	21 980	28 300	31 400	34 500	66 200	72 000	21 980	28 300	31 400	66 200	72 000	21 980	28 300	31 400	66 200	72 000	

VAM TOP® HT / VAM TOP® HC TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	90 - 95 - 100 ksi										105 - 110 - 115 ksi																				
			All materials					Carbon & 13 % Cr					All materials					Carbon & 13% Cr															
			Max. Torque Shoulder (70% of Optl.)		VAM TOP® HT Field end for non rotation & VAM TOP® HC		VAM TOP® HT only		Mill & licensee min. & Field		Liner max		CRA: S13% Cr & 13% Cr modified		Max. Torque Shoulder (70% of Optl.)		VAM TOP® HT Field end for non rotation & VAM TOP® HC		VAM TOP® HT only		Mill & licensee min. & Field		Liner max		CRA: S13% Cr & 13% Cr modified								
min.	optl.	max.	min.	max.	min.	max.	min.	max.	min.	max.	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m									
7 5/8 193,68	29.70	0.38	11 655	16 650	18 250	20 800	23 000	18 800	20 700	12 915	16 650	18 450	20 250	24 000	26 800	21 650	23 800	22 500	25 000	27 500	24 000	26 800	21 650	23 800	22 500	25 000	27 500	24 000	26 800	21 650	23 800		
			15 820	20 300	22 800	28 200	31 200	26 800	27 900	25 500	28 100	17 500	20 850	23 150	25 450	30 900	34 300	28 200	30 900	20 850	23 150	25 450	30 900	34 300	28 200	30 900	20 850	23 150	25 450	30 900	34 300		
10.92	33.70	0.43	19 880	25 600	28 400	31 200	34 000	30 900	34 000	16 205	20 850	23 150	25 450	31 900	34 000	27 100	21 980	28 300	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	
			21 980	28 300	31 400	34 500	39 000	43 200	33 400	36 700	16 205	20 850	23 150	25 450	30 700	34 000	29 000	21 980	28 300	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400
14.27	35.80	0.47	16 205	20 850	23 150	25 450	30 700	34 000	26 400	29 000	16 205	20 850	23 150	25 450	31 900	34 000	27 100	21 980	28 300	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400
			21 980	28 300	31 400	34 500	39 000	43 200	33 400	36 700	16 205	20 850	23 150	25 450	30 700	34 000	29 000	21 980	28 300	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400
15.11	39.00	0.50	16 205	20 850	23 150	25 450	30 700	34 000	26 400	29 000	16 205	20 850	23 150	25 450	31 900	34 000	27 100	21 980	28 300	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400
			21 980	28 300	31 400	34 500	39 000	43 200	33 400	36 700	16 205	20 850	23 150	25 450	30 700	34 000	29 000	21 980	28 300	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400
15.11	42.80	0.56	16 205	20 850	23 150	25 450	30 700	34 000	26 400	29 000	16 205	20 850	23 150	25 450	31 900	34 000	27 100	21 980	28 300	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400
			21 980	28 300	31 400	34 500	39 000	43 200	33 400	36 700	16 205	20 850	23 150	25 450	30 700	34 000	29 000	21 980	28 300	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400
15.11	45.30	0.60	16 205	20 850	23 150	25 450	30 700	34 000	26 400	29 000	16 205	20 850	23 150	25 450	31 900	34 000	27 100	21 980	28 300	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400
			21 980	28 300	31 400	34 500	39 000	43 200	33 400	36 700	16 205	20 850	23 150	25 450	30 700	34 000	29 000	21 980	28 300	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400
15.88	47.10	0.63	16 205	20 850	23 150	25 450	30 700	34 000	26 400	29 000	16 205	20 850	23 150	25 450	31 900	34 000	27 100	21 980	28 300	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400
			21 980	28 300	31 400	34 500	39 000	43 200	33 400	36 700	16 205	20 850	23 150	25 450	30 700	34 000	29 000	21 980	28 300	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400



VAM TOP[®] HT / VAM TOP[®] HC TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	120 - 125 - 130 ksi												135 - 140 ksi											
			All materials				Carbon & 13% Cr		CRA: S13% Cr & 13% Cr modified		All materials				Carbon & 13% Cr		CRA: S13% Cr & 13% Cr modified									
			Max. Torque Shoulder (70% of Optl.)	min.	opti.	max.	VAM TOP [®] HT Field end for non rotation & VAM TOP [®] HC	Mill & licensee min. & Field Liner max	max.	VAM TOP [®] HT only	Mill & licensee min. & Field Liner max	max.	CRA: S13% Cr & 13% Cr modified	Max. Torque Shoulder (70% of Optl.)	min.	opti.	max.	VAM TOP [®] HT Field end for non rotation & VAM TOP [®] HC	Mill & licensee min. & Field Liner max	max.	VAM TOP [®] HT only	Mill & licensee min. & Field Liner max	max.	CRA: S13% Cr & 13% Cr modified		
ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m	ft.lb N/m		
4 1/2* 114,30	10.50	0.22	3.450	3.830	4.210	4.770	5.240	4.630	5.080	2.884	3.710	4.120	4.530	5.240	5.810	5.140	5.660	2.884	3.710	4.120	4.530	5.240	5.810	5.140	5.660	
		5.69	4.700	5.200	5.700	6.500	7.100	6.300	6.900	3.920	5.000	5.600	6.200	7.100	7.900	7.000	7.700	3.920	5.000	5.600	6.200	7.100	7.900	7.000	7.700	
		6.35	4.500	4.980	5.480	6.150	6.760	5.930	6.520	3.745	4.820	5.350	5.880	6.600	7.320	6.510	7.180	3.745	4.820	5.350	5.880	6.600	7.320	6.510	7.180	
		12.60	4.760	6.100	6.800	7.500	8.300	8.000	8.800	5.110	6.600	7.300	8.000	8.900	9.900	8.800	9.700	5.110	6.600	7.300	8.000	8.900	9.900	8.800	9.700	
			3.889	5.020	5.570	6.120	7.310	8.040	7.720	4.200	5.400	6.000	6.600	7.820	8.670	7.740	8.510	4.200	5.400	6.000	6.600	7.820	8.670	7.740	8.510	
		6.88	6.800	7.600	8.400	9.900	10.900	9.500	10.500	5.670	7.300	8.100	8.900	10.600	11.600	10.500	11.500	5.670	7.300	8.100	8.900	10.600	11.600	10.500	11.500	
		13.50	4.459	5.740	6.370	7.000	8.300	9.130	8.830	4.760	6.120	6.800	7.480	8.920	9.900	8.980	9.680	4.760	6.120	6.800	7.480	8.920	9.900	8.980	9.680	
		7.37	6.020	7.700	8.600	9.500	11.300	12.400	10.900	6.440	8.300	9.200	10.100	12.100	13.400	11.900	13.100	6.440	8.300	9.200	10.100	12.100	13.400	11.900	13.100	
		15.10	7.170	7.960	8.750	10.400	11.400	10.050	11.050	6.090	7.830	8.700	9.570	11.150	12.350	11.000	12.100	6.090	7.830	8.700	9.570	11.150	12.350	11.000	12.100	
		8.56	9.700	10.800	11.900	14.100	15.500	13.600	15.000	8.260	10.600	11.600	13.000	15.100	16.700	14.900	16.400	8.260	10.600	11.600	13.000	15.100	16.700	14.900	16.400	
		17.00	8.825	8.780	9.750	10.720	12.400	13.750	12.000	7.350	9.500	10.500	11.500	13.600	15.100	13.150	14.450	7.350	9.500	10.500	11.500	13.600	15.100	13.150	14.450	
		9.65	9.240	11.900	13.200	14.500	16.800	18.600	16.300	9.940	12.800	14.200	15.600	18.400	20.500	17.600	19.600	9.940	12.800	14.200	15.600	18.400	20.500	17.600	19.600	
		17.70	7.350	9.500	10.500	11.500	13.000	14.400	13.000	7.840	10.100	11.200	12.300	14.250	15.800	14.250	15.650	7.840	10.100	11.200	12.300	14.250	15.800	14.250	15.650	
		10.21	9.940	12.800	14.200	15.600	17.600	19.500	17.600	10.640	13.700	15.200	16.700	19.300	21.400	19.300	21.200	10.640	13.700	15.200	16.700	19.300	21.400	19.300	21.200	
		18.90	8.085	10.450	11.550	12.850	14.350	15.950	14.250	8.855	11.450	12.650	13.850	15.750	17.450	15.600	17.100	8.855	11.450	12.650	13.850	15.750	17.450	15.600	17.100	
		10.92	10.990	14.100	15.700	17.300	19.500	21.600	19.300	12.040	15.500	17.200	18.900	21.400	23.700	21.400	23.200	12.040	15.500	17.200	18.900	21.400	23.700	21.400	23.200	
		21.50	10.115	13.050	14.450	15.850	17.800	19.750	17.050	10.885	14.050	15.550	17.050	19.500	21.650	18.650	20.450	10.885	14.050	15.550	17.050	19.500	21.650	18.650	20.450	
		12.70	13.720	17.600	19.600	21.600	24.100	26.800	23.100	14.770	19.000	21.100	23.200	26.400	29.400	25.300	27.700	14.770	19.000	21.100	23.200	26.400	29.400	25.300	27.700	
		23.70	11.655	15.050	16.650	18.250	20.350	22.600	19.000	11.900	15.300	17.000	18.700	22.450	24.900	20.900	22.900	11.900	15.300	17.000	18.700	22.450	24.900	20.900	22.900	
		14.22	15.820	20.300	22.600	24.900	27.600	30.600	25.800	16.100	20.700	23.000	25.300	30.400	33.600	28.300	31.000	16.100	20.700	23.000	25.300	30.400	33.600	28.300	31.000	

* VAM TOP[®] HT only. Not compatible with VAM TOP[®].

VAM TOP[®] HT / VAM TOP[®] HC TORQUE VALUES

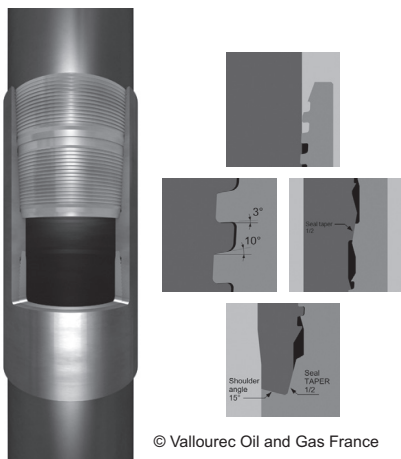
Size (OD)	Nominal Weight	Wall Thickness	lb/ft	In mm	120 - 125 - 130 ksi										135 - 140 ksi																			
					All materials					Carbon & 13% Cr					All materials					Carbon & 13% Cr														
					Max. Torque Shoulder (70% of Optl.)		VAM TOP [®] HT Field end for non rotation & VAM TOP [®] HC		VAM TOP [®] HT only		Mill & licensee & Field Liner max		min. max.		VAM TOP [®] HT Field end for non rotation & VAM TOP [®] HC		VAM TOP [®] HT only		Mill & licensee & Field Liner max		min. max.		Max. Torque Shoulder (70% of Optl.)		VAM TOP [®] HT Field end for non rotation & VAM TOP [®] HC		VAM TOP [®] HT only		Mill & licensee & Field Liner max		min. max.			
ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m	ft.lb	N/m					
6 5/8 168.28	23.20	0.33	9 870	12 700	14 100	15 500	20 250	22 300	17 500	19 200	10 640	13 700	15 200	16 700	20 600	22 900	19 200	21 100	10 640	13 700	15 200	16 700	20 600	22 900	19 200	21 100	10 640	13 700	15 200	16 700	20 600	22 900	19 200	21 100
		8.38	13 370	17 200	19 100	21 000	27 500	30 200	23 700	26 000	14 420	18 500	20 600	22 700	27 900	31 000	26 000	28 600	14 420	18 500	20 600	22 700	27 900	31 000	26 000	28 600	14 420	18 500	20 600	22 700	27 900	31 000	26 000	28 600
	24.00	0.35	11 130	14 400	15 900	17 400	22 800	25 100	19 400	21 300	11 655	15 050	16 650	18 250	23 300	25 900	21 350	23 450	11 655	15 050	16 650	18 250	23 300	25 900	21 350	23 450	11 655	15 050	16 650	18 250	23 300	25 900	21 350	23 450
		8.94	15 120	19 400	21 800	23 800	30 900	34 000	26 300	28 900	15 820	20 300	22 600	24 900	31 600	35 100	28 800	31 800	15 820	20 300	22 600	24 900	31 600	35 100	28 800	31 800	15 820	20 300	22 600	24 900	31 600	35 100	28 800	31 800
	28.00	0.42	12 390	16 000	17 700	19 400	26 600	32 650	23 900	26 300	13 405	17 250	19 150	21 050	30 300	33 600	28 250	28 850	13 405	17 250	19 150	21 050	30 300	33 600	28 250	28 850	13 405	17 250	19 150	21 050	30 300	33 600	28 250	28 850
		10.59	16 800	21 600	24 000	26 400	40 100	44 300	32 400	35 700	18 200	23 400	26 000	28 600	41 100	45 600	35 600	39 100	18 200	23 400	26 000	28 600	41 100	45 600	35 600	39 100	18 200	23 400	26 000	28 600	41 100	45 600	35 600	39 100
	32.00	0.48	15 435	19 850	22 050	24 250	37 150	40 850	28 100	30 900	16 205	20 850	23 150	25 450	37 500	41 800	33 800	33 800	16 205	20 850	23 150	25 450	37 500	41 800	33 800	33 800	16 205	20 850	23 150	25 450	37 500	41 800	33 800	33 800
		12.07	20 930	26 900	29 900	32 900	50 400	55 400	38 100	41 900	21 980	28 300	31 400	34 500	50 800	56 400	41 800	45 800	21 980	28 300	31 400	34 500	50 800	56 400	41 800	45 800	21 980	28 300	31 400	34 500	50 800	56 400	41 800	45 800
	36.70	0.56	16 205	20 850	23 150	25 450	42 700	47 300	32 600	35 900	16 205	20 850	23 150	25 450	46 900	52 000	35 700	39 200	16 205	20 850	23 150	25 450	46 900	52 000	35 700	39 200	16 205	20 850	23 150	25 450	46 900	52 000	35 700	39 200
		14.27	21 980	28 300	31 400	34 500	57 900	64 100	44 200	48 700	21 980	28 300	31 400	34 500	63 600	70 500	48 400	53 100	21 980	28 300	31 400	34 500	63 600	70 500	48 400	53 100	21 980	28 300	31 400	34 500	63 600	70 500	48 400	53 100
7 177.80	26.00	0.36	11 655	15 050	16 650	18 250	24 000	26 450	20 400	22 400	12 390	16 000	17 700	19 400	24 500	27 200	22 300	24 500	12 390	16 000	17 700	19 400	24 500	27 200	22 300	24 500	12 390	16 000	17 700	19 400	24 500	27 200	22 300	24 500
		9.19	15 820	20 300	22 600	24 900	32 500	35 900	27 700	30 400	16 800	21 600	24 000	26 400	33 200	36 900	30 300	33 200	16 800	21 600	24 000	26 400	33 200	36 900	30 300	33 200	16 800	21 600	24 000	26 400	33 200	36 900	30 300	33 200
	29.00	0.41	12 670	16 300	18 100	19 900	30 100	33 150	24 400	26 800	13 685	17 650	19 550	21 450	30 800	34 100	26 750	29 350	13 685	17 650	19 550	21 450	30 800	34 100	26 750	29 350	13 685	17 650	19 550	21 450	30 800	34 100	26 750	29 350
		10.36	17 150	22 100	24 500	27 000	40 800	44 900	33 100	36 300	15 550	20 300	22 600	24 900	36 200	40 400	32 500	35 800	15 550	20 300	22 600	24 900	36 200	40 400	32 500	35 800	15 550	20 300	22 600	24 900	36 200	40 400	32 500	35 800
	32.00	0.45	15 190	19 600	21 700	23 800	34 700	38 200	27 100	29 800	16 205	20 850	23 150	25 450	35 100	38 900	29 650	32 550	16 205	20 850	23 150	25 450	35 100	38 900	29 650	32 550	16 205	20 850	23 150	25 450	35 100	38 900	29 650	32 550
		11.51	20 580	26 500	29 400	32 300	47 000	51 800	36 700	40 400	21 980	28 300	31 400	34 500	52 700	57 700	40 200	44 100	21 980	28 300	31 400	34 500	52 700	57 700	40 200	44 100	21 980	28 300	31 400	34 500	52 700	57 700	40 200	44 100
	35.00	0.50	16 205	20 850	23 150	25 450	41 800	46 050	31 000	34 100	16 205	20 850	23 150	25 450	42 700	47 400	34 000	37 400	16 205	20 850	23 150	25 450	42 700	47 400	34 000	37 400	16 205	20 850	23 150	25 450	42 700	47 400	34 000	37 400
		12.65	21 980	28 300	31 400	34 500	56 700	62 400	41 000	46 200	21 980	28 300	31 400	34 500	64 300	70 500	46 100	50 700	21 980	28 300	31 400	34 500	64 300	70 500	46 100	50 700	21 980	28 300	31 400	34 500	64 300	70 500	46 100	50 700
	38.00	0.54	16 205	20 850	23 150	25 450	47 300	52 150	33 600	36 900	16 205	20 850	23 150	25 450	48 400	53 600	36 700	40 300	16 205	20 850	23 150	25 450	48 400	53 600	36 700	40 300	16 205	20 850	23 150	25 450	48 400	53 600	36 700	40 300
		13.72	21 980	28 300	31 400	34 500	64 100	70 700	45 600	50 000	21 980	28 300	31 400	34 500	72 900	79 600	49 800	54 700	21 980	28 300	31 400	34 500	72 900	79 600	49 800	54 700	21 980	28 300	31 400	34 500	72 900	79 600	49 800	54 700
41.00	0.59	16 205	20 850	23 150	25 450	53 750	59 150	36 200	39 800	16 205	20 850	23 150	25 450	55 000	61 000	39 850	43 450	16 205	20 850	23 150	25 450	55 000	61 000	39 850	43 450	16 205	20 850	23 150	25 450	55 000	61 000	39 850	43 450	
	14.99	21 980	28 300	31 400	34 500	72 900	80 200	49 100	54 000	21 980	28 300	31 400	34 500	82 700	89 600	53 600	59 900	21 980	28 300	31 400	34 500	82 700	89 600	53 600	59 900	21 980	28 300	31 400	34 500	82 700	89 600	53 600	59 900	

VAM TOP® HT / VAM TOP® HC TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	120 - 125 - 130 ksi										135 - 140 ksi									
			All materials					Carbon & 13% Cr					All materials					Carbon & 13% Cr				
			Max. Torque Shoulder (70% of Optl.)	VAM TOP® HT Field end for non rotation & VAM TOP® HC		VAM TOP® HT only		CRA: S13% Cr & 13% Cr modified	Min.	Optl.	Max.	Mill & licensee & Field Liner max	Min.	Max.	Mill & licensee & Field Liner max	Min.	Optl.	Max.	Mill & licensee & Field Liner max	Min.	Max.	Mill & licensee & Field Liner max
ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb	ft.lb		
7.518	29.70	0.38	14,420	18,600	20,800	22,800	27,300	30,300	24,500	27,000	15,680	20,200	22,400	24,800	30,000	33,300	27,000	29,700	30,000	33,300	27,000	
193.68		9.53	19,530	25,100	27,900	30,700	37,000	41,100	33,200	36,600	21,280	27,400	30,400	33,400	40,700	45,100	36,600	40,300	40,700	45,100	36,600	
	33.70	0.43	16,205	20,850	23,150	25,450	35,100	38,900	29,650	32,600	16,205	20,850	23,150	25,450	38,700	42,900	32,600	35,900	38,700	42,900	32,600	
		10.92	21,980	28,300	31,400	34,500	47,600	52,700	40,200	44,200	21,980	28,300	31,400	34,500	58,200	66,300	50,800	55,900	58,200	66,300	50,800	
	35.80	0.47	16,205	20,850	23,150	25,450	37,700	41,800	32,000	35,200	16,205	20,850	23,150	25,450	41,500	46,000	35,100	38,600	41,500	46,000	35,100	
		11.81	21,980	28,300	31,400	34,500	51,100	56,700	43,400	47,700	21,980	28,300	31,400	34,500	62,400	71,600	52,300	57,300	62,400	71,600	52,300	
	39.00	0.50	16,205	20,850	23,150	25,450	40,100	44,400	34,100	37,600	16,205	20,850	23,150	25,450	44,100	48,900	37,500	41,200	44,100	48,900	37,500	
		12.70	21,980	28,300	31,400	34,500	54,400	60,200	46,200	51,000	21,980	28,300	31,400	34,500	59,800	69,300	50,800	55,900	59,800	69,300	50,800	
	42.80	0.56	16,205	20,850	23,150	25,450	46,800	51,900	37,800	41,500	16,205	20,850	23,150	25,450	51,500	57,100	41,400	45,500	51,500	57,100	41,400	
		14.27	21,980	28,300	31,400	34,500	63,400	70,400	51,200	56,300	21,980	28,300	31,400	34,500	69,800	77,400	61,700	67,100	69,800	77,400	61,700	
	45.30	0.60	16,205	20,850	23,150	25,450	49,800	55,200	39,300	43,200	16,205	20,850	23,150	25,450	54,700	60,700	43,000	47,300	54,700	60,700	43,000	
		15.11	21,980	28,300	31,400	34,500	67,500	74,800	53,300	58,600	21,980	28,300	31,400	34,500	74,200	82,300	64,100	69,400	74,200	82,300	64,100	
	47.10	0.63	16,205	20,850	23,150	25,450	51,700	57,400	40,600	44,600	16,205	20,850	23,150	25,450	56,800	63,000	44,400	48,800	56,800	63,000	44,400	
		15.88	21,980	28,300	31,400	34,500	70,100	77,800	55,000	60,500	21,980	28,300	31,400	34,500	77,000	85,400	60,200	66,200	77,000	85,400	60,200	

3.4 VAM® HP

Application



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Dual VAM® Metal To Metal Seal, Reverse Angle Torque Shoulder and Slim-Line Couplings

VAM® High Pressure (HP) has been specifically designed for, and is extensively used in the world's most extreme High Pressure, High Temperature (HPHT) oilfields.

An additional external pressure seal, located in between the threaded areas, gives the connection an industry-leading 100% External Pressure rating that has been successfully proven through the latest ISO 13679 CAL IV physical qualification testing.

A reverse angle torque shoulder energizes a 50% taper metal-to-metal seal, and leads to a 100% Internal Pressure rating, while the shallow thread taper produces a high compression rating of 60% of pipe body strength. The long threaded area gives the connection its excellent tensile characteristics and resistance to bending.

Hook Thread Design

A coarse thread pitch with a -3° reverse load flank angle gives the connection superior tension strength and eliminates the risk of jump out. Precision machining in the threads contributes to reduce hoop stresses in the coupling.

Slim-Line Coupling

The coupling diameter for each size of VAM® HP has been designed with a specific HPHT project in mind. In general, the couplings are slim-line in order to allow them to fit inside intermediate casing strings that maintain a given drift size and the slim-line nature minimizes cementing difficulties.

The coupling design minimizes hoop stresses, and is ideal for use with controlled yield materials and/or thick wall pipes in high-pressure high temperature wells where sour gas or other corrosive environments may be encountered. The thread form has a taper of 1:8, 1:10 or 1:12, depending on the size of the casing. In general, the connection uses 5 TPI.

Dope quantities

The minimum quantity of compound should be applied on the Pin end only. Dope should be applied evenly in order to get a uniform coating on all parts of the connection. If a dope applicator is used for the box end it shall be adjusted to apply the above recommended quantity of dope.

Minimum make-up dope quantity

Nominal OD	Weight	Dope volume	
		(cm ³)	(in ³)
7	74.33	26	1.6
7 5/8	51.20	21	1.3
7 5/8	55.30	25	1.5
7 5/8	59.20	25	1.5
7 5/8	61.50	28	1.7
9	110.30	38	2.3
10 3/4	71.10	21	1.3
10 3/4	73.20	21	1.3
10 3/4	79.20	21	1.3
10 3/4	85.30	21	1.3
10 3/4	100.40	31	1.9
10 3/4	110.20	34	2.1
10 7/8	72.00	21	1.3
11	125.20	34	2.1

Make-up procedure / Acceptance criteria

No special requirements see general running procedure 2. for information.

VAM® HP TECHNICAL DATA

Size (OD)	Nominal Weight	Version (if any)	Wall Thickness		API Drift Diameter	Coupling OD	Coupling ID	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Regular Yield Strength (1000 lb)					
			in	mm								90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi
7"	74.33		1.200	30.48	4.475	8.206	4.811	8.739	19.490	21.865	21.865	1968	2077	2187	2405	2733	3061
<i>177.8</i>																	
7 5/8"	51.20	SC78	0.687	17.45	6.126	8.094	6.309	6.957	15.906	14.975	11.675	1051	1109	1167	1284	1459	1634
<i>193.68</i>	55.30	SC77	0.750	19.05	6.000	8.120	6.124	7.311	16.614	16.199	12.436	1119	1181	1244	1368	1555	1741
	59.20	SC76	0.812	20.62	5.876	8.141	5.994	7.737	17.480	17.380	13.208	1189	1255	1321	1453	1651	1849
7.844"	61.50	SC75	0.850	21.59	5.875*	8.150	5.939	8.100	18.189	18.092	13.567	1221	1289	1357	1492	1696	1899
<i>194.16</i>																	
9"	110.30		1.350	34.29	6.175	10.376	6.539	9.648	21.300	32.445	32.445	2920	3082	3245	3569	4056	4542
<i>228.6</i>																	
10.528"	96.00	SC80	0.940	23.88	8.500	11.191	8.669	7.855	17.720	28.309	22.646	2038	2151	2265	2491	2831	3170
<i>267.36</i>																	
10 3/4"	71.10	SC90	0.650	16.51	9.294	11.437	9.631	7.535	17.047	20.624	18.555	1670	1763	1856	2041	2319	2598
<i>273.05</i>	73.20	SC90	0.672	17.07	9.33*	11.470	9.616	7.535	17.047	21.275	19.156	1724	1820	1916	2107	2395	2682
	79.20	SC84	0.734	18.64	9.126	11.344	9.337	7.937	17.874	23.097	19.308	1738	1834	1931	2124	2414	2703
	85.30	SC73	0.797	20.24	9.000	11.470	9.352	8.006	18.012	24.921	18.095	1629	1719	1809	1990	2262	2533
	85.30	SC87	0.797	20.24	9.000	11.470	9.352	8.006	18.012	24.921	21.674	1951	2059	2167	2384	2709	3034
	100.40	SC80	0.960	24.38	8.674	11.470	9.085	8.226	18.425	29.526	23.510	2116	2233	2351	2586	2939	3291
	104.30	SC70	1.000	25.40	8.594	11.221	8.726	8.760	19.530	30.631	21.441	1930	2037	2144	2359	2680	3002
	110.20	SC80	1.050	26.67	8.5*	11.491	8.871	8.409	18.819	31.997	25.598	2304	2432	2560	2816	3200	3584
10 7/8"	72.00		0.656	16.66	9.407	11.620	9.669	7.178	16.340	21.060	21.060	1895	2001	2106	2317	2633	2948
<i>276.23</i>																	
12 1/4"	134.25	SC90	1.125	28.58	9.894*	13.230	10.084	8.964	19.920	38.319	35.342	3181	3357	3534	3888	4418	4948
<i>311.15</i>																	

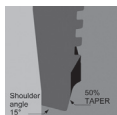
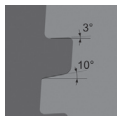
* special drift

VAM® HP TORQUE VALUES

Size (OD) in mm	Nominal Weight lb/ft	Wall Thickness		Validated range Carbon steel grade	Make-up Torques		
		in	mm		min.	opti.	max.
7" 177,8	74,33	1,200	30,48	105 → 140 ksi	56 600	61 600	66 600
					76 700	83 500	90 300
7 5/8" 193,68	51,20	0,687	17,45	80 → 140 ksi	27 700	30 000	33 000
					36 500	40 600	44 700
	55,30	0,750	19,05		27 700	30 000	33 000
	36 500	40 600	44 700				
7.644" 194,16	61,50	0,850	21,59	80 → 140 ksi	29 700	33 000	36 300
					40 150	44 660	49 170
9" 228,6	110,30	1,350	34,29	120 → 130 ksi	65 000	70 000	75 000
					88 100	94 900	101 700
10.526" 267,36	96,00	0,940	23,88	80 → 140 ksi	48 600	54 000	59 400
					65 900	73 200	80 500
10 3/4" 273,05	71,10	0,650	16,51	80 → 140 ksi	38 700	43 000	47 300
					52 400	58 300	64 100
	73,20	0,672	17,07		38 700	43 000	47 300
	52 400	58 300	64 100				
	79,20	0,734	18,64		40 600	45 000	49 400
	55 000	61 000	67 000				
	85,30	0,797	20,24	41 400	46 000	50 600	
	56 100	62 400	68 600				
	100,40	0,960	24,38	45 000	50 000	55 000	
	60 900	67 700	74 470				
10 7/8" 276,23	72,00	0,656	16,66	90 → 140 ksi	48 600	54 000	59 400
				65 900	73 200	80 500	
12 1/4" 311 1/7	134,25	1,125	28,58	80 → 140 ksi	48 600	54 000	59 400
				65 900	73 200	80 500	
105 → 140 ksi	67 500	75 000	82 500	41 400	46 000	50 600	
				56 100	62 400	68 600	
105 → 140 ksi	67 500	75 000	82 500	67 500	75 000	82 500	
				91 500	101 700	111 900	

3.5 VAM® HW ST

Application



VAM® Metal To Metal Seal and Reverse Angle Torque Shoulder

A reverse angle torque shoulder energizes a 50% taper metal-to-metal seal, and is self energized by internal pressure.

The rugged design of the pin nose makes for a rugged connection that is able to withstand the high combined loads that are encountered in deep, high-pressure wells.

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VAM® HW ST is the solution for a connection to withstand pressures as high as the burst and the collapse ratings of the heavy wall casing.

Hook Thread Design

A coarse thread pitch with a -3° reverse load flank angle gives the connection superior tension strength and eliminates the risk of jump out. Precision machining in the threads contributes to reduce hoop stresses in the coupling

A steep thread taper allows for easy stabbing and fast make-up. Making-up heavy wall casing with VAM® HW ST is as easy as with standard wall casing, with virtually no danger of cross threading.

Extra Strength Coupling

The coupling size is calculated to provide in excess of 100% tensile efficiency on heavy weight casing.

The coupling design minimizes hoop stresses, and is ideal for use with controlled yield materials in high-pressure high temperature wells where sour gas or other corrosive environments may be encountered.

The thread form has a taper of 1:8 or 1:5.5

On diameters 5" to 14", there is 4 TPI.

Dope quantities

The minimum quantity of compound should be shared between Pin and Box ends as follows:

2/3 on Box (never leave the box without any dope)

1/3 on Pin

Dope should be applied evenly in order to get a uniform coating on all parts of the connection.

If a dope applicator is used for the box end it shall be adjusted to apply the above recommended quantity of dope.

Minimum make-up dope quantity

Nominal OD	Dope volume	
	(in)	(cm ³)
5	14	0.9
5 ½	16	1
6 5/8	19	1.2
7	25	1.5
7 5/8	27	1.7
9 1/8	39	2.4
9 5/8	41	2.5
10 ¾	46	2.8
11 ¾	59	3.6
13 3/8	67	4.1
14	70	4.3

VAM® HW ST TECHNICAL DATA

Size (OD) In mm	Nominal Weight lb/ft	Wall Thickness		API Drift Diameter in (reg)	Coupling OD (reg) in	Coupling ID in	Make-up Loss in	Coupling Length in	Pipe Body Section sq.in	Coupling CCS sq.in	Yield Strength (1000 lb)				
		in	mm								80 ksi	90 ksi	95 ksi	110 ksi	125 ksi
5" <i>127.00</i>	28.20	0.600	15.24	3.675	5.791	3.938	4.382	10.732	8.294	8.474	NA	746	788	912	1 037
	30.20	0.650	16.51	3.575	5.839	3.848	4.568	11.105	8.883	9.080	NA	799	844	977	1 110
	32.15	0.700	17.78	3.475	5.882	3.758	4.754	11.477	9.456	9.650	NA	851	898	1 040	1 182
	34.00	0.750	19.05	3.375	5.925	3.668	4.941	11.850	10.014	10.225	NA	901	951	1 102	1 252
	35.88	0.800	20.32	3.275	5.969	3.578	5.126	12.221	10.556	10.804	NA	950	1 003	1 161	1 320
5 1/2" <i>139.70</i>	31.40	0.600	15.24	4.175	6.276	4.442	4.706	11.380	9.236	9.455	NA	831	877	1 016	1 155
	32.60	0.625	15.88	4.125	6.307	4.396	4.706	11.380	9.572	9.767	NA	861	909	1 053	1 196
	33.67	0.650	16.51	4.075	6.343	4.352	4.706	11.380	9.904	10.118	792	891	941	1 089	1 238
	35.30	0.687	17.45	4.001	6.394	4.285	4.706	11.380	10.388	10.630	831	935	987	1 143	1 299
	35.88	0.700	17.78	3.975	6.406	4.261	4.754	11.477	10.556	10.799	844	950	1 003	1 161	1 320
6"	38.00	0.750	19.05	3.875	6.449	4.172	4.941	11.850	11.192	11.427	895	1 007	1 063	1 231	1 399
	40.16	0.800	20.32	3.775	6.492	4.081	5.126	12.221	11.812	12.056	945	1 063	1 122	1 299	1 477
	40.50	0.812	20.62	3.751	6.504	4.060	5.170	12.309	11.959	12.220	957	1 076	1 136	1 315	1 495
	42.21	0.850	21.59	3.675	6.535	3.992	5.313	12.594	12.417	12.687	NA	1 118	1 180	1 366	1 552
	43.22	0.875	22.23	3.625	6.555	3.946	5.406	12.781	12.714	12.984	NA	1 144	1 208	1 398	1 589
6 5/8" <i>168.28</i>	44.22	0.900	22.86	3.575	6.575	3.902	5.499	12.966	13.006	13.280	NA	1 171	1 236	1 431	1 626
	41.48	0.650	16.51	5.200	7.516	5.483	4.568	11.105	12.201	12.481	976	1 098	1 159	1 342	1 525
	47.10	0.750	19.05	5.000	7.618	5.303	4.941	11.850	13.843	14.161	1 107	1 246	1 315	1 523	1 730
	49.77	0.800	20.32	4.900	7.665	5.213	5.126	12.221	14.640	14.959	1 171	1 318	1 391	1 610	1 830
	52.43	0.850	21.59	4.800	7.681	5.123	5.628	13.225	15.421	15.767	1 234	1 388	1 465	1 696	1 928
7" <i>177.80</i>	55.03	0.900	22.86	4.700	7.744	5.033	5.628	13.225	16.187	16.531	1 295	1 457	1 538	1 781	2 023
	57.58	0.950	24.13	4.600	7.807	4.943	5.628	13.225	16.937	17.300	1 355	1 524	1 609	1 863	2 117
	60.08	1.000	25.40	4.500	7.728	4.853	5.552	13.072	17.671	18.053	1 414	1 590	1 679	1 944	2 209
	44.08	0.650	16.51	5.575	7.850	5.859	5.009	11.966	12.967	13.237	1 037	1 167	1 232	1 426	1 621
	46.00	0.670	17.02	5.535	7.870	5.823	5.097	12.162	13.324	13.595	1 066	1 199	1 266	1 466	1 666
46.40	0.687	17.45	5.501	7.890	5.792	5.171	12.311	13.625	13.936	1 090	1 226	1 294	1 499	1 703	

VAM® HW ST TECHNICAL DATA

Size (OD)	Nominal Weight	Wall Thickness		API Drift Diameter	Coupling OD (reg)	Coupling ID	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Yield Strength (1000 lb)				
		in	mm								80 ksi	90 ksi	95 ksi	110 ksi	125 ksi
7" <i>177.80</i>	47.10	0.700	17.78	5.475	7.902	5.769	5.228	12.425	13.854	14.158	1.108	1.247	1.316	1.524	1.732
	49.50	0.730	18.54	5.415	7.929	5.715	5.360	12.689	14.379	14.672	1.150	1.294	1.366	1.582	1.797
	50.10	0.750	19.05	5.375	7.949	5.679	5.448	12.865	14.726	15.033	1.178	1.325	1.399	1.620	1.841
	52.97	0.800	20.32	5.275	7.996	5.589	5.669	13.306	15.582	15.911	1.247	1.402	1.480	1.714	1.948
	53.60	0.812	20.62	5.251	8.008	5.568	5.720	13.409	15.785	16.126	1.263	1.421	1.500	1.736	1.973
	55.83	0.850	21.59	5.175	8.043	5.499	5.889	13.746	16.423	16.791	1.314	1.478	1.560	1.806	2.053
	57.24	0.875	22.23	5.125	8.063	5.454	5.999	13.967	16.837	17.182	1.347	1.515	1.600	1.852	2.105
	58.63	0.900	22.86	5.075	8.087	5.409	6.109	14.186	17.247	17.624	1.380	1.552	1.638	1.897	2.156
	60.67	0.937	23.80	5.001	8.118	5.342	6.271	14.511	17.847	18.233	1.428	1.606	1.695	1.963	2.231
	61.38	0.950	24.13	4.975	8.130	5.319	6.328	14.625	18.056	18.457	1.444	1.625	1.715	1.986	2.257
7 5/8" <i>193.68</i>	64.08	1.000	25.40	4.875	8.091	5.229	5.752	13.472	18.850	19.239	1.508	1.697	1.791	2.074	2.356
	52.10	0.700	17.78	6.100	8.539	6.399	5.228	12.425	15.229	15.545	1.218	1.371	1.447	1.675	1.904
	52.80	0.712	18.08	6.076	8.551	6.378	5.280	12.529	15.463	15.777	1.237	1.392	1.469	1.701	1.933
	55.30	0.750	19.05	6.000	8.591	6.309	5.448	12.865	16.199	16.548	1.296	1.458	1.539	1.782	2.025
	58.31	0.800	20.32	5.900	8.638	6.219	5.669	13.306	17.153	17.501	1.372	1.544	1.630	1.887	2.144
	59.20	0.812	20.62	5.876	8.650	6.198	5.720	13.409	17.380	17.734	1.390	1.564	1.651	1.912	2.173
	61.50	0.850	21.59	5.800	8.685	6.129	5.889	13.746	18.092	18.456	1.447	1.628	1.719	1.990	2.262
	64.64	0.900	22.86	5.700	8.732	6.039	6.109	14.186	19.014	19.411	1.521	1.711	1.806	2.092	2.377
	64.95	0.905	22.99	5.680	8.736	6.030	6.131	14.231	19.106	19.496	1.528	1.720	1.815	2.102	2.388
	67.72	0.950	24.13	5.600	8.780	5.949	6.328	14.625	19.922	20.370	1.594	1.793	1.893	2.191	2.490
9 5/8" <i>244.48</i>	64.90	0.672	17.07	8.125	10.551	8.460	5.424	12.816	18.901	19.341	1.512	1.701	1.796	2.079	2.363
	66.72	0.700	17.78	8.069	10.579	8.410	5.546	13.061	19.627	20.023	1.570	1.766	1.865	2.159	2.463
	70.30	0.734	18.64	8.001	10.618	8.349	5.696	13.360	20.502	20.951	1.640	1.845	1.948	2.255	2.563
	71.80	0.750	19.05	7.969	10.634	8.320	5.767	13.502	20.911	21.344	1.673	1.882	1.987	2.300	2.614
	75.60	0.797	20.24	7.875	10.685	8.235	5.973	13.914	22.104	22.576	1.768	1.989	2.100	2.431	2.763
	75.90	0.800	20.32	7.869	10.689	8.230	5.987	13.942	22.180	22.667	1.774	1.996	2.107	2.440	2.773



VAM® HW ST TECHNICAL DATA

Size (OD)	Nominal Weight	Wall Thickness		API Drift Diameter	Coupling OD (reg)	Coupling ID	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS					
		in	mm							80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	
9 5/8" <i>244.48</i>	79.66	0.850	21.59	7.769	10.740	8.140	6.207	14.382	23.432	23.926	1.875	2.109	2.226	2.578	2.929
	83.86	0.900	22.86	7.669	10.791	8.050	6.427	14.822	24.669	25.188	1.974	2.220	2.344	2.714	3.084
	88.02	0.950	24.13	7.569	10.843	7.960	6.646	15.261	25.891	26.454	2.071	2.330	2.460	2.848	3.236
10 3/4" <i>273.05</i>	85.30	0.797	20.24	9.000	11.803	9.365	6.212	14.392	24.921	25.482	2.001	2.251	2.376	2.741	3.126
	90.30	0.850	21.59	8.894	11.858	9.269	6.461	14.891	26.437	27.012	2.115	2.379	2.512	2.908	3.305
	91.20	0.859	21.82	8.876	11.866	9.253	6.504	14.977	26.692	27.246	2.135	2.402	2.536	2.936	3.337
11 3/4" <i>298.45</i>	94.68	0.900	22.86	8.794	11.909	9.179	6.686	15.361	27.850	28.443	2.228	2.507	2.646	3.064	3.481
	99.70	0.950	24.13	8.694	11.961	9.089	6.931	15.831	29.248	29.875	2.340	2.632	2.779	3.217	3.656
	100.40	0.960	24.38	8.674	11.969	9.071	6.978	15.924	29.526	30.118	2.362	2.657	2.805	3.248	3.691
11 3/4" <i>298.45</i>	110.20	1.050	26.67												
	77.06	0.650	16.51	10.294	12.650	10.635	5.522	13.012	22.667	23.173	1.813	2.040	2.153	2.493	2.833
	82.61	0.700	17.78	10.194	12.705	10.544	5.757	13.482	24.300	24.795	1.944	2.187	2.309	2.673	3.038
13 3/8" <i>339.73</i>	88.11	0.750	19.05	10.094	12.764	10.455	5.992	13.952	25.918	26.502	2.073	2.333	2.462	2.851	3.240
	93.56	0.800	20.32	9.994	12.819	10.365	6.227	14.422	27.520	28.134	2.202	2.477	2.614	3.027	3.440
	98.95	0.850	21.59	9.894	12.874	10.275	6.461	14.891	29.107	29.768	2.329	2.620	2.765	3.202	3.638
13 3/8" <i>339.73</i>	104.29	0.900	22.86	9.794	12.925	10.185	6.696	15.361	30.678	31.327	2.454	2.761	2.914	3.375	3.835
	109.58	0.950	24.13	9.694	12.976	10.094	6.931	15.831	32.233	32.886	2.579	2.901	3.062	3.546	4.029
	94.76	0.700	17.78	11.819	14.346	12.180	5.757	13.482	27.874	28.517	2.230	2.509	2.648	3.066	3.484
14" <i>355.60</i>	101.13	0.750	19.05	11.719	14.402	12.090	5.992	13.952	29.747	30.361	2.380	2.677	2.826	3.272	3.718
	107.44	0.800	20.32	11.619	14.461	12.000	6.227	14.422	31.604	32.299	2.528	2.844	3.002	3.476	3.951
	113.70	0.850	21.59	11.519	14.516	11.910	6.461	14.891	33.446	34.150	2.676	3.010	3.177	3.679	4.181
14" <i>355.60</i>	119.91	0.900	22.86	11.419	14.571	11.820	6.696	15.361	35.272	36.005	2.822	3.174	3.351	3.890	4.409
	122.01	0.917	23.29	11.385	14.591	11.790	6.776	15.820	35.889	36.658	2.871	3.230	3.409	3.948	4.486
	126.06	0.950	24.13	11.319	14.626	11.730	6.931	15.831	37.083	37.863	2.967	3.337	3.523	4.079	4.635
14" <i>355.60</i>	120.00	0.850	21.59	12.113	15.146	12.538	6.461	14.891	35.115	35.824	2.809	3.160	3.336	3.863	4.389
	125.92	0.900	22.86	12.013	15.205	12.448	6.696	15.361	37.039	37.854	2.963	3.334	3.519	4.074	4.630
	132.41	0.950	24.13	11.913	15.260	12.357	6.931	15.831	38.948	39.798	3.116	3.505	3.700	4.284	4.869

VAM® HW ST TECHNICAL DATA

Size (OD) In	Nominal Weight lb/ft	Wall Thickness		API Drift Diameter in	Coupling OD (reg) in	Coupling ID in	Make-up Loss in	Coupling Length in	Pipe Body Section sq.in	Coupling CCS sq.in	Yield Strength (1000 lb)				
		in	mm								80 ksi	90 ksi	95 ksi	110 ksi	125 ksi
9 5/8" <i>244.48</i>	79.66	0.850	21.59	7.769	10.740	8.140	6.207	14.382	23.432	23.926	1875	2 109	2 226	2 578	2 829
	83.86	0.900	22.86	7.669	10.791	8.050	6.427	14.822	24.669	25.188	1974	2 220	2 344	2 714	3 084
	88.02	0.950	24.13	7.589	10.843	7.960	6.646	6.521	15.261	25.891	26.454	2 071	2 330	2 460	2 848	3 236
10 3/4" <i>273.05</i>	85.30	0.797	20.24	9.000	11.803	9.365	6.212	14.392	24.921	25.482	2 001	2 251	2 376	2 741	3 126
	90.30	0.850	21.59	8.894	11.858	9.289	6.461	14.891	26.437	27.012	2 115	2 379	2 512	2 908	3 305
	91.20	0.859	21.82	8.876	11.866	9.253	6.504	14.977	26.692	27.246	2 135	2 402	2 536	2 936	3 337
11 3/4" <i>298.45</i>	94.68	0.900	22.86	8.794	11.909	9.179	6.696	15.361	27.850	28.443	2 228	2 507	2 646	3 064	3 481
	99.70	0.950	24.13	8.694	11.961	9.089	6.931	15.831	29.248	29.875	2 340	2 632	2 779	3 217	3 656
	100.40	0.960	24.38	8.674	11.969	9.071	6.978	15.924	29.526	30.118	2 362	2 657	2 805	3 248	3 691
11 3/4" <i>298.45</i>	110.20	1.050	26.67												
	77.06	0.650	16.51	10.294	12.650	10.635	5.522	13.012	22.667	23.173	1 813	2 040	2 153	2 493	2 833
	82.61	0.700	17.78	10.194	12.705	10.544	5.757	13.482	24.300	24.795	1 944	2 187	2 309	2 673	3 038
13 3/8" <i>339.73</i>	88.11	0.750	19.05	10.094	12.764	10.455	5.982	13.952	25.918	26.502	2 073	2 333	2 462	2 851	3 240
	93.56	0.800	20.32	9.994	12.819	10.365	6.227	14.422	27.520	28.134	2 202	2 477	2 614	3 027	3 440
	98.95	0.850	21.59	9.894	12.874	10.275	6.461	14.891	28.107	28.768	2 329	2 620	2 765	3 202	3 638
13 3/8" <i>339.73</i>	104.29	0.900	22.86	9.794	12.925	10.185	6.696	15.361	30.678	31.327	2 454	2 761	2 914	3 375	3 835
	109.58	0.950	24.13	9.694	12.976	10.094	6.931	15.831	32.233	32.886	2 579	2 901	3 062	3 546	4 029
	94.76	0.700	17.78	11.819	14.346	12.180	5.757	13.482	27.874	28.517	2 230	2 509	2 648	3 066	3 484
14" <i>355.60</i>	101.13	0.750	19.05	11.719	14.402	12.090	5.982	13.952	29.747	30.361	2 380	2 677	2 826	3 272	3 718
	107.44	0.800	20.32	11.619	14.461	12.000	6.227	14.422	31.604	32.299	2 528	2 844	3 002	3 476	3 951
	113.70	0.850	21.59	11.519	14.516	11.910	6.461	14.891	33.446	34.150	2 676	3 010	3 177	3 679	4 181
14" <i>355.60</i>	119.91	0.900	22.86	11.419	14.571	11.820	6.696	15.361	35.272	36.005	2 822	3 174	3 351	3 890	4 409
	122.01	0.917	23.29	11.385	14.591	11.790	6.776	15.520	35.889	36.658	2 871	3 230	3 409	3 948	4 486
	126.06	0.950	24.13	11.319	14.626	11.730	6.931	15.831	37.083	37.863	2 967	3 337	3 523	4 079	4 635
14" <i>355.60</i>	120.00	0.850	21.59	12.113	15.146	12.538	6.461	14.891	35.115	35.824	2 809	3 160	3 336	3 863	4 389
	125.92	0.900	22.86	12.013	15.203	12.448	6.696	15.361	37.039	37.854	2 963	3 334	3 519	4 074	4 630
	132.41	0.950	24.13	11.913	15.265	12.357	6.931	15.831	38.948	39.798	3 116	3 505	3 700	4 284	4 869



VAM® HW ST TORQUE VALUES

Size (OD)	Wall Thickness	75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			
		min.	opti.	max.	min.	opti.	max.	min.	opti.	max.	
in	mm	ft.lb N/m			ft.lb N/m			ft.lb N/m			
5"	127.00	0.800	-	-	9 400	10 400	11 400	10 300	11 400	12 500	
		15.24	-	-	12 700	14 100	15 500	13 900	15 400	16 900	
		0.850	-	-	10 700	11 900	13 100	11 700	13 000	14 300	
		16.51	-	-	14 600	16 200	17 800	15 900	17 700	19 500	
		0.700	-	-	12 100	13 500	14 900	13 200	14 700	16 200	
		17.78	-	-	16 500	18 300	20 100	18 000	20 000	22 000	
		0.750	-	-	13 500	15 000	16 500	14 800	16 400	18 000	
		19.05	-	-	18 300	20 300	22 300	20 000	22 200	24 400	
		0.800	-	-	14 800	16 500	18 200	16 200	18 000	19 800	
		20.32	-	-	20 200	22 400	24 600	22 000	24 500	27 000	
5 1/2"	139.70	0.850	-	-	-	-	-	17 700	19 700	21 700	
		21.59	-	-	-	-	-	24 000	26 700	29 400	
		0.900	-	-	-	-	-	19 200	21 300	23 400	
		22.86	-	-	-	-	-	26 000	28 900	31 800	
		0.950	-	-	-	-	-	20 800	22 900	25 200	
		24.13	-	-	-	-	-	28 000	31 100	34 200	
		0.800	-	-	9 900	11 000	12 100	10 900	12 100	13 300	
		15.24	-	-	13 400	14 900	16 400	14 800	16 400	18 000	
		0.825	-	-	10 900	12 100	13 300	12 000	13 300	14 600	
		15.88	-	-	14 800	16 400	18 000	16 200	18 000	19 800	
5 1/2"	139.70	0.650	10 700	11 900	13 100	11 900	13 200	14 500	13 000	14 500	16 000
		16.51	14 500	16 100	17 700	16 100	17 900	19 700	17 700	19 700	21 700
		0.687	12 000	13 300	14 600	13 300	14 800	16 300	14 800	16 400	18 000
		17.45	16 300	18 100	19 900	18 100	20 100	22 100	20 000	22 200	24 400
		0.700	12 300	13 700	15 100	13 800	15 300	16 800	15 100	16 800	18 500
		17.78	16 700	18 600	20 500	18 600	20 700	22 800	20 500	22 800	25 100

VAM® HW ST TORQUE VALUES

Size (OD)	Wall Thickness		75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			
	In	In	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	
5 1/2" 139.70	0.750	13 800	15 300	16 800	18 700	15 300	17 000	18 700	16 800	18 700	20 600	
	19.05	19 700	20 800	22 900	20 800	23 100	25 400	22 900	22 900	25 400	27 900	
	0.800	15 200	16 900	18 600	16 900	20 700	22 800	18 600	20 700	22 800	22 800	
	20.32	20 700	23 000	25 300	22 900	25 500	28 100	25 200	28 000	28 000	30 800	
	0.812	15 700	17 400	19 100	17 300	19 200	21 100	19 100	21 200	21 200	23 300	
	20.62	21 100	23 500	25 900	23 500	26 100	28 700	25 800	28 700	28 700	31 600	
	0.850	-	-	-	18 400	20 500	22 600	20 300	22 600	24 900	24 900	24 900
	21.59	-	-	-	25 000	27 800	30 600	27 500	30 600	33 700	33 700	33 700
	0.875	-	-	-	19 300	21 400	23 500	20 800	23 100	25 400	25 400	25 400
	22.23	-	-	-	26 100	29 000	31 900	28 300	31 400	34 500	34 500	34 500
	0.900	-	-	-	20 100	22 300	24 500	20 800	23 100	25 400	25 400	25 400
	22.86	-	-	-	27 200	30 200	33 200	28 300	31 400	34 500	34 500	34 500
0.925	-	-	-	20 800	23 100	25 400	20 800	23 100	25 400	27 800	27 800	
23.50	-	-	-	28 300	31 400	34 500	30 900	34 300	37 700	37 700	37 700	
0.950	-	-	-	20 800	23 100	25 400	20 800	23 100	25 400	27 800	27 800	
24.13	-	-	-	28 300	31 400	34 500	30 900	34 300	37 700	37 700	37 700	
6 5/8" 168.28	0.850	14 100	15 700	17 300	15 900	17 700	19 500	17 800	19 800	21 800	21 800	
	16.51	19 200	21 300	23 400	19 700	24 100	26 500	24 200	26 900	29 600	29 600	
	0.700	16 100	17 900	19 700	16 100	20 100	22 100	20 200	22 500	24 800	24 800	
	17.78	21 800	24 200	26 600	24 600	27 300	30 000	27 400	30 500	33 600	33 600	
	0.750	18 000	20 000	22 000	20 300	22 600	24 900	20 800	23 100	25 400	25 400	
	19.05	24 400	27 100	29 800	27 500	30 600	33 700	28 300	31 400	34 500	34 500	
	0.800	19 900	22 100	24 300	20 800	23 100	25 400	20 800	23 100	25 400	25 400	
	20.32	27 000	30 000	33 000	28 300	31 400	34 500	28 300	31 400	34 500	34 500	
	0.850	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400	25 400	
	21.59	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500	34 500	



VAM® HW ST TORQUE VALUES

Size (OD) in	Wall Thickness in	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
		min.	opti.	max.	min.	opti.	max.	min.	opti.	max.
		ft.lb			ft.lb			ft.lb		
5 1/2" 139.70	0.750	18 400	20 600	22 600	19 800	22 000	24 200	20 800	23 100	25 400
	19.05	25 000	27 800	30 600	26 800	29 800	32 800	28 300	31 400	34 500
	0.800	20 300	22 600	24 900	20 800	23 100	25 400	20 800	23 100	25 400
	20.32	27 500	30 600	33 700	28 300	31 400	34 500	28 300	31 400	34 500
	0.812	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	20.62	28 200	31 300	34 400	28 300	31 400	34 500	28 300	31 400	34 500
	0.850	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	21.59	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.875	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	22.23	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.900	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	22.86	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.925	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
23.50	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000	
0.950	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300	
24.13	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000	
6 5/8" 168.28	0.850	19 700	21 900	24 100	20 800	23 100	25 400	20 800	23 100	25 400
	16.51	28 700	29 700	32 700	28 300	31 400	34 500	28 300	31 400	34 500
	0.700	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	17.78	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.750	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	19.05	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.800	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	20.32	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.850	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	21.59	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500

VAM® HW ST TORQUE VALUES

Size (OD) in	Wall Thickness in			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			
	min.	opti.	max.	min.	opti.	max.	min.	opti.	max.	min.	opti.	max.	
	ft.lb			ft.lb			ft.lb			ft.lb			
6 5/8" 168.28	0.900	22 800	25 300	27 800	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	22.86	30 900	34 300	37 700	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	0.950	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	24.13	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	1.000	20 800	23 100	25 400	22 800	25 300	27 800	24 700	27 500	30 300	24 700	27 500	30 300
	25.40	29 200	31 300	34 400	30 900	34 300	37 700	30 900	34 300	37 700	30 900	34 300	37 700
	1.050	22 400	24 900	27 400	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	26.67	30 400	33 800	37 200	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	1.100	24 000	26 700	29 400	26 700	29 700	32 700	27 000	30 000	33 000	27 000	30 000	33 000
	27.94	32 600	36 200	39 800	36 200	40 200	44 200	36 600	40 700	44 800	36 600	40 700	44 800
	1.125	24 800	27 600	30 400	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
	28.58	33 700	37 400	41 100	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
1.150	25 600	28 500	31 400	27 000	30 000	33 000	27 000	30 000	33 000	29 200	32 500	35 800	
29.21	34 700	38 600	42 500	36 600	40 700	44 800	39 700	44 100	48 500	39 700	44 100	48 500	
1.200	27 300	30 300	33 300	29 200	32 500	35 800	29 200	32 500	35 800	29 200	32 500	35 800	
30.48	36 900	41 000	45 100	39 700	44 100	48 500	39 700	44 100	48 500	39 700	44 100	48 500	
7" 177.80	0.650	14 000	15 600	17 200	15 800	17 600	19 400	15 800	17 600	19 400	17 600	19 600	21 600
	16.51	19 100	21 200	23 300	21 500	23 900	26 300	23 900	26 300	28 700	26 300	28 700	31 100
	0.670	14 900	16 600	18 300	16 600	18 500	20 400	16 600	18 500	20 400	18 500	20 600	22 700
	17.02	20 300	22 600	24 900	22 600	25 100	27 600	25 200	28 000	30 800	25 200	28 000	30 800
	0.687	15 700	17 400	19 100	17 500	19 500	21 500	17 500	19 500	21 500	19 500	21 700	23 900
	17.45	21 100	23 500	25 900	23 800	26 500	29 200	26 500	29 400	32 300	26 500	29 400	32 300
	0.700	16 100	17 900	19 700	18 200	20 200	22 200	18 200	20 200	22 200	20 200	22 400	24 600
	17.78	21 900	24 300	26 700	24 600	27 300	30 000	24 600	27 300	30 000	27 400	30 400	33 400
	0.730	17 400	19 300	21 200	19 500	21 700	23 900	19 500	21 700	23 900	20 800	23 100	25 400
	18.54	23 600	26 200	28 800	26 500	29 400	32 300	26 500	29 400	32 300	28 300	31 400	34 500



VAM® HW ST TORQUE VALUES

Size (OD)	Wall Thickness in	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
		min.	opti.	max.	min.	opti.	max.	min.	opti.	max.
		ft.lb			ft.lb			ft.lb		
6 5/8" 168.28	0.900	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	22.86	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	0.950	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	24.13	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	1.000	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	25.40	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	1.050	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	26.67	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	1.100	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
	27.94	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
	1.125	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
	28.58	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
	1.150	29 200	32 500	35 800	29 200	32 500	35 800	29 200	32 500	35 800
29.21	39 700	44 100	48 500	39 700	44 100	48 500	39 700	44 100	48 500	
1.200	29 200	32 500	35 800	29 200	32 500	35 800	29 200	32 500	35 800	
30.48	39 700	44 100	48 500	39 700	44 100	48 500	39 700	44 100	48 500	
7" 177.80	0.650	19 400	21 600	23 800	20 800	23 100	25 400	20 800	23 100	25 400
	16.51	26 400	29 300	32 200	28 300	31 400	34 500	28 300	31 400	34 500
	0.670	20 160	22 400	24 600	20 800	23 100	25 400	20 800	23 100	25 400
	17.02	27 300	30 400	33 400	28 300	31 400	34 500	28 300	31 400	34 500
	0.687	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	17.45	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.700	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	17.78	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.730	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	18.54	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500

VAM® HW ST TORQUE VALUES

Size (OD) in	Wall Thickness in	75-80.85 ksi			90-95-100 ksi			105-110-115 ksi		
		min.	optl. ft.lb	max.	min.	optl. ft.lb	max.	min.	optl. ft.lb	max.
7" 177.80	0.750	18 200	20 200	22 200	20 400	22 700	25 000	20 800	23 100	25 400
	19.05	24 700	27 400	30 100	27 700	30 800	33 900	28 300	31 400	34 500
0.800	20 200	22 500	24 800	27 100	20 800	23 100	25 400	20 800	23 100	25 400
	20.32	27 400	30 500	33 600	28 300	31 400	34 500	28 300	31 400	34 500
0.812	20 700	23 000	25 300	27 600	20 800	23 100	25 400	20 800	23 100	25 400
	20.62	28 100	31 200	34 300	28 300	31 400	34 500	28 300	31 400	34 500
0.850	20 800	23 100	25 400	27 800	20 800	23 100	25 400	20 800	23 100	25 400
	21.59	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
0.875	22 800	25 300	27 800	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	22.23	30 900	34 300	37 700	33 600	37 300	41 000	33 600	37 300	41 000
0.900	22 800	25 300	27 800	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	22.86	30 900	34 300	37 700	33 600	37 300	41 000	33 600	37 300	41 000
0.937	24 700	27 500	30 300	33 000	24 700	27 500	30 300	24 700	27 500	30 300
	23.80	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
0.950	24 700	27 500	30 300	33 000	27 000	30 000	33 000	27 000	30 000	33 000
	24.13	33 600	37 300	41 000	36 600	40 700	44 800	36 600	40 700	44 800
1.000	22 000	24 400	26 800	22 800	25 300	27 800	26 800	24 700	27 500	30 300
	25.40	29 800	33 100	36 400	30 900	34 300	37 700	33 600	37 300	41 000
1.050	23 800	26 400	29 000	24 700	27 500	30 300	30 300	24 700	27 500	30 300
	26.67	32 200	35 600	39 400	33 600	37 300	41 000	33 600	37 300	41 000
1.062	24 200	26 900	29 600	24 700	27 500	30 300	30 300	24 700	27 500	30 300
	26.97	32 800	36 400	40 000	33 600	37 300	41 000	33 600	37 300	41 000
1.100	25 500	28 300	31 100	27 000	30 000	33 000	33 000	27 000	30 000	33 000
	27.94	34 500	38 300	42 100	36 600	40 700	44 800	36 600	40 700	44 800
1.150	27 300	30 300	33 300	29 200	32 500	35 800	35 800	29 200	32 500	35 800
	29.21	36 900	41 000	45 100	39 700	44 100	48 500	39 700	44 100	48 500

VAM® HW ST TORQUE VALUES

Size (OD) in	Wall Thickness in	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
		min.	opti.	max.	min.	opti.	max.	min.	opti.	max.
		ft.lb			ft.lb			ft.lb		
7 177.80	0.750	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	19.05	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.800	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	20.32	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.812	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	20.62	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.850	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	21.59	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.875	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	22.23	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	0.900	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	22.86	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	0.937	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	23.80	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	0.950	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
24.13	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800	
1.000	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300	
25.40	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000	
1.050	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300	
26.67	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000	
1.062	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300	
26.97	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000	
1.100	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000	
27.94	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800	
1.150	29 200	32 500	35 800	29 200	32 500	35 800	29 200	32 500	35 800	
29.21	39 700	44 100	48 500	39 700	44 100	48 500	39 700	44 100	48 500	

VAM® HW ST TORQUE VALUES

Size (OD) in	Wall Thickness in	75-80 ksi			90-95-100 ksi			105-110-115 ksi		
		min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
		ft.lb			ft.lb			ft.lb		
7" 177.80	1.175	28 100	31 200	34 300	29 200	32 500	35 800	31 200	34 700	38 200
	29.85	38 000	42 200	46 400	31 700	44 100	48 500	42 400	47 100	51 800
	1.200	28 900	32 100	35 300	31 200	34 700	38 200	31 200	34 700	38 200
	30.48	39 200	43 600	48 000	42 400	47 100	51 800	42 400	47 100	51 800
	1.250	30 700	34 100	37 500	34 000	37 800	41 600	34 500	38 300	42 100
	31.75	41 700	46 300	50 900	46 200	51 300	56 400	46 800	52 000	57 200
	0.650	15 700	17 500	19 300	17 900	19 900	21 900	20 000	22 200	24 400
	16.51	21 400	23 800	26 200	24 200	26 900	29 600	27 200	30 200	33 200
	0.687	17 500	19 500	21 500	19 900	22 100	24 300	20 800	23 100	25 400
	17.45	23 800	26 400	29 000	26 900	29 900	32 900	28 300	31 400	34 500
7.75" 193.68	0.700	18 100	20 100	22 100	20 500	22 800	25 100	20 800	23 100	25 400
	17.78	24 600	27 300	30 000	27 800	30 900	34 000	28 300	31 400	34 500
	0.712	18 250	20 250	22 250	20 800	23 100	25 400	20 800	23 100	25 400
	18.08	24 700	27 500	30 300	28 300	31 400	34 500	28 300	31 400	34 500
	0.750	20 400	22 700	25 000	20 800	23 100	25 400	20 800	23 100	25 400
	19.05	27 700	30 800	33 900	28 300	31 400	34 500	28 300	31 400	34 500
	0.800	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	20.32	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.812	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	20.62	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
8" 203.20	0.850	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	21.59	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.900	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	22.86	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	0.905	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	22.99	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000

VAM® HW ST TORQUE VALUES

Size (OD) in	Wall Thickness in	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
		min.	opti.	max.	min.	opti.	max.	min.	opti.	max.
		ft.lb			ft.lb			ft.lb		
7" 177.80	1.175	31 200	34 700	38 200	31 200	34 700	38 200	31 200	34 700	38 200
	29.85	42 400	47 100	51 800	42 400	47 100	51 800	42 400	47 100	51 800
	1.200	31 200	34 700	38 200	31 200	34 700	38 200	31 200	34 700	38 200
	30.48	42 400	47 100	51 800	42 400	47 100	51 800	42 400	47 100	51 800
	1.250	34 500	38 300	42 100	34 500	38 300	42 100	34 500	38 300	42 100
	31.75	46 800	52 000	57 200	46 800	52 000	57 200	46 800	52 000	57 200
	0.850	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	16.51	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.887	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	17.45	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
7 5/8" 193.68	0.700	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	17.78	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.712	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	18.08	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.750	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	19.05	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.800	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	20.32	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.812	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	20.62	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
8"	0.850	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	21.59	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.900	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	22.86	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	0.905	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	22.99	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000

VAM® HW ST TORQUE VALUES

Size (OD) in	Wall Thickness in	75-80-85 ksi			90-95-100 ksi			105-110-115 ksi		
		min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
		ft.lb								
7 5/8" 193.68	0.950	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
	2.4 13	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
	1.000	22 800	25 300	27 800	24 700	27 500	30 300	24 700	27 500	30 300
	25.40	30 900	34 300	37 700	33 600	37 300	41 000	33 600	37 300	41 000
	1.050	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	26.67	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	1.100	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
	27.94	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
	1.150	29 200	32 500	35 800	29 200	32 500	35 800	29 200	32 500	35 800
	29.21	39 700	44 100	48 500	39 700	44 100	48 500	39 700	44 100	48 500
	1.200	31 200	34 700	38 200	31 200	34 700	38 200	31 200	34 700	38 200
	30.48	42 400	47 100	51 800	42 400	47 100	51 800	42 400	47 100	51 800
1.250	34 500	38 300	42 100	34 500	38 300	42 100	34 500	38 300	42 100	
31.75	46 800	52 000	57 200	46 800	52 000	57 200	46 800	52 000	57 200	
9 5/8" 244.48	0.872	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	17.07	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.700	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	17.78	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.734	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	18.64	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.750	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	19.05	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.797	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	20.24	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.800	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	20.32	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500

VAM® HW ST TORQUE VALUES

Size (OD) in	Wall Thickness in	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
		min.	opti.	max.	min.	opti.	max.	min.	opti.	max.
		ft.lb			ft.lb			ft.lb		
7 5/8" 193.68	0.950	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
	2.413	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
	1.000	24 700	27 600	30 300	24 700	27 600	30 300	24 700	27 600	30 300
	2.540	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	1.050	24 700	27 600	30 300	24 700	27 600	30 300	24 700	27 600	30 300
	2.667	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	1.100	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
	27.94	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
	1.150	29 200	32 600	35 800	29 200	32 600	35 800	29 200	32 600	35 800
	29.21	39 700	44 100	48 500	39 700	44 100	48 500	39 700	44 100	48 500
	1.200	31 200	34 700	38 200	31 200	34 700	38 200	31 200	34 700	38 200
	30.48	42 400	47 100	51 800	42 400	47 100	51 800	42 400	47 100	51 800
9 5/8" 244.48	1.250	34 500	38 300	42 100	34 500	38 300	42 100	34 500	38 300	42 100
	31.75	46 800	52 000	57 200	46 800	52 000	57 200	46 800	52 000	57 200
	0.672	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	17.07	29 300	31 400	34 500	29 300	31 400	34 500	29 300	31 400	34 500
	0.700	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	17.78	29 300	31 400	34 500	29 300	31 400	34 500	29 300	31 400	34 500
	0.734	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	18.64	29 300	31 400	34 500	29 300	31 400	34 500	29 300	31 400	34 500
	0.750	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	19.05	29 300	31 400	34 500	29 300	31 400	34 500	29 300	31 400	34 500
	0.797	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	20.24	29 300	31 400	34 500	29 300	31 400	34 500	29 300	31 400	34 500
0.800	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400	
20.32	29 300	31 400	34 500	29 300	31 400	34 500	29 300	31 400	34 500	

VAM® HW ST TORQUE VALUES

Size (OD)	Wall Thickness	75-80-85 ksi			90-95-100 ksi			105-110-115 ksi		
		min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in	in	ft.lb			ft.lb			ft.lb		
9 5/8" 244.48	0.850	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	1.050	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	1.250	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	1.450	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	1.650	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	1.850	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	2.050	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	2.250	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	2.450	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	2.650	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	2.850	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	3.050	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
10 3/4" 273.05	0.700	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	0.900	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	1.100	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	1.300	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	1.500	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	1.700	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	1.900	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	2.100	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	2.300	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	2.500	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	2.700	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	2.900	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500

VAM® HW ST TORQUE VALUES

Size (OD) in	Wall Thickness in	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
		min.	opti.	max.	min.	opti.	max.	min.	opti.	max.
		ft.lb			ft.lb			ft.lb		
9 5/8" 244.48	0.850	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	21.59	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	0.900	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	22.86	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	0.950	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	24.13	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	1.000	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	25.40	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	1.050	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
	26.67	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
	1.100	29 200	32 500	35 800	29 200	32 500	35 800	29 200	32 500	35 800
	27.94	39 700	44 100	48 500	39 700	44 100	48 500	39 700	44 100	48 500
	1.150	32 600	36 200	39 800	32 600	36 200	39 800	32 600	36 200	39 800
	29.21	44 100	49 000	53 900	44 100	49 000	53 900	44 100	49 000	53 900
	1.200	34 500	38 300	42 100	34 500	38 300	42 100	34 500	38 300	42 100
30.48	46 800	52 000	57 200	46 800	52 000	57 200	46 800	52 000	57 200	
1.250	36 400	40 500	44 600	36 400	40 500	44 600	36 400	40 500	44 600	
31.75	49 400	54 900	60 400	49 400	54 900	60 400	49 400	54 900	60 400	
10 3/4" 273.05	0.700	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	17.78	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.734	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	18.64	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.750	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	19.05	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.797	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	20.24	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500

VAM® HW ST TORQUE VALUES

Size (OD) in	Wall Thickness in	75-80 ksi			90-95-100 ksi			105-110-115 ksi		
		min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
		ft.lb								
10 3/4" 273.05	0.800	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	20.32	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	0.850	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	21.59	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	0.859	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	21.82	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	0.900	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
	22.86	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
	0.950	29 200	32 500	35 800	29 200	32 500	35 800	29 200	32 500	35 800
	24.13	39 700	44 100	48 500	39 700	44 100	48 500	39 700	44 100	48 500
	0.980	31 200	34 700	38 200	31 200	34 700	38 200	31 200	34 700	38 200
	24.38	42 400	47 100	51 800	42 400	47 100	51 800	42 400	47 100	51 800
	0.984	31 200	34 700	38 200	31 200	34 700	38 200	31 200	34 700	38 200
	24.99	42 400	47 100	51 800	42 400	47 100	51 800	42 400	47 100	51 800
	1.000	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
25.40	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800	
1.050	29 200	32 500	35 800	29 200	32 500	35 800	29 200	32 500	35 800	
26.67	39 700	44 100	48 500	39 700	44 100	48 500	39 700	44 100	48 500	
1.100	31 200	34 700	38 200	31 200	34 700	38 200	31 200	34 700	38 200	
27.94	42 400	47 100	51 800	42 400	47 100	51 800	42 400	47 100	51 800	
1.150	34 500	38 300	42 100	34 500	38 300	42 100	34 500	38 300	42 100	
29.21	46 800	52 000	57 200	46 800	52 000	57 200	46 800	52 000	57 200	
1.200	36 400	40 500	44 600	36 400	40 500	44 600	36 400	40 500	44 600	
30.48	49 400	54 900	60 400	49 400	54 900	60 400	49 400	54 900	60 400	
1.250	36 400	40 500	44 600	36 400	40 500	44 600	36 400	40 500	44 600	
31.75	49 400	54 900	60 400	49 400	54 900	60 400	49 400	54 900	60 400	

VAM® HW ST TORQUE VALUES

Size (OD) in	Wall Thickness in	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
		min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
		ft.lb			ft.lb			ft.lb		
10-3/4" 273.05	0.800	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	20.32	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	0.850	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	21.59	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	0.859	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	21.82	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	0.900	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
	22.86	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
	0.950	29 200	32 500	35 800	29 200	32 500	35 800	29 200	32 500	35 800
	24.13	39 700	44 100	48 500	39 700	44 100	48 500	39 700	44 100	48 500
	0.960	31 200	34 700	38 200	31 200	34 700	38 200	31 200	34 700	38 200
	24.38	42 400	47 100	51 800	42 400	47 100	51 800	42 400	47 100	51 800
	0.984	31 200	34 700	38 200	31 200	34 700	38 200	31 200	34 700	38 200
	24.99	42 400	47 100	51 800	42 400	47 100	51 800	42 400	47 100	51 800
	1.000	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
	25.40	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
	1.050	29 200	32 500	35 800	29 200	32 500	35 800	29 200	32 500	35 800
	26.67	39 700	44 100	48 500	39 700	44 100	48 500	39 700	44 100	48 500
	1.100	31 200	34 700	38 200	31 200	34 700	38 200	31 200	34 700	38 200
	27.94	42 400	47 100	51 800	42 400	47 100	51 800	42 400	47 100	51 800
1.150	34 500	38 300	42 100	34 500	38 300	42 100	34 500	38 300	42 100	
29.21	46 800	52 000	57 200	46 800	52 000	57 200	46 800	52 000	57 200	
1.200	36 400	40 500	44 600	36 400	40 500	44 600	36 400	40 500	44 600	
30.48	49 400	54 900	60 400	49 400	54 900	60 400	49 400	54 900	60 400	
1.250	36 400	40 500	44 600	36 400	40 500	44 600	36 400	40 500	44 600	
31.75	49 400	54 900	60 400	49 400	54 900	60 400	49 400	54 900	60 400	

VAM® HW ST TORQUE VALUES

Size (OD) in	Wall Thickness in	75-80-85 ksi			90-95-100 ksi			105-110-115 ksi		
		min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
		ft.lb			ft.lb			ft.lb		
11 3/4" 298.45	0.850	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	1.600	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.700	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	1.778	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.750	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	1.905	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.800	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	2.032	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	0.850	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	2.159	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
0.860	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000	
	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800	
	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000	
	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800	
11 3/4" 298.45	0.950	31 200	34 700	38 200	31 200	34 700	38 200	31 200	34 700	38 200
	2.413	42 400	47 100	51 800	42 400	47 100	51 800	42 400	47 100	51 800
13 3/8" 339.73	0.850	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	1.651	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.700	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
13 3/8" 339.73	1.778	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.750	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	1.905	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
0.800	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300	
	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000	
	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300	
0.850	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300	
	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000	



VAM® HW ST TORQUE VALUES

Size (OD) in	Wall Thickness in	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
		min.	opti.	max.	min.	opti.	max.	min.	opti.	max.
		ft.lb			ft.lb			ft.lb		
11 3/4" 298.45	0.650	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	16.51	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.700	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	17.78	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.750	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	19.05	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.800	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	20.32	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	0.850	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	21.59	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
13 3/8" 339.73	0.860	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
	21.84	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
	0.900	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000
	22.86	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800
	0.950	31 200	34 700	38 200	31 200	34 700	38 200	31 200	34 700	38 200
	24.13	42 400	47 100	51 800	42 400	47 100	51 800	42 400	47 100	51 800
	0.950	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	16.51	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.700	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	17.78	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
13 3/8" 339.73	0.750	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	19.05	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.800	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	20.32	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
	0.850	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
21.59	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000	

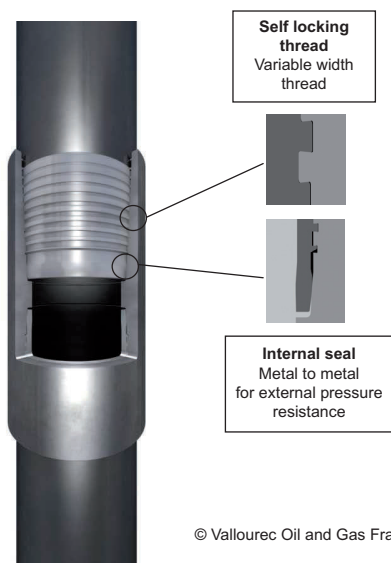
VAM® HW ST TORQUE VALUES

Size (OD) in	Wall Thickness in	75-80 ksi			90-95-100 ksi			105-110-115 ksi		
		min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
		ft.lb			ft.lb			ft.lb		
13 3/8" 339.73	0.900	29 200	32 500	35 800	29 200	32 500	35 800	29 200	32 500	35 800
	22.86	39 700	44 100	48 500	39 700	44 100	48 500	39 700	44 100	48 500
	0.917	29 200	32 500	35 800	29 200	32 500	35 800	29 200	32 500	35 800
	23.29	39 700	44 100	48 500	39 700	44 100	48 500	39 700	44 100	48 500
	0.950	31 200	34 700	38 200	31 200	34 700	38 200	31 200	34 700	38 200
14" 355.60	24.13	42 400	47 100	51 800	42 400	47 100	51 800	42 400	47 100	51 800
	0.800	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	15.24	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.850	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	16.51	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.700	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	17.78	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.750	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	19.05	28 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.800	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	20.32	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
0.850	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000	
21.59	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800	
0.900	29 200	32 500	35 800	29 200	32 500	35 800	29 200	32 500	35 800	
22.86	39 700	44 100	48 500	39 700	44 100	48 500	39 700	44 100	48 500	
0.950	32 600	36 200	39 800	32 600	36 200	39 800	32 600	36 200	39 800	
24.13	44 100	49 000	53 900	44 100	49 000	53 900	44 100	49 000	53 900	

VAM® HW ST TORQUE VALUES

Size (OD) in	Wall Thickness in	120-125-130 ksi			135-140 ksi			145-150-155 ksi		
		min.	opti.	max.	min.	opti.	max.	min.	opti.	max.
		ft.lb			ft.lb			ft.lb		
13 3/8" 339.73	0.900	29 200	32 500	35 800	29 200	32 500	35 800	29 200	32 500	35 800
	22.86	39 700	44 100	48 500	39 700	44 100	48 500	39 700	44 100	48 500
	0.917	29 200	32 500	35 800	29 200	32 500	35 800	29 200	32 500	35 800
	23.29	39 700	44 100	48 500	39 700	44 100	48 500	39 700	44 100	48 500
	0.950	31 200	34 700	38 200	31 200	34 700	38 200	31 200	34 700	38 200
	24.13	42 400	47 100	51 800	42 400	47 100	51 800	42 400	47 100	51 800
14" 355.60	0.800	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	15.24	29 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.850	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	16.51	29 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.700	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	17.78	29 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.750	20 800	23 100	25 400	20 800	23 100	25 400	20 800	23 100	25 400
	19.05	29 300	31 400	34 500	28 300	31 400	34 500	28 300	31 400	34 500
	0.800	24 700	27 500	30 300	24 700	27 500	30 300	24 700	27 500	30 300
	20.32	33 600	37 300	41 000	33 600	37 300	41 000	33 600	37 300	41 000
0.850	27 000	30 000	33 000	27 000	30 000	33 000	27 000	30 000	33 000	
21.59	36 600	40 700	44 800	36 600	40 700	44 800	36 600	40 700	44 800	
0.900	29 200	32 500	35 800	29 200	32 500	35 800	29 200	32 500	35 800	
22.86	39 700	44 100	48 500	39 700	44 100	48 500	39 700	44 100	48 500	
0.950	32 600	36 200	39 800	32 600	36 200	39 800	32 600	36 200	39 800	
24.13	44 100	49 000	53 900	44 100	49 000	53 900	44 100	49 000	53 900	

3.6 VAM® HTTC



VAM® HTTC is a Threaded & Coupled (T&C) premium connection offering extreme high torque capacity combining sealability / reliability as per API RP5C5:2017 CAL IV.

Applicable Range

- Available in sizes from 3 ½" to 9 5/8".
- Standard and alternative drifts as per API 5CT and special drifts upon request.
- Validated on Carbon, Martensitic stainless steel (13%Cr & Super 13%Cr), Duplex, Super Duplex and Nickel base Alloys material, with yield Strengths from 80 ksi to 125 ksi.
- VAM HTTC is also available with CLEANWELL® dopefree option (please contact your local VAM® representative for more details in terms available sizes and product validation)

Applications

- Extended reach drilling / wells (ERD) and horizontal wells with long laterals
- Rotating while cementing
- Drilling with casing / reaming with casing
- Production casing, tie-backs and liners

Performances

- Gas Sealability as per API RP 5C5:2017 CAL IV, including at Maximum Torque with Sealability (MTS)
- Extreme high torque capacity
- Tension: 100% PBYS capacity
- Compression: 80% PBYS compression for API 5C5 sealability (100% PBYS uniaxial compression)
- Internal pressure: 100% pipe pressure rating
- Collapse: 100% Pipe collapse
- Bending: up to 42°/100 ft under combined loads
- Thermal cycles up to 356°F (180°C)

Benefits

- Simple, reliable and easy running (running practice similar to standard premium connections)
- High bending capacity
- Performances preserved even at extreme high torque (Maximum Torque with Sealability –MTS) allowing string rotation through highly deviated and long lateral sections
- Recess free bore as standard feature for all sizes

Thread Compound

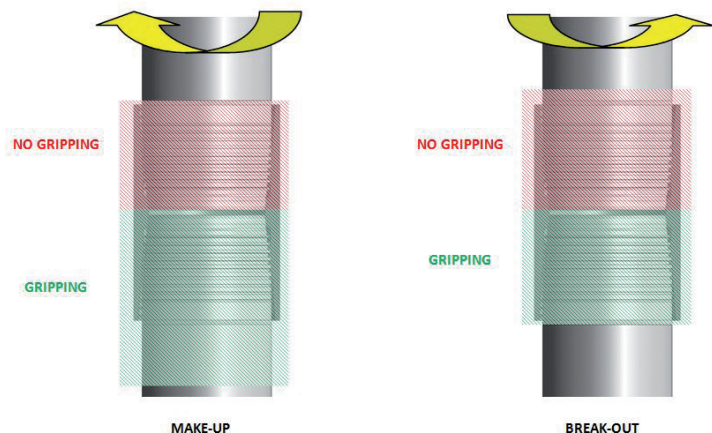
Approved list of thread running compound is presented on the “running compound” section of this book. Application of the thread compound shall be uniform. The thread form shall be visible after application. The thread compound shall be applied preferably 100% on the pin or 100% on the box and shall entirely cover the machined profiles of either pin or box.

OD (in)	Nominal Weight (lb/ft)	Minimum thread compound volume		Maximum thread compound volume	
		(cm ³)	(fl.oz)	(cm ³)	(fl.oz)
3 1/2	9.20	5.5	0.19	7.5	0.25
	10.20	5.5	0.19	7.5	0.25
4 1/2	12.60	8.5	0.29	11.5	0.39
	13.50	8.5	0.29	11.5	0.39
	15.10	10	0.34	14	0.47
5	18.00	11.5	0.39	16.5	0.56
	21.40	11.5	0.39	16.5	0.56
	23.20	11.5	0.39	16.5	0.56
5 1/2	17.00	10.5	0.36	14.5	0.49
	20.00	12	0.41	17	0.57
	23.00	12	0.41	17	0.57
6 5/8	24.00	15	0.51	21	0.71
	28.00	15	0.51	21	0.71
	32.00	15	0.51	21	0.71
7	23.00	14.5	0.49	20.5	0.69
	26.00	14.5	0.49	20.5	0.69
	29.00	14.5	0.49	20.5	0.69
	32.00	14.5	0.49	20.5	0.69
	35.00	16.5	0.56	23.5	0.79
9 5/8	43.50	21	0.71	29	0.98
	47.00	21	0.71	29	0.98
	53.50	21	0.71	29	0.98

Running

Before starting your job, check the specific "Pipe preparation and Running Equipment" section of this book.

Jaws shall not grip on the side of the make-up/break-out side of connection as illustrated below:



Make-up / Torques

It is recommended that VAM® HTTC is made-up to its optimum torque on the field. When the application requires a higher torque it is permitted to increase the final torque up to the MTS (Maximum Torque with Sealability). This can be done either at the time of make-up or after the string is run in hole as described below:

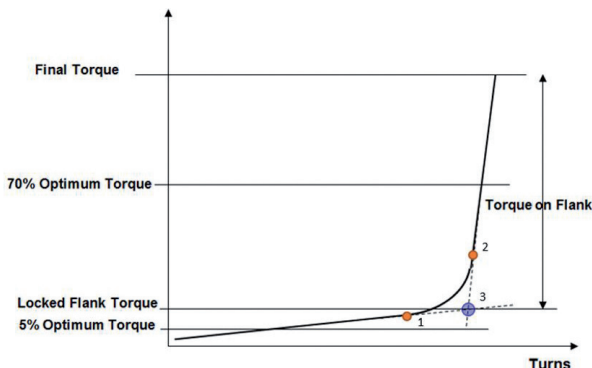
- VAM® HTTC is made-up to the optimum torque - when rotating the string downhole the torque applied on it shall not exceed the MTS
- make-up to a torque in between the maximum torque and the MTS and again when in-service down-hole, the connection shall not be submitted to a torque higher than the MTS to keep the full sealability performance. In this situation, visible coupling rotation (rig floor) may occur. There is no compromise to connection integrity, nevertheless if graph show loss of linearity the connection need to be broken-out, inspected and remade if no issues.

MTS = Maximum Torque with Sealability. This maximum torque level can be applied either on the rig make-up, or during rotation downhole, as previous explained, keeping full connection sealability performances.

As VAM® HTTC family does not have a torque shoulder the term “Shouldering torque” is not used however the point at which the flanks of the threads lock is known as the 'locked flank torque' and at this point there will be a gradual increase in torque as shown between points 1 and 2 in the graph below.

The points represented on the graph below are:

1. start of locking
2. end of locking
3. locked flank torque



The locked flank torque is shown by point 3 in the graph above. The acceptance criteria for this point is:

- Minimum locked flank torque = 5 % of the optimum torque
- Maximum locked flank torque = 70 % of the optimum torque.

Determination of “locked flank torque”

- Automatic “locked flank torque” determination is acceptable but must display a value close to manual or visual determination. In case of automatic determination, a visual spot check shall be periodically performed in order to verify that there is no discrepancy.
- Many torque turn systems are not capable to display the locked flank torque (point 3) as it is not on the make-up curve. In this case the shoulder torque determination can be used as an alternative to indicate close to the locked flank torque. When the shoulder point on the line is used, take point 2 as the locked flank torque. If point 2 is above 70% of optimum, check visually if the real locked flank point is between 5% and 70%. In this case final acceptance will be the point 3.

Please note that if a target torque other than optimum torque is used, the locked flank parameters shall remain as a percentage (5% and 70%) of the book optimum torque.

VAM® HTTC TECHNICAL DATA

Size (OD)	Nominal Weight			Wall Thickness		Nominal ID		Drift diameter		Nominal Cross Section area		Connection					Connection Yield Strength (x 1000 lb)						
	in	mm	lb/ft	in	mm	in	in	in	in	sq.in	in	in	in	in	in	in	sq.in	%	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi
3 1/2 <i>88.90</i>	9.20	0.254	6.45	2.992	2.867	2.590	3.971	2.926	3.450	8.058	1.760	100	207	233	246	285	324						
4 1/2 <i>114.30</i>	10.20	0.289	7.34	2.922	2.797	2.915	3.971	2.880	3.450	8.058	1.760	100	233	262	277	321	364						
5 <i>127.00</i>	12.60	0.271	6.88	3.958	3.833	3.600	4.906	3.873	4.281	9.719	1.828	100	288	324	342	396	450						
5 1/2 <i>139.70</i>	13.50	0.290	7.37	3.920	3.795	3.836	4.930	3.849	4.380	9.917	1.970	100	307	345	364	422	480						
6 5/8 <i>168.28</i>	15.10	0.337	8.56	3.826	3.701	4.407	4.967	3.741	5.108	11.374	2.206	100	353	397	419	485	551						
7 <i>177.80</i>	18.00	0.362	9.19	4.276	4.151	5.275	5.510	4.204	5.150	11.458	2.411	100	422	475	501	580	659						
8 <i>198.00</i>	21.40	0.437	11.10	4.126	4.001	6.264	6.505	4.042	5.270	11.698	3.068	100	501	564	595	689	783						
9 5/8 <i>244.48</i>	23.20	0.478	12.14	4.044	3.919	6.791	6.966	3.966	5.270	11.698	3.500	100	543	611	645	747	849						
10 3/4 <i>273.00</i>	17.00	0.304	7.72	4.892	4.767	4.962	5.971	4.814	4.514	10.186	2.336	100	397	447	471	546	620						
11 3/4 <i>294.90</i>	20.00	0.361	9.17	4.778	4.653	5.828	6.006	4.697	5.248	11.653	2.607	100	466	525	554	641	729						
12 3/4 <i>320.00</i>	23.00	0.415	10.54	4.670	4.545	6.630	6.093	4.602	5.248	11.653	3.269	100	530	597	630	729	829						
13 3/4 <i>346.00</i>	24.00	0.352	8.94	5.921	5.796	6.937	7.158	5.841	5.109	11.376	3.344	100	555	624	659	763	867						
14 3/4 <i>372.00</i>	28.00	0.417	10.59	5.791	5.666	8.133	7.266	5.766	5.109	11.376	4.332	100	651	732	773	895	1 017						
15 3/4 <i>398.00</i>	32.00	0.475	12.07	5.675	5.550	9.177	7.359	5.663	5.109	11.376	5.177	100	734	826	872	1 009	1 147						
16 3/4 <i>424.00</i>	23.00	0.317	8.05	6.366	6.250 A	6.655	7.475	6.293	4.562	10.282	2.977	100	532	599	632	732	832						
17 3/4 <i>450.00</i>	26.00	0.362	9.19	6.276	6.151	7.549	7.552	6.212	4.562	10.282	3.704	100	604	679	717	830	944						
18 3/4 <i>476.00</i>	29.00	0.408	10.36	6.184	6.125 A	8.449	7.628	6.168	4.562	10.282	4.438	100	676	760	803	929	1 056						
19 3/4 <i>502.00</i>	32.00	0.453	11.51	6.094	6.000 A	9.317	7.703	6.072	4.562	10.282	5.161	100	745	839	885	1 025	1 165						
20 3/4 <i>528.00</i>	35.00	0.498	12.65	6.004	5.879	10.172	7.719	5.920	5.409	11.975	5.316	100	814	915	966	1 119	1 272						
21 3/4 <i>554.00</i>	43.50	0.435	11.05	8.755	8.599	12.559	10.313	8.689	5.044	11.245	6.790	100	1 005	1 130	1 193	1 381	1 570						
22 3/4 <i>580.00</i>	47.00	0.472	11.99	8.681	8.525	13.572	10.376	8.639	5.044	11.245	7.609	100	1 086	1 221	1 289	1 493	1 697						
23 3/4 <i>606.00</i>	53.50	0.545	13.84	8.535	8.500 A	15.546	10.416	8.555	5.975	13.108	8.119	100	1 244	1 399	1 477	1 710	1 943						

A = Alternative Drift

S = Special Drift

VAM® HTTC TECHNICAL DATA

Size (OD)	Nominal Weight	Minimum Internal Yield Pressure (psi) (API 5C3)					External Pressure (psi) (API 5C3)				
		lb/ft	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	80 ksi	90 ksi	95 ksi	110 ksi
3 1/2 <i>89.90</i>	9.20	10.160	11.430	12.070	13.970	15.880	10.540	11.570	12.080	13.530	14.890
	10.20	11.560	13.010	13.730	15.900	18.060	12.120	13.640	14.390	16.670	18.940
4 1/2 <i>114.30</i>	12.60	8.430	9.490	10.010	11.590	13.170	7.500	8.120	8.410	9.210	9.890
	13.50	9.020	10.150	10.710	12.410	14.100	8.540	9.300	9.660	10.690	11.600
5 <i>127.00</i>	15.10	10.480	11.800	12.450	14.420	16.380	11.080	12.220	12.760	14.340	15.830
	18.00	10.140	11.400	12.040	13.940	15.840	10.500	11.520	12.020	13.470	14.820
5 1/2 <i>139.70</i>	21.40	12.240	13.770	14.530	16.820	19.120	12.760	14.360	15.150	17.550	19.940
	23.20	13.360	15.060	15.890	18.400	20.910	13.830	15.560	16.430	19.020	21.620
6 5/8 <i>168.28</i>	17.00	7.740	8.710	9.190	10.640	12.090	6.290	6.730	6.940	7.480	7.890
	20.00	9.190	10.340	10.910	12.640	14.360	8.830	9.630	10.020	11.110	12.090
6 5/8 <i>168.28</i>	23.00	10.560	11.880	12.540	14.530	16.510	11.160	12.380	12.930	14.540	16.060
	24.00	7.440	8.370	8.830	10.230	11.620	5.760	6.140	6.310	6.730	7.020
7 <i>177.80</i>	28.00	8.810	9.910	10.460	12.120	13.770	8.170	8.880	9.220	10.160	11.000
	32.00	10.040	11.290	11.920	13.800	15.680	10.320	11.330	11.820	13.230	14.540
9 5/8 <i>244.48</i>	23.00	6.340	7.130	7.530	8.720	9.910	3.830	4.030	4.150	4.440	4.650
	26.00	7.240	8.150	8.600	9.960	11.310	5.410	5.740	5.890	6.230	6.450
9 5/8 <i>244.48</i>	29.00	8.160	9.180	9.690	11.220	12.750	7.030	7.580	7.840	8.530	9.110
	32.00	9.060	10.190	10.760	12.460	14.160	8.610	9.370	9.740	10.780	11.710
9 5/8 <i>244.48</i>	35.00	9.960	11.210	11.830	13.700	15.560	10.190	11.170	11.650	13.030	14.320
	43.50	6.330	7.120	7.510	8.700	9.890	3.810	4.010	4.130	4.420	4.620
53.50	47.00	6.870	7.720	8.150	9.440	10.730	4.760	4.990	5.090	5.300	5.630
	53.50	7.930	8.920	9.410	10.900	12.390	6.620	7.110	7.340	7.950	8.440

A = Alternative Drift

S = Special Drift

VAM® HTTC TORQUE VALUES

Size (OD)	Nominal Weight	Make-up Torque ft.lb All grades from 80 to 125 ksi				Maximum Torque with Sealability (MTS)							
		Mill end only		Field end only		80 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi		
In mm	lb/ft	ft.lb N.m		ft.lb N.m		ft.lb N.m							
		Min.	Opti.	Max.	Opti.	Max.	80 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	
3 1/2 88.90	9.20	5 000	5 175	5 350	3 650	3 825	4 000	6 300	7 000	7 350	7 650	8 400	9 400
		6 800	6 800	7 250	5 000	5 200	5 400	8 550	9 500	9 850	10 350	11 400	12 750
		5 000	5 175	5 350	3 650	3 825	4 000	6 300	7 000	7 350	7 650	8 400	9 400
4 1/2 114.30	10.20	6 800	6 800	7 250	5 000	5 200	5 400	8 550	9 500	9 850	10 350	11 400	12 750
		5 000	5 175	5 350	3 650	3 825	4 000	6 300	7 000	7 350	7 650	8 400	9 400
		6 800	6 800	7 250	5 000	5 200	5 400	8 550	9 500	9 850	10 350	11 400	12 750
5 127.00	12.80	10 200	10 700	11 200	6 660	7 410	8 160	11 900	13 100	13 700	14 300	15 450	17 200
		13 800	13 800	15 150	9 050	10 050	11 050	16 150	17 750	18 550	19 400	20 950	23 300
		10 200	10 700	11 200	6 660	7 410	8 160	11 900	13 100	13 700	14 300	15 450	17 200
5 127.00	13.50	10 640	11 140	11 640	6 910	7 710	8 510	12 350	13 550	14 200	14 800	16 050	17 850
		14 400	14 400	15 750	9 400	10 450	11 500	16 750	18 350	19 250	20 050	21 750	24 200
		10 640	11 140	11 640	6 910	7 710	8 510	12 350	13 550	14 200	14 800	16 050	17 850
5 127.00	15.10	13 320	14 110	14 900	8 650	9 650	10 650	17 550	19 450	20 400	21 350	23 200	26 050
		18 050	18 050	20 200	11 800	13 100	14 400	23 800	26 350	27 650	28 950	31 450	35 300
		13 320	14 110	14 900	8 650	9 650	10 650	17 550	19 450	20 400	21 350	23 200	26 050
5 127.00	18.00	15 140	16 275	17 410	11 050	11 580	12 110	19 150	21 150	22 200	23 200	25 200	28 250
		20 550	20 550	23 600	15 000	15 700	16 400	25 950	28 700	30 100	31 450	34 150	38 300
		15 140	16 275	17 410	11 050	11 580	12 110	19 150	21 150	22 200	23 200	25 200	28 250
5 127.00	21.40	16 170	17 380	18 590	11 450	12 195	12 940	20 450	22 650	23 700	24 800	27 000	30 250
		21 900	21 900	25 200	15 550	16 500	17 500	27 750	30 700	32 150	33 600	36 600	41 000
		16 170	17 380	18 590	11 450	12 195	12 940	20 450	22 650	23 700	24 800	27 000	30 250
5 127.00	23.20	17 380	18 380	19 380	11 450	12 195	12 940	20 450	22 650	23 700	24 800	27 000	30 250
		21 900	21 900	25 200	15 550	16 500	17 500	27 750	30 700	32 150	33 600	36 600	41 000
		17 380	18 380	19 380	11 450	12 195	12 940	20 450	22 650	23 700	24 800	27 000	30 250
5 1/2 139.70	17.00	18 750	19 150	19 550	14 000	14 500	15 000	20 400	22 450	23 500	24 550	26 600	29 750
		25 400	25 400	26 500	19 000	19 700	20 300	27 650	30 450	31 850	33 300	36 050	40 350
		18 750	19 150	19 550	14 000	14 500	15 000	20 400	22 450	23 500	24 550	26 600	29 750
5 1/2 139.70	20.00	20 400	20 800	21 200	15 320	15 820	16 320	23 750	26 250	27 500	28 750	31 250	35 000
		27 650	27 650	28 700	20 850	21 450	22 100	32 250	35 500	37 250	39 000	42 250	47 500
		20 400	20 800	21 200	15 320	15 820	16 320	23 750	26 250	27 500	28 750	31 250	35 000
5 1/2 139.70	23.00	20 400	20 800	21 200	15 320	15 820	16 320	23 750	26 250	27 500	28 750	31 250	35 000
		27 650	27 650	28 700	20 850	21 450	22 100	32 250	35 500	37 250	39 000	42 250	47 500
		20 400	20 800	21 200	15 320	15 820	16 320	23 750	26 250	27 500	28 750	31 250	35 000
6 5/8 168.28	24.00	29 000	29 900	30 800	21 200	22 200	23 200	32 500	36 000	37 500	39 000	42 750	48 000
		39 300	39 300	41 750	28 800	30 100	31 450	44 000	48 750	51 250	53 500	58 000	65 000
		29 000	29 900	30 800	21 200	22 200	23 200	32 500	36 000	37 500	39 000	42 750	48 000
6 5/8 168.28	28.00	29 900	29 900	30 800	21 200	22 200	23 200	32 500	36 000	37 500	39 000	42 750	48 000
		39 300	39 300	41 750	28 800	30 100	31 450	44 000	48 750	51 250	53 500	58 000	65 000
		29 900	29 900	30 800	21 200	22 200	23 200	32 500	36 000	37 500	39 000	42 750	48 000
6 5/8 168.28	32.00	29 900	29 900	30 800	21 200	22 200	23 200	32 500	36 000	37 500	39 000	42 750	48 000
		39 300	39 300	41 750	28 800	30 100	31 450	44 000	48 750	51 250	53 500	58 000	65 000
		29 900	29 900	30 800	21 200	22 200	23 200	32 500	36 000	37 500	39 000	42 750	48 000

MTS values for cold hardened CRA and 13Cr/13Cr may be different.

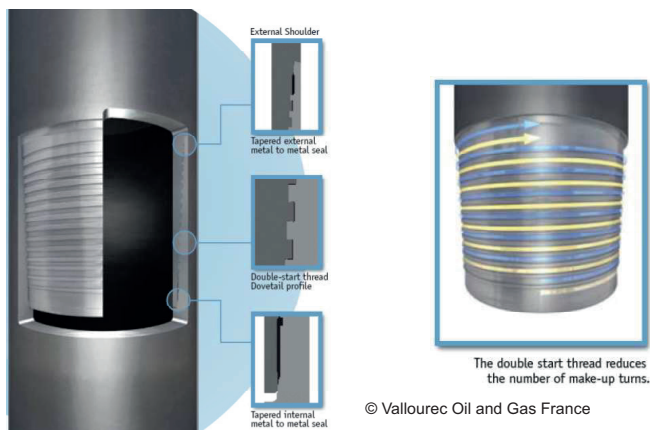


VAM® HTTC TORQUE VALUES

Size (OD)	Nominal Weight	Make-up Torque ft.lb All grades from 80 to 125 ksi				Maximum Torque with Sealability (MTS)											
		Mill end only				Field end only				ft.lb N.m							
		Min.	Optl.	Max.		Min.	Optl.	Max.		80 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi		
7 177.80	23.00	30 570	31 320	32 070	22 950	23 700	24 450		35 000	38 750	40 500	42 500	46 000	51 500			
		41 400	41 400	43 450	31 300	32 150	33 100		47 500	52 500	55 000	57 500	62 250	69 750			
26.00	30 570	31 320	32 070	32 070	22 950	23 700	24 450		35 000	38 750	40 500	42 500	46 000	51 500			
		41 400	41 400	43 450	31 300	32 150	33 100		47 500	52 500	55 000	57 500	62 250	69 750			
29.00	30 570	31 320	32 070	32 070	22 950	23 700	24 450		35 000	38 750	40 500	42 500	46 000	51 500			
		41 400	41 400	43 450	31 300	32 150	33 100		47 500	52 500	55 000	57 500	62 250	69 750			
32.00	30 570	31 320	32 070	32 070	22 950	23 700	24 450		35 000	38 750	40 500	42 500	46 000	51 500			
		41 400	41 400	43 450	31 300	32 150	33 100		47 500	52 500	55 000	57 500	62 250	69 750			
35.00	36 320	37 320	38 320	38 320	27 050	28 050	29 050		48 000	53 250	56 000	58 500	63 750	71 750			
		49 200	49 200	51 950	36 800	38 050	39 350		65 000	72 250	76 000	79 250	86 500	97 250			
9 5/8 244.48	43.50	48 000	49 000	50 000	36 400	37 400	38 400		67 750	75 000	78 750	82 500	89 750	100 750			
		65 050	66 400	67 750	49 450	50 750	52 050		91 750	101 750	106 750	111 750	121 750	136 500			
47.00	48 000	49 000	50 000	50 000	36 400	37 400	38 400		67 750	75 000	78 750	82 500	89 750	100 750			
		65 050	66 400	67 750	49 450	50 750	52 050		91 750	101 750	106 750	111 750	121 750	136 500			
53.50	48 000	49 000	50 000	50 000	36 400	37 400	38 400		66 950	74 550	78 350	82 150	89 750	101 150			
		65 050	66 400	67 750	49 450	50 750	52 050		90 750	101 050	106 200	111 350	121 650	137 100			

MTS values for cold hardened CRA and 13Cr/13Cr may be different.

3.7 VAM® BOLT-II



Application

VAM® BOLT-II is a Premium Flush Casing connection suitable for tight clearance applications. It is easy to run and provides superior seal abilities and mechanical integrity in extreme loads.

VAM® BOLT-II is the best in class premium flush connection of the industry. It has been developed in order to improve performances and to provide larger availability in sizes than initial VAM® BOLT product line keeping most of design features that made the success of VAM® BOLT already.

Design features

VAM® BOLT-II

- Double metal to metal seals provide internal and external pressure tightness.
- Maximum compression resistance (100% of the connection yield strength).
- The rugged dovetail thread provides excellent mechanical integrity (prevents from jump-out).
- Easy running properties thanks to fast make-up with double start thread, improved stabbing, and the square shoulder that provides high break-out resistance and reliable make-up.

Performances

VAM® BOLT-II

- It is available from 10 1/8" to 18" OD.
- Seal ability validated with combined loads cycles as per the latest API RP 5C5 4th edition 2017 CAL II (for 10 1/8" to 16" sizes) and API RP 5C5 4th edition 2017 CAL I with gas (for 17" to 18" sizes).

Running

VAM® BOLT-II is an integral connection, so it doesn't have a coupling face to lift the pipe on. For this reason, lifting plugs or lifting sub are required.

It is recommended to place the tong grips at least three inches above the pin threads and, if using a tong with integral back-up to grip the box at a distance of more than 6 inches from the end of the pipe.

Note: A minimum of 3 lifting plugs is recommended (2 in process of running, at least 1 spare). This would avoid slowing down the operation and avoid damaging the pipes threads if the plug is damaged itself. This will also allow time to carry out thread inspection of the lifting plug while running.

Dope Quantities

The minimum quantity of compound should be shared between Pin and Box ends as follows:

- 50% on Box (never leave the box without any dope)
- 50% on Pin
- Dope should be applied evenly in order to get a uniform coating on all parts of the connection.
- If a dope applicator is used for the box end it shall be adjusted to apply the above recommended quantity of dope.

Thread Compound

VAM® BOLT II

Nominal OD (in)	Weight lb/ft	Minimum Dope volume		Maximum Dope volume	
		(cm ³)	(in ³)	(cm ³)	(in ³)
11 3/4"	60.00	30.00	1.86	40.00	2.41
	65.00	32.00	1.94	41.00	2.52
	82.60	36.00	2.20	47.00	2.86
11 7/8"	71.80	33.00	2.03	43.00	2.64
13 5/8"	88.20	43.00	2.63	56.00	3.41
14"	112.60	51.00	3.14	67.00	4.08
	115.00	57.00	3.45	73.00	4.48
16"	84.00	39.00	2.41	51.00	3.13
	95.00	50.00	3.07	65.00	3.99
	97.00	50.00	3.06	65.00	3.98
	109.00	60.00	3.67	78.00	4.77
17"	88.10	47.00	2.87	61.00	3.72
17 7/8"	93.50	49.00	2.99	64.00	3.91
	105.00	52.00	3.17	68.00	4.15
17 15/16"	93.80	49.00	2.99	64.00	3.91
18"	94.00	49.00	2.99	64.00	3.91
	105.00	57.00	3.48	74.00	4.52
	117.00	71.00	4.33	92.00	5.61
	119.00	65.00	3.97	85.00	5.19
	127.00	72.00	4.39	94.00	5.74

VAM® BOLT II

VAM® BOLT-III TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140-145 ksi		
			min.	opti. fl.b. N.m.	max.	min.	opti. fl.b. N.m.	max.	min.	opti. fl.b. N.m.	max.	min.	opti. fl.b. N.m.	max.	min.	opti. fl.b. N.m.	max.
10 1/8	76.50	0.758	24200	26800	29100	26900	33200	28000	32700	37300	32200	36800	41500	36400	41000	45700	
			32800	36100	39400	36000	40500	45000	38000	44300	50900	43700	50000	56300	49300	55900	61900
11 3/4	80.00	0.489	18700	20800	23200	21100	23700	26400	21200	25400	29800	24400	28800	32700	27800	31700	36900
			25400	28400	31500	28800	32200	35800	28800	34400	40700	33100	38700	44400	37400	43000	48700
288.45	65.00	0.534	19800	22300	24700	22700	25500	28400	22700	27400	32000	28400	31100	35700	30000	34700	39300
			26800	30200	33500	30800	34600	38500	30800	37100	43400	35900	42100	48400	40700	47000	53300
288.45	82.80	0.691	28800	32300	35800	32800	37000	41100	33800	40000	46200	41500	46300	51300	43800	48600	55700
			39000	43800	48700	44500	50100	55700	46000	54300	62800	56000	62800	69600	59100	67300	75500
11 7/8	71.80	0.652	22800	25400	28200	26000	28900	32500	26300	31500	36700	30500	35800	40800	34700	39800	45100
			30700	34500	38300	35300	39700	44100	35600	42700	49800	41400	48500	55500	47100	54100	61200
301.63	86.20	0.625	28000	32600	36200	33200	37300	41500	34200	40500	46800	39600	45700	52000	44600	51000	57300
			39300	44200	49100	45000	50900	56300	46400	54900	63400	53500	62000	70500	60700	69200	77700
346.08	112.80	0.797	38900	43700	48600	44800	50300	55900	46500	54900	63200	53800	62300	70600	58700	67100	74700
			52700	59300	65900	60700	68200	75800	63100	74400	85700	73100	84400	95700	79800	90900	101300
355.60	115.00	0.812	41700	46500	49200	45000	50700	56300	47200	55200	63900	54900	62300	70400	61300	69300	77400
			56600	61700	66700	61000	68700	76300	64000	74900	85900	73600	84500	95400	83100	94000	104900
406.40	84.00	0.495	29400	33100	36800	33800	38000	42200	34900	41200	47800	41600	47300	53000	46600	52000	58300
			39800	44800	49800	45800	51500	57200	47200	55900	64600	56300	64100	71900	61800	70600	79100
406.40	95.00	0.566	31800	36900	39800	36800	41400	46000	37900	44800	52000	44000	51000	58100	50000	57100	64200
			43300	48700	54100	49800	56100	62300	51400	60900	70500	59600	69200	78800	67800	77400	87000
406.40	97.00	0.575	32600	38700	40800	37500	42300	47000	38700	46000	53100	46500	52100	59400	51100	58300	65600
			44200	49700	55300	50900	57300	63700	52500	62300	72000	61000	70700	80500	69300	79100	88800
406.40	106.00	0.656	36300	40800	45400	41500	46800	51900	43300	50900	58500	49800	57500	65100	56600	64100	71700
			49200	55300	61500	56300	63400	70400	58700	69000	79300	67700	78000	88300	76600	86900	97200

VAM® BOLT-III TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS		75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi		
		in.	mm.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
17" 431.80	88.10	0.500	0.500	36700	41300	45850	41750	46950	52200	46750	52800	58450	52050	58600	65100
		12.70	12.70	49750	55950	62200	56600	63700	70750	63400	71300	79250	70600	79400	88250
17 7/8" 454.03	93.50	0.500	0.500	33500	37700	41900	38200	43000	47750	42850	48200	53550	45200	50850	56500
		12.70	12.70	45450	51150	56800	51800	58300	64750	59100	65350	72600	61300	68950	76650
17 15/16" 431.80	93.80	0.500	0.500	33900	38150	42350	38650	43500	48300	43350	48800	54200	45900	51500	57200
		12.70	12.70	45950	51700	57450	52400	58950	65500	58800	66150	73500	62050	68850	77600
18" 457.20	94.00	0.500	0.500	34000	38250	42500	38800	43650	48550	43600	49050	54500	46050	51800	57550
		12.70	12.70	46100	51850	57650	52650	59200	65800	59100	66500	73900	62450	70250	78050
18"	105.00	0.562	0.562	33000	37100	41200	37550	42250	46950	42050	47350	52800	46650	52450	58300
		14.27	14.27	44700	50300	55900	50900	57250	63650	57050	64150	71300	63250	71150	79050
18"	117.00	0.625	0.625	35150	39550	43900	39950	44900	49800	44650	50250	55850	49450	55650	61850
		15.88	15.88	47650	53600	59550	54150	60900	67650	60550	68150	75700	67050	75450	83800
18"	119.00	0.640	0.640	35500	39950	44350	40350	45350	50400	45100	50750	56400	49950	56200	62450
		16.26	16.26	48150	54150	60150	54650	61500	68350	61150	68800	76450	67700	76200	84650
18"	127.00	0.688	0.688	36000	40500	45000	40700	45750	50850	45300	51000	56650	50000	56250	62500
		17.48	17.48	48800	54800	61000	55150	62050	68950	61450	69100	76800	67800	76250	84750

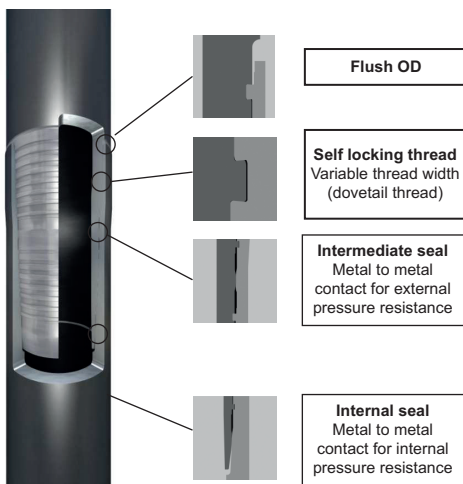
VAM® BOLT-II TORQUE VALUES

SIZE (OD)	NOMINAL WEIGHT	WALL THICKNESS	MTS				
			80 ksi	95 ksi	110 ksi	125 ksi	140 ksi
in.	ft.lb.	in.	ft.lb.				
mm	mm	mm	N.m.				
10 1/8 257.18	76.50	0.758	30500	35000	39300	43700	48100
			41400	47400	53300	59300	65200
11 3/4 298.45	60.00	0.489	24400	27800	31100	34400	37800
			33100	37700	42200	46700	51200
	65.00	0.534	26000	29900	33700	37500	41400
			35300	40500	45700	50900	56100
	82.60	0.691	37800	43200	48600	54000	58600
			51200	58600	65900	73200	79500
11 7/8 301.63	71.80	0.582	29800	34200	38600	43100	47500
			40400	46400	52400	58500	64400
13 5/8 346.08	86.20	0.625	42600	48800	55000	61200	67400
			57700	66200	74600	83000	91400
14 355.60	112.60	0.797	57200	65800	74300	83000	87900
			77500	89200	100800	112600	119200
	115.00	0.812	57900	66200	74400	82800	91000
			78500	89800	100900	112200	123400
16 406.40	84.00	0.495	43300	49600	56000	62300	68700
			58700	67300	75900	84500	93100
	95.00	0.566	46900	54100	61200	68400	75500
			63600	73300	83000	92700	102300
	97.00	0.575	47900	55200	62500	69800	77100
			65000	74900	84700	94600	104500
	109.00	0.656	53300	61100	68800	76600	84400
			72300	82900	93300	103900	114400

3.8 VAM® HTF-NR

VAM® HTF (High Torque Flush) is a flush OD integral connection providing maximum clearance along with extreme torque strength for challenging applications such as extended reach and slim hole wells, drilling with liner / casing, liner rotation to achieve better cementation in highly deviated and critical High Pressure/High Temperature wells.

VAM® HTF-NR is an optimized design of the VAM® HTF and became the new standard version of VAM® extreme high torque flush connection. The VAM® HTF-NR has extensive tests as per API RP 5C5:2017 CAL II which include the gas sealability having combined load points in both internal, external pressures and internal pressure with bending at 135° C.



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Applicable Range

- Available in sizes from 4 1/2" to 9 7/8". Other sizes are available upon request.
- Standard and alternative drifts as per API 5CT and special drifts upon request.
- Validated on Carbon, Martensitic stainless steel, for Yield Strengths from 80 ksi to 125 ksi.

Applications

- Production liners
- Drilling liners and liners to be rotated into place during cementing
- Horizontal / deviated wells
- Extended Reach and slim hole wells
- Drilling with liner / casing

Performances

- An external and internal metal-to-metal seal work independently of each other to achieve reliable sealability against annular and well bore pressures
- Extensive tests as per API RP 5C5:2017 CAL II.

Benefits

- Proven gas sealability
- Maximum clearance
- Superior rotational capability
- User friendly
- Reliable internal and external pressure integrity, and under combined loads.

Thread Compound

Approved list of thread running compound is presented on the “running compound” section of this book.

Application of the thread compound shall be uniform. The thread form shall be visible after application. The thread compound shall be applied 50% on the pin and 50% on the box and shall entirely cover the machined profile.

Running

Before start your job, check the specific “Pipe preparation and Running Equipment” section of this book.

VAM® HTF-NR is an integral connection and does not have a coupling face to lift the pipe on. For this reason lifting plugs or subs are required.

It is recommended to place the tong grips at least three inches above the pin threads and, if using a tong with integral back-up to grip the box at a distance of more than 6 inches from the end of the pipe.

OD (in)	Nominal Weight (lb/ft)	Minimum thread compound volume		Maximum thread compound volume	
		(cm ³)	(fl.oz)	(cm ³)	(fl.oz)
4 1/2	12.60	7	0.24	9	0.30
	13.50	8	0.27	10	0.34
	15.10	8	0.27	10	0.34
	16.60	10	0.34	13	0.44
	17.00	10	0.34	13	0.44
	18.90	11	0.37	14	0.47
	21.50	13	0.44	17	0.57
	15.00	9	0.30	12	0.41
	18.00	11	0.37	14	0.47
	20.30	10	0.34	13	0.44
5	21.40	13	0.44	17	0.57
	23.20	14	0.47	18	0.61
	24.10	14	0.47	18	0.61
	26.70	15	0.51	20	0.68
	17.00	9	0.30	12	0.41
	20.00	11	0.37	14	0.47
5 1/2	23.00	13	0.44	17	0.57
	26.00	16	0.54	21	0.71
	29.70	19	0.64	25	0.85
	28.00	17	0.57	22	0.74

OD (in)	Nominal Weight (lb/ft)	Minimum thread compound volume		Maximum thread compound volume	
		(cm ³)	(fl.oz)	(cm ³)	(fl.oz)
7	23.00	13	0.44	17	0.57
	26.00	16	0.54	21	0.71
	29.00	18	0.61	23	0.78
	32.00	20	0.68	26	0.88
	35.00	21	0.71	27	0.91
	38.00	24	0.81	31	1.05
	26.40	16	0.54	21	0.71
	29.70	16	0.54	21	0.71
	33.70	20	0.68	26	0.88
	39.00	24	0.81	31	1.05
7 3/4	42.80	28	0.95	36	1.22
	45.30	30	1.01	39	1.32
	46.10	28	0.95	36	1.22
	39.00	24	0.81	31	1.05
9 3/8	40.00	24	0.81	31	1.05
	43.50	27	0.91	35	1.18
9 5/8	47.00	30	1.01	39	1.32
	53.50	34	1.15	44	1.49
	58.40	34	1.15	44	1.49
	62.80	41	1.39	53	1.79

Make-up criteria / Torques

It is recommended that VAM® HTF-NR is made-up to its optimum torque on the field.

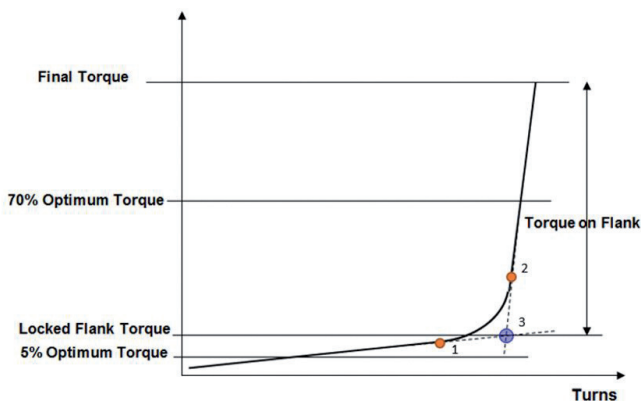
When the application requires a higher torque it is permitted to increase the final torque up to the MTS (Maximum Torque with Sealability). In this case VAM® HTF-NR should be made-up to the optimum torque and then a torque up to MTS should be applied when rotating the string downhole. The connection should not be submitted to a torque higher than the MTS to keep the full sealability performances.

MTS = Maximum Torque with Sealability. This maximum torque level can be applied either on the rig make-up, or during rotation downhole, keeping full connection sealability performances.

As VAM® HTF family does not have a torque shoulder the term "Shouldering torque" is not used however the point at which the flanks of the threads lock is known as the 'locked flank torque' and at this point there will be a gradual increase in torque as shown between points 1 and 2 in the graph below.

The points represented on the graph below are:

1. start of locking
2. end of locking
3. locked flank torque



The locked flank torque is shown by point 3 in the graph above. The acceptance criteria for this point is

- Minimum locked flank torque = 5 % of the optimum torque
- Maximum locked flank torque = 70 % of the optimum torque

Determination of “locked flank torque”:

- Automatic “locked flank torque” determination is acceptable but must display a value close to manual or visual determination. In case of automatic determination, a visual spot check shall be periodically performed in order to verify that there is no discrepancy.
- Many torque turn systems are not capable to display the locked flank torque (point 3) as it is not on the make-up curve. In this case the shoulder torque determination can be used as an alternative to indicate close to the locked flank torque. When the shoulder point on the line is used, take point 2 as the locked flank torque. If point 2 is above 70% of optimum, check visually if the real locked flank point is between 5% and 70%. In this case final acceptance will be the point 3.

Please note that if a target torque other than optimum torque is used, the locked flank parameters shall remain as a percentage (5% and 70%) of the book optimum torque.

In case of any doubts and question, please contact [Mr. Help](mailto:Mr.Help) at www.vamservices.com

VAM® HTF-NR TECHNICAL DATA

Size (OD)	Nominal Weight	Pipe						Connection				Connection Yield Strength (x 1000 lb)				
		Wall Thickness		Nominal ID	Drift diameter	Nominal Cross Section area	OD (nom)	ID (nom)	Make Up Loss	Tension Efficiency	80 ksi	95 ksi	110 ksi	125 ksi	140 ksi	
		in.	mm.													in.
4 1/2 114.30	13.50	0.290	7.37	3.920	3.795	3.836	4.545	3.826	3.968	58.7%	180	214	248	281	315	
	15.10*	0.337	8.56	3.826	3.701	4.407	4.545	3.733	3.976	53.5%	189	224	259	295	330	
	16.60	0.375	9.53	3.750	3.625	4.859	4.545	3.657	5.091	61.8%	240	285	330	375	420	
	17.00	0.380	9.65	3.740	3.615	4.918	4.545	3.646	4.907	61.5%	242	287	333	378	423	
	18.90	0.430	10.92	3.640	3.515	5.498	4.545	3.563	5.687	62.4%	274	326	377	429	480	
5 127.00	21.50	0.500	12.70	3.500	3.375	6.284	4.545	3.423	6.418	62.7%	315	374	433	492	552	
	15.00	0.296	7.52	4.408	4.283	4.374	5.050	4.315	4.019	56.8%	199	236	273	311	348	
	18.00	0.362	9.20	4.276	4.151	5.275	5.050	4.183	4.769	61.8%	261	310	359	407	456	
	20.30	0.408	10.36	4.184	4.059	5.885	5.050	4.091	5.155	58.1%	274	325	376	427	479	
	21.40	0.437	11.10	4.126	4.001	6.264	5.050	4.049	5.798	62.8%	315	374	433	492	551	
5 1/2 139.70	23.20	0.478	12.14	4.044	3.919	6.791	5.050	3.967	6.349	61.9%	336	399	462	525	589	
	24.10	0.500	12.70	4.000	3.875	7.070	5.050	3.924	6.357	62.4%	353	419	485	551	618	
	26.70	0.562	14.28	3.876	3.751	7.835	5.050	3.800	6.774	62.1%	389	462	535	608	681	
6 1/2 168.28	17.00	0.304	7.72	4.892	4.767	4.962	5.555	4.798	3.931	58.4%	232	275	319	362	406	
	20.00	0.361	9.17	4.778	4.653	5.828	5.555	4.685	4.659	57.8%	269	320	371	421	472	
	23.00	0.415	10.54	4.670	4.545	6.629	5.555	4.594	5.289	60.9%	323	384	444	505	565	
6 3/4	26.00	0.476	12.09	4.548	4.423	7.513	5.555	4.471	6.486	62.9%	378	449	520	591	662	
	29.70	0.562	14.28	4.376	4.251	8.719	5.555	4.300	7.954	63.0%	439	522	604	687	769	
	28.00	0.417	10.59	5.791	5.67	8.133	6.691	5.698	5.776	57.7%	375	446	516	587	657	

VAM® HTF-NR TECHNICAL DATA

Size (OD)	Nominal Weight	Minimum Internal Yield Pressure (psi) (API 5C3)				External Pressure (psi) (API 5C3)			
		80 ksi	95 ksi	110 ksi	125 ksi	80 ksi	95 ksi	110 ksi	125 ksi
	lb/ft								
	<i>mm</i>								
4 1/2 <i>114.30</i>	13.50	9 020	10 710	12 410	14 100	8 540	9 660	10 690	11 600
	15.10*	10 480	12 450	14 420	16 380	11 080	12 760	14 340	15 830
	16.60	11 670	13 850	16 040	18 230	12 220	14 510	16 810	19 100
5 <i>127.00</i>	17.00	11 820	14 040	16 260	18 470	12 370	14 690	17 010	19 330
	18.90	13 380	15 890	18 390	20 900	13 830	16 420	19 010	21 610
	21.50	15 560	18 470	21 390	24 310	15 800	18 770	21 730	24 690
5 1/2 <i>139.70</i>	15.00	8 290	9 840	11 400	12 950	7 250	8 110	8 850	9 480
	18.00	10 140	12 040	13 940	15 840	10 500	12 020	13 470	14 820
	20.30	11 420	13 570	15 710	17 850	12 000	14 240	16 490	18 560
	21.40	12 240	14 530	16 820	19 120	12 760	15 150	17 550	19 940
	23.20	13 380	15 890	18 400	20 910	13 830	16 430	19 020	21 620
	24.10	14 000	16 630	19 250	21 880	14 400	17 100	19 800	22 500
6 5/8 <i>168.28</i>	26.70	15 740	18 690	21 640	24 590	15 960	18 950	21 940	24 930
	17.00	7 740	9 190	10 640	12 090	6 290	6 940	7 480	7 890
	20.00	9 190	10 910	12 640	14 360	8 830	10 020	11 100	12 090
6 5/8 <i>168.28</i>	23.00	10 560	12 540	14 530	16 510	11 160	12 930	14 540	16 060
	26.00	12 120	14 390	16 660	18 930	12 650	15 020	17 390	19 760
	29.70	14 310	16 990	19 670	22 350	14 680	17 430	20 180	22 940
	28.00	8 810	10 460	12 120	13 770	8 170	9 220	10 160	11 000

VAM® HTF-NR TECHNICAL DATA

Size (OD)	Nominal Weight	Wall Thickness		Nominal ID		Drift diameter	Nominal Cross Section area	Pipe				Connection				Connection Yield Strength (x 1000 lb)			
		in.	mm.	in.	in.			OD (nom)	ID (nom)	Make Up Loss	Tension Efficiency	80 ksi	95 ksi	110 ksi	125 ksi	140 ksi			
7 <i>177.80</i>	23.00	0.317	8.05	6.366	6.250 A	6.656	7.070	6.281	4.327	57.3%	305	362	419	477	534				
	26.00	0.362	9.20	6.276	6.151	7.549	7.070	6.183	5.089	59.3%	358	425	492	560	627				
	29.00	0.408	10.36	6.184	6.059	8.449	7.070	6.174	5.555	58.6%	396	470	545	619	693				
	32.00	0.453	11.51	6.094	6.000 A	9.317	7.070	6.050	6.364	60.9%	454	539	624	709	794				
	35.00	0.498	12.65	6.004	5.879	10.173	7.070	5.928	6.691	61.6%	501	595	689	783	877				
7 5/8 <i>193.68</i>	38.00	0.540	13.72	5.920	5.795	10.959	7.070	5.844	7.709	62.1%	544	647	749	851	953				
	26.40	0.328	8.33	6.969	6.844	7.519	7.701	6.876	4.496	56.4%	339	403	466	530	594				
	29.70	0.375	9.53	6.875	6.750	8.541	7.701	6.781	4.657	58.2%	398	472	547	621	696				
	33.70	0.430	10.92	6.765	6.640	9.720	7.701	6.690	5.722	60.0%	467	554	642	729	816				
	39.00	0.500	12.70	6.625	6.500	11.193	7.701	6.550	7.099	62.9%	563	669	774	880	986				
7 3/4 <i>196.85</i>	42.80	0.562	14.28	6.501	6.376	12.470	7.701	6.426	8.105	62.1%	620	736	852	968	1 084				
	45.30	0.595	15.11	6.435	6.310	13.141	7.701	6.360	8.559	62.2%	654	777	899	1 022	1 144				
	46.10	0.595	15.11	6.560	6.500 A	13.373	7.828	6.550	8.032	58.2%	623	739	856	973	1 090				
9 3/8 <i>238.13</i>	39.00	0.400	10.16	8.575	8.500 S	11.278	9.469	8.550	5.716	55.3%	499	592	686	780	873				
	9 5/8 <i>244.48</i>	40.00	0.395	10.03	8.835	8.750 A	11.455	9.721	8.781	5.591	55.6%	509	605	701	796	892			
43.50		0.435	11.05	8.755	8.599	12.560	9.721	8.630	6.354	60.4%	607	721	834	948	1 062				
47.00		0.472	11.99	8.681	8.525	13.572	9.721	8.557	6.984	62.4%	678	805	932	1 059	1 186				
53.50		0.545	13.84	8.535	8.500 A	15.547	9.721	8.550	7.811	58.4%	726	862	999	1 135	1 271				
58.40		0.595	15.11	8.435	8.375 A	16.880	9.721	8.425	7.811	57.4%	775	920	1 066	1 211	1 356				
9 7/8 <i>250.83</i>	62.80	0.625	15.88	8.625	8.500 S	18.161	9.974	8.550	8.770	66.2%	962	1 142	1 323	1 503	1 683				

A = Alternative Drift S = Special Drift
* based on VAM® HTF-NR

VAM® HTF-NR TECHNICAL DATA

Size (OD)	Nominal Weight	Minimum Internal Yield Pressure (psi) (API 5C3)				External Pressure (psi) (API 5C3)			
		80 ksi	95 ksi	110 ksi	125 ksi	80 ksi	95 ksi	110 ksi	125 ksi
7 <i>177.80</i>	23.00	6 340	7 530	8 720	9 910	3 830	4 150	4 440	4 650
	26.00	7 240	8 600	9 960	11 310	5 410	5 890	6 230	6 450
	29.00	8 160	9 690	11 220	12 750	7 030	7 840	8 530	9 110
	32.00	9 060	10 760	12 460	14 160	8 610	9 740	10 780	11 710
	35.00	9 960	11 830	13 700	15 560	10 190	11 650	13 030	14 320
7 5/8 <i>193.68</i>	38.00	10 800	12 830	14 850	16 880	11 390	13 430	15 130	16 740
	26.40	6 020	7 150	8 280	9 410	3 400	3 710	3 920	4 050
	29.70	6 890	8 180	9 470	10 760	4 790	5 130	5 350	5 670
	33.70	7 900	9 380	10 860	12 340	6 560	7 270	7 870	8 340
	39.00	9 180	10 900	12 620	14 340	8 820	10 000	11 080	12 060
7 3/4 <i>196.85</i>	42.80	10 320	12 250	14 190	16 120	10 820	12 410	13 930	15 350
	45.30	10 920	12 970	15 020	17 070	11 510	13 670	15 440	17 110
	46.10	10 750	12 780	14 780	16 790	11 340	13 320	15 000	16 600
9 3/8 <i>238.13</i>	39.00	5 970	7 090	8 210	9 330	3 340	3 640	3 840	3 960
	9 5/8 <i>244.48</i>	40.00	5 750	6 820	7 900	8 980	3 090	3 330	3 470	3 530
43.50		6 330	7 510	8 700	9 890	3 810	4 130	4 420	4 620
47.00		6 870	8 150	9 440	10 730	4 760	5 090	5 300	5 630
53.50		7 930	9 410	10 900	12 390	6 620	7 340	7 950	8 440
58.40		8 650	10 280	11 900	13 520	7 900	8 880	9 770	10 540
9 7/8 <i>250.83</i>	62.80	8 860	10 520	12 180	13 840	8 260	9 320	10 290	11 140

A = Alternative Drift S = Special Drift
* based on VAM® HTF-NT

VAM® HTF-NR TORQUE VALUES

Size (OD)	Nominal Weight	lb/ft	Make-up Torque ft.lb All grades from 80 to 125 ksi			Maximum Torque with Sealability (MTS) except cold hardened CRA						
			ft.lb N.m	Opti.	Max.	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi		
4 1/2 114.30			Min.	6 220	7 150	8 190	9 070	9 510	10 840	12 170		
			7 100	8 400	9 700	11 100	12 300	14 700	16 500			
13.50			6 660	6 660	8 920	9 920	10 440	11 910	13 390			
			6 600	7 800	9 000	12 100	13 450	14 150	16 150			
15.10*			8 070	8 070	8 300	9 180	9 630	10 920	12 240			
			8 200	9 600	11 000	11 250	12 450	13 050	14 800			
16.60			11 750	11 750	12 000	13 350	14 100	16 100	18 050			
			12 000	13 950	15 900	16 300	18 100	19 100	21 800			
17.00			11 050	11 050	11 350	12 550	13 200	15 050	16 900			
			12 200	13 600	15 000	15 400	17 000	17 900	20 400			
18.90			12 900	12 900	13 050	14 550	15 200	17 350	19 550			
			14 500	15 900	17 300	17 700	19 700	20 600	23 500			
21.50			15 000	15 000	15 350	17 050	17 900	20 450	22 950			
			12 700	13 850	15 000	20 800	23 100	24 300	27 700			
5 127.00			8 730	8 730	11 800	13 150	13 800	15 800	17 800			
			8 800	10 300	11 800	16 000	17 800	18 700	21 400			
18.00			11 400	11 400	13 550	15 050	15 800	18 050	20 350			
			11 400	13 400	15 400	18 400	20 400	21 400	24 500			
20.30			14 610	14 610	14 850	16 450	17 200	19 600	22 000			
			14 600	17 100	19 600	20 100	22 300	23 300	26 600			
21.40			13 450	13 450	16 500	18 350	19 250	22 000	24 800			
			13 500	15 900	18 300	22 400	24 900	26 100	29 800			
23.20			14 550	14 550	19 050	21 150	22 200	25 350	28 550			
			14 600	17 200	19 800	25 800	28 700	30 100	34 400			
24.10			15 300	15 300	18 950	21 000	22 050	25 200	28 300			
			15 300	18 000	20 700	25 700	28 500	29 900	34 200			
26.70			16 950	16 950	20 500	22 700	23 800	27 100	30 400			
			17 000	20 000	23 000	27 750	30 750	32 250	36 750			

* based on VAM® HTF-NT

VAM® HTF-NR TORQUE VALUES

Size (OD)	Nominal Weight	Make-up Torque ft.lb All grades from 80 to 125 ksi			Maximum Torque with Sealability (MTS) except cold hardened CRA						
		lb/ft	ft.lb N.m	Max.	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi		
5 1/2 139.70	17.00		Min.	Opti.	Max.	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	
			6 940	8 170	9 400	12 400	13 800	14 450	16 500	18 600	
	20.00			9 400	11 100	12 800	16 800	18 700	19 600	22 400	25 200
				8 500	10 000	11 500	15 500	17 200	18 050	20 650	23 250
	23.00			11 500	13 500	15 500	21 000	23 300	24 500	28 000	31 500
				11 000	12 950	14 900	19 050	21 150	22 200	25 350	28 550
	26.00			15 000	17 600	20 200	25 800	28 700	30 100	34 400	38 700
				17 600	20 450	23 300	23 800	26 400	27 700	31 700	35 600
	29.70			23 800	27 700	31 600	32 250	35 750	37 500	43 000	48 250
				21 600	23 300	25 000	25 600	28 600	29 900	34 300	38 500
6 5/8 166.28			29 200	31 600	34 000	34 750	38 750	40 500	46 500	52 250	
			13 500	15 900	18 300	28 900	32 300	33 900	38 700	43 500	
7 177.80	23.00		18 400	21 600	24 800	39 250	43 750	46 000	52 500	59 000	
			8 250	9 700	11 150	20 800	23 100	24 250	27 750	31 200	
	26.00			11 100	13 100	15 100	28 200	31 300	32 900	37 600	42 300
				9 750	11 450	13 150	26 700	29 700	31 300	35 800	40 200
	29.00			13 200	15 500	17 800	36 250	40 250	42 500	48 500	54 500
				11 050	13 000	14 950	30 500	34 250	35 750	41 250	46 500
	32.00			15 100	17 700	20 300	41 500	46 500	48 500	56 000	63 000
				15 550	18 300	21 050	37 250	41 750	43 500	50 250	56 500
	35.00			21 100	24 800	28 500	50 500	56 500	59 000	68 000	76 500
				18 600	21 900	25 200	39 000	43 500	45 750	52 250	59 000
38.00			25 200	29 700	34 200	53 000	59 000	62 000	71 000	80 000	
			25 650	30 150	34 650	41 250	46 000	48 250	55 250	62 000	
			34 800	40 900	47 000	56 000	62 500	65 500	75 000	84 000	

VAM® HTF-NR TORQUE VALUES

Size (OD)	Nominal Weight	lb/ft	Make-up Torque ft.lb All grades from 80 to 125 ksi			Maximum Torque with Sealability (MTS) except cold hardened CRA						
			ft.lb N.m	Opti.	Max.	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi		
7 5/8 193.68	9.90	11 400	11 400	11 400	29 700	33 000	39 600	44 800	44 800	44 800		
	9.60	13 400	13 400	15 400	40 250	44 750	47 000	53 750	60 750	60 750		
	9.60	11 300	13 000	13 000	31 000	34 250	36 250	41 250	46 500	46 500		
	13 000	15 300	17 600	17 600	42 000	46 500	49 000	56 000	63 000	63 000		
	15 450	18 150	20 850	20 850	38 000	42 000	44 250	50 500	57 250	57 250		
	20 900	24 600	28 300	28 300	51 500	57 000	60 000	68 500	77 500	77 500		
	20 150	23 700	27 250	27 250	43 500	48 250	51 000	58 250	65 250	65 250		
	27 400	32 200	37 000	37 000	59 000	65 500	69 000	79 000	88 500	88 500		
	28 250	33 250	38 250	38 250	52 250	58 250	61 250	70 000	79 250	79 250		
	38 300	45 100	51 900	51 900	71 000	79 000	83 000	95 000	107 500	107 500		
45.30	31 900	37 550	43 200	43 200	56 500	63 000	66 000	75 500	85 250	85 250		
	43 300	50 900	58 500	58 500	76 500	85 500	89 500	102 500	115 500	115 500		
	24 650	29 000	33 350	33 350	53 500	59 750	62 750	72 000	80 750	80 750		
	33 400	39 300	45 200	45 200	72 500	81 000	85 000	97 500	109 500	109 500		
	11 500	13 550	15 600	15 600	46 750	52 000	54 500	62 750	70 750	70 750		
	15 500	18 300	21 100	21 100	63 500	70 500	74 000	85 000	96 000	96 000		
	11 450	13 450	15 450	15 450	47 250	52 750	55 250	63 500	71 500	71 500		
	15 500	18 200	20 900	20 900	64 000	71 500	75 000	86 000	97 000	97 000		
	17 650	20 750	23 850	23 850	57 500	63 750	67 000	77 000	86 750	86 750		
	23 900	28 100	32 300	32 300	78 000	86 500	91 000	104 500	117 500	117 500		
47.00	19 000	22 350	25 700	25 700	66 500	73 750	77 750	89 250	100 250	100 250		
	25 800	30 300	34 800	34 800	90 000	100 000	105 500	121 000	136 000	136 000		
	21 200	24 950	28 700	28 700	78 250	87 000	91 750	105 000	118 750	118 750		
	28 700	33 800	38 900	38 900	106 000	118 000	124 500	142 500	161 000	161 000		
	24 250	28 550	32 850	32 850	78 500	87 750	92 250	105 500	119 000	119 000		
	32 900	38 700	44 500	44 500	106 500	119 000	125 000	143 000	161 500	161 500		
	32 800	38 600	44 400	44 400	94 750	105 500	111 000	127 500	143 750	143 750		
	44 500	52 400	60 300	60 300	128 500	143 000	150 500	173 000	195 000	195 000		
	9 7/8 250.83											

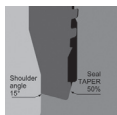
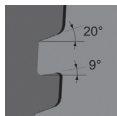
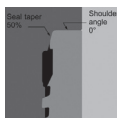
VAM® HTF-NR

3.9 VAM® MUST

Application



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Integral Flush Design

VAM® MUST is a fully flush integral connection threaded on heavy weight casing.

Basic application is to run this pipe in salt or other floating formations (high collapse !) in certain sections of the casing string, where high collapse performance is mandatory. Typically 10 3/4" VAM® MUST is used for 9 5/8" / 9 7/8" or even 10" casing sections, or 7 5/8" VAM® MUST for 7" casing string sections, where the bigger VAM® MUST about equals the coupling OD and tension efficiency of the smaller T&C section

Multiple Seal System

An external seal and an internal seal work independently of each other to achieve sealing against internal pressure and external pressure up to 100% of the rated internal and external pressure resistance of the pipe body.

Interference Tapered Thread

Thread load flank has a 9° reverse angle to avoid jump-out.

Thread stabbing flank has a 20° angle for easy stabbing and fast, trouble-free make-up.

Streamlined Internal and External Profile

The OD and ID. is 100% flush (there is no upset).

The ID is bored and recess-free for smooth, efficient flow.

The OD is turned to tight tolerance.

VAM® MUST can be repaired by VAM® licensed workshops.

Internal reverse angle torque shoulder

The reverse angle torque shoulder provides a positive torque stop, which allows accurate power-tight make-up.

The reverse angle of the shoulder increases the internal seal contact pressure achieving excellent gas-tightness under internal pressure.

The combination of the reverse angle torque shoulder and the 9° load flank of the threads creates a “wedge” effect which improves the structural strength of the connection.

Streamlined internal and external profile

The OD and ID is 100% flush (no upset).

The ID is bored and recess-free for smooth, efficient flow.

The OD is turned to tight tolerance.

Dope quantities

The minimum quantity of compound should be shared between Pin and Box ends as follows:

2/3 on Box (never leave the box without any dope)

1/3 on Pin

Dope should be applied evenly in order to get a uniform coating on all parts of the connection. If a dope applicator is used for the box end it shall be adjusted to apply the above recommended quantity of dope.

Minimum make-up dope quantity

Nominal OD	Dope volume	
	(in)	(cm ³)
5 1/2	17	1
7 5/8	24	1.5
10 3/4	42	2.6

Running procedure

Please refer to chapter 2: Lifting and handling Tools for flush/semi-flush connections for the running recommendations of VAM® MUST.

VAM® MUST TECHNICAL DATA

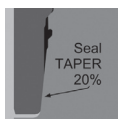
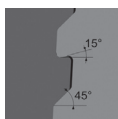
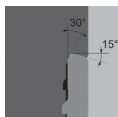
Size (OD)	Pipe											
	Nominal Weight		Wall Thickness		ID Nominal	API Drift Diameter	Pin ID	Pin Length	Joint CCS		Connection Yield Strength (10,000 lb)	
	in	mm	in	mm	in	in	in	in	sq.in	80 ksi	95 ksi	110 ksi
5 1/2"	0.612	15.54	4.276	4.151	4.406	3.773	4.703	376	447	517		
<i>139.70</i>												
7 5/8"	0.750	19.050	6.125	6.000	6.291	5.290	9.153 P	732	870	1 007		
<i>193.68</i>	0.812	20.620	6.001	5.876	6.177	5.853	10.029 P	802	953	1 103		
10 3/4"	1.033	26.240	8.684	8.528	8.397	6.289	17.723 P	1 418	1 684	1 950		
<i>273.05</i>												

VAM® MUST TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140-145 ksi		
			min.	opti.	max.	min.	opti.	max.	min.	opti.	max.	min.	opti.	max.	min.	opti.	max.
in	lb/ft	in	ft.lb	N.m	ft.lb	N.m	ft.lb	N.m	ft.lb	N.m	ft.lb	N.m	ft.lb	N.m	ft.lb	N.m	
5 1/2" 139.70	32.00	0.812	8 100	9 000	9 900	9 150	10 150	11 150	10 400	11 600	12 800	11 700	13 000	14 300	Upon request		
		15.54	11 000	12 200	13 400	12 400	13 800	15 200	14 100	15 700	17 300	15 840	17 600	19 360	Upon request		
7 5/8" 193.68	55.30	0.750	14 900	16 600	18 300	17 280	19 200	21 120	19 900	22 100	24 300	20 850	23 150	25 450	23 150	25 700	28 250
		19.05	20 300	22 600	14 900	23 400	26 000	28 600	26 900	29 900	32 900	28 300	31 400	34 500	31 300	34 800	38 300
10 3/4" 273.05	108.00	0.812	16 650	18 450	20 250	18 270	20 300	22 330	20 850	23 150	25 450	22 800	25 320	27 900	25 050	27 850	30 650
		20.62	22 500	25 000	27 500	24 800	27 500	30 300	28 300	31 400	34 500	30 900	34 300	37 700	34 000	37 800	41 600
		1.033	31 500	35 000	38 500	31 500	35 000	38 500	31 500	35 000	38 500	31 500	35 000	38 500	31 500	35 000	38 500
		26.24	42 700	47 500	52 300	42 800	47 500	52 300	42 700	47 500	52 300	42 700	47 500	52 300	42 700	47 500	52 300

3.10 VAM® FJL

Application



Integral Flush Design

VAM® FJL is an integral connection threaded on plain-end pipe with the OD of the connection totally flush with the pipe body.

Sizes range from 2 3/8" to 11 7/8" for such clearance applications as tubing in small sizes, drilling liners and tie-backs in medium sizes, and contingency liner in larger casing diameters

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External Torque Shoulder

An innovative reverse angle external torque shoulder provides a positive torque stop and energizes the external metal-to-metal seal.

This shoulder also permits visual confirmation of power-tight make-up.

Multiple Seal System

An external seal and an internal seal work independently of each other to achieve sealing against annulus and bore pressures.

This multiple seal arrangement ensures gas-tight sealing integrity to 100% of the rated burst and collapse of the pipe body.

Interference Tapered Thread

In order to provide optimum strength, the VAM® FJL is designed for 65% to 70% efficiency under tension in medium wall thickness.

Thread load flank has a 15° reverse angle to resist jump out.

Thread stabbing flank has a 45° angle for fast, trouble-free make-up.

The design of VAM® FJL exhibits an exceptional bending resistance for a connection of this class.

Streamlined Internal and External Profile

The OD. and ID. is 100% flush (there is no upset).

The ID. is bored and recess-free for smooth, efficient flow.

The OD. is turned to tight tolerance.

VAM® FJL can be repaired by VAM® licensed workshops. Only slight pin end swaging and slight box end expansion are needed for machining threads

Dope quantities

The minimum quantity of compound should be shared between Pin and Box ends as follows:

2/3 on Box (never leave the box without any dope)

1/3 on Pin

Dope should be applied evenly in order to get a uniform coating on all parts of the connection.

If a dope applicator is used for the box end it shall be adjusted to apply the above recommended quantity of dope.

Minimum make-up dope quantity

Nominal OD	Dope volume	
	(in)	(cm ³)
2 3/8	9	0.5
2 7/8	10	0.6
3 1/2	13	0.8
4	14	0.9
4 1/2	16	1
5	24	1.5
5 1/2	26	1.6
6 5/8	32	1.9
7	42	2.6
7 5/8	46	2.8
8 1/8	57	3.48
8 5/8	62	3.8
9 3/8	67	4.1
9 5/8	69	4.2
9 7/8	71	4.3
10 3/4	77	4.7
11 3/4	99	6
11 7/8	100	6.1

Running procedure

The VAM® FJL connection can be run exactly as VAM® tubing or casing when the special lifting plug has been set in the box of the joint to simulate a coupling face.

Setting the lifting plug:

Caution: Be aware that VAM® FJL of the same OD but different wall thickness (lb/ft) may have different thread tapers. Ensure that lifting plugs match thread taper requirements. In addition the use of slip type elevators is strongly recommended.

This lifting plug must be firmly tightened with a steel bar.

The joint can be used exactly as a normal coupled joint.

When the lifting plug is tightened:

Remove the lifting plug from the previous joint (the pipe in the slips shall be fitted with a safety clamp).

Stab as a VAM® joint with a stabbing guide.

Engage the four or five first threads with a chain tong.

Note: During running when the joint turns make sure the lifting plug is free from the elevator and rotates with the pipe. Otherwise there is a risk of unscrewing the lifting plug, which could then fall onto the drill-floor.

When using the back-up tong, in order to avoid any ovalisation of the box end the back up tong shall be positioned at least 1 foot from the end of the pipe.

The lifting plug must be kept clean and checked every make up in order to verify the integrity of threads (risk of galling).

Note: a minimum of 3 lifting plugs is required (2 in process of running, at least 1 spare).

This will avoid slowing down the operation and avoid damaging the pipes threads if the plug is damaged itself. This will also allow time to carry out thread inspection of the lifting plug while running.

VAM® FJL TECHNICAL DATA

Size OD	Pipe				Connection		Tensile Performance (1000 lb)								
	In mm	Wall Thickness in mm	ID Nominal in	Drift Diameter in	Pin ID in	Pin Length in	Joint critical cross section sq.in	Joint Tensile Efficiency %	L80	N80	R95	P110	Q125	140	150
2 3/8 60.33	4.60	0.190	4.83	1.995	1.933	1.890	0.586 P	45%	56	59	62	73	79	88	94
	5.10	0.218	5.54	1.939	1.878	2.283	0.760 P	51%	72	76	80	95	103	114	122
	5.80	0.254	6.45	1.867	1.773	2.992	0.936 B	55%	89	94	98	117	126	140	150
	6.30	0.280	7.11	1.815	1.721	2.874	1.015 B	55%	96	102	107	127	137	152	162
	7.35	0.336	8.53	1.703	1.609	3.701	1.183 B	55%	112	118	124	148	160	177	189
2 7/8 73.03	6.40	0.217	5.51	2.441	2.378	2.244	0.887 P	49%	84	89	93	111	120	133	142
	7.80	0.276	7.01	2.323	2.276	2.913	1.172 B	52%	111	117	123	146	158	176	188
	8.60	0.308	7.82	2.259	2.165	3.071	1.378 P	55%	131	138	145	172	186	207	220
	9.80	0.362	9.19	2.151	2.057	3.819	1.573 B	55%	149	157	165	197	212	236	252
	10.70	0.405	10.29	2.065	1.971	5.787	2.038 P	65%	194	204	214	255	275	306	326
3 1/2 88.90	7.70	0.216	5.49	3.068	2.943	2.126	1.059 P	48%	101	106	111	132	143	159	169
	9.20	0.254	6.45	2.992	2.867	2.941	1.420 P	55%	135	142	149	177	192	213	227
	10.20	0.289	7.34	2.922	2.797	3.307	1.598 B	55%	152	160	168	200	216	240	256
	12.70	0.375	9.53	2.750	2.625	3.976	2.390 P	65%	227	239	251	299	323	359	382
	13.70	0.413	10.49	2.674	2.549	4.449	2.713 B	68%	258	271	285	339	366	407	434
4 101.60	14.70	0.449	11.40	2.602	2.477	4.921	2.931 B	68%	278	293	308	366	396	440	469
	15.50	0.476	12.09	2.548	2.423	5.236	3.075 B	68%	292	308	323	384	415	461	492
	9.50	0.226	5.74	3.548	3.423	2.205	1.288 P	48%	122	129	135	161	174	193	206
	10.90	0.262	6.65	3.476	3.351	2.795	1.685 P	55%	160	168	177	211	227	253	270
	11.30	0.286	7.34	3.428	3.303	3.180	1.837 B	55%	174	184	193	230	248	276	294
4 1/2 114.30	13.20	0.330	8.38	3.340	3.260	2.992	2.093 P	55%	199	209	220	262	282	314	335
	14.80	0.380	9.65	3.240	3.115	3.780	2.610 P	60%	248	261	274	326	352	392	418
	16.50	0.430	10.92	3.140	3.063	4.409	3.111 P	65%	296	311	327	389	420	467	498
	11.60	0.250	6.35	4.000	3.875	2.559	1.533 P	46%	146	153	161	192	207	230	245
	12.60	0.271	6.88	3.958	3.833	2.559	1.796 P	50%	171	180	189	225	243	269	287
13.50	0.290	7.37	3.920	3.795	2.559	2.031 P	53%	193	203	213	254	274	305	325	
15.10	0.337	8.56	3.826	3.701	3.756	3.189	2.602 P	59%	247	260	273	325	351	390	416



VAM® FJL TECHNICAL DATA

Size OD	Pipe				Connection		Tensile Performance (1000 lb)									
	Nominal Weight	Plain End Weight	Wall Thickness	ID Nominal	Drift Diameter	Pin ID	Pin Length	Joint critical cross section	Joint tensile Efficiency	L80	N80	R95	P110	Q125	140	150
in mm	lb/ft	lb/ft	in mm	in	in	in	in	sq.in	%							
4 1/2 114.30	17.00	16.72	0.380	3.740	3.615	3.673	3.701	3.112 P	63%	296	311	327	389	420	467	498
	18.90	18.69	0.430	3.640	3.515	3.575	4.291	3.577 B	65%	340	358	376	447	483	537	572
	21.50	21.36	0.500	3.500	3.375	3.453	5.118	4.086 B	65%	388	409	429	511	562	613	654
	23.70	23.56	0.560	3.380	3.255	3.335	5.827	4.514 B	65%	429	451	474	564	609	677	722
	13.00	12.83	0.253	4.494	4.369	4.417	2.795	2.079 B	55%	197	208	218	260	281	312	333
5 127.00	15.00	14.87	0.296	7.52	4.408	4.431	3.504	2.407 B	55%	229	241	253	301	325	361	385
	18.00	17.93	0.362	9.19	4.276	4.209	3.425	3.205 P	61%	305	321	337	401	433	481	513
	20.30	20.01	0.408	10.36	4.184	4.059	4.118	3.818 P	65%	363	382	401	477	515	573	611
	20.80	20.63	0.422	10.72	4.156	4.091	4.213	3.999 B	66%	380	400	420	500	540	600	640
	21.40	21.30	0.437	11.10	4.126	4.079	4.331	4.083 B	65%	388	408	429	510	551	612	653
5 1/2 139.70	23.20	23.08	0.478	12.14	4.044	3.996	5.039	4.574 B	67%	435	457	480	572	617	686	732
	24.10	24.03	0.500	12.70	4.000	3.957	5.039	4.574 B	65%	435	457	480	572	617	686	732
	15.50	15.35	0.275	6.99	4.950	4.874	2.874	2.488 P	55%	236	249	261	311	336	373	398
	17.00	16.87	0.304	7.72	4.892	4.823	3.346	2.736 B	55%	260	274	287	342	369	410	438
	20.00	19.81	0.361	9.17	4.778	4.653	3.386	3.416 P	59%	325	342	359	427	461	512	547
6 1/8 168.28	23.00	22.54	0.415	10.54	4.670	4.602	4.252	4.218 P	64%	401	422	443	527	569	633	675
	26.00	25.54	0.476	12.09	4.548	4.423	4.843	5.031 B	67%	478	503	528	629	679	755	805
	28.40	28.13	0.530	13.46	4.440	4.390	5.315	5.391 B	65%	512	539	566	674	728	809	863
	29.70	29.64	0.562	14.27	4.251	4.317	5.709	5.690 B	65%	541	569	597	711	768	854	910
	32.00	31.95	0.612	15.54	4.276	4.217	5.709	6.135 B	65%	583	614	644	767	828	920	982
6 5/8 168.28	23.20	23.58	0.330	8.94	5.965	5.898	2.953	3.579 P	55%	340	358	376	447	483	537	573
	24.00	23.58	0.352	8.94	5.921	5.858	2.953	3.991 P	58%	379	399	419	499	539	599	639
	28.00	27.65	0.417	10.59	5.791	5.666	3.976	5.186 P	64%	493	519	545	648	700	778	830
	32.00	31.20	0.475	12.07	5.675	5.550	4.724	6.039 B	66%	574	604	634	755	815	906	966
	35.00	34.20	0.525	13.34	5.575	5.450	5.528	6.778 B	67%	644	678	712	847	915	1017	1084
7 177.80	23.00	22.63	0.317	8.05	6.366	6.299	2.638	3.401 P	51%	323	340	357	425	459	510	544
	26.00	25.60	0.362	9.19	6.276	6.151	3.150	4.297 P	57%	408	430	451	537	580	645	688

VAM® FJL TECHNICAL DATA

Size OD In mm	Nominal Weight lb/ft	Pipe				Connection		Tensile Performance (1000 lb)								
		Plain End Weight lb/ft	Wall Thickness in mm	ID Nominal in	Drift Diameter in	Pin ID in	Pin Length in	Joint critical cross section sq.in	Joint tensile Efficiency %	L80	N80	R95	P110	Q125	140	150
7 <i>177.80</i>	29.00	28.72	0.408	10.36	6.059	6.122	3.701	5.199 P	62%	484	520	546	650	702	780	832
	32.00	31.67	0.453	11.51	6.000 A	6.063	4.291	6.064 P	65%	576	606	637	758	819	910	970
	35.00	34.58	0.498	12.65	6.004	5.957	4.843	6.642 B	65%	631	664	697	830	897	996	1063
	38.00	37.26	0.540	13.72	5.920	5.874	5.354	7.152 B	65%	679	715	751	894	965	1073	1144
	41.00	40.39	0.590	14.99	5.820	5.772	5.945	7.735 B	65%	735	773	812	967	1044	1160	1238
7 5/8 <i>193.68</i>	26.40	25.56	0.328	8.33	6.969	6.906	2.638	3.892 P	52%	370	389	409	487	525	584	623
	29.70	29.04	0.375	9.53	6.875	6.815	3.228	4.910 P	57%	466	491	516	614	663	737	786
	33.70	33.04	0.430	10.92	6.765	6.640	3.937	6.092 P	63%	579	609	640	761	822	914	975
	35.80	35.56	0.465	11.81	6.695	6.570	4.370	6.822 B	65%	648	682	716	853	921	1023	1092
	39.00	38.05	0.500	12.70	6.625	6.500	4.803	7.297 B	65%	693	730	766	912	985	1095	1168
8 <i>206.38</i>	42.80	42.39	0.562	14.27	6.501	6.376	5.551	8.114 B	65%	771	811	852	1014	1095	1217	1298
	45.30	44.67	0.595	15.11	6.435	6.310	6.063	8.669 B	66%	824	867	910	1084	1170	1300	1387
	47.10	46.73	0.625	15.88	6.375	6.250	5.906	9.063 B	66%	861	906	952	1133	1223	1359	1450
	32.50		0.375	9.53	7.375	7.250	3.878	5.185 B	57%							
8 5/8 <i>219.08</i>	32.00	31.10	0.352	8.94	7.921	7.862	2.874	4.985 P	54%	474	498	523	623	673	748	798
	36.00	35.14	0.400	10.16	7.825	7.768	3.583	6.167 P	60%	586	617	648	771	833	925	987
	40.00	39.29	0.450	11.43	7.725	7.625 A	4.370	7.389 P	64%	702	739	776	924	997	1108	1182
	44.00	43.39	0.500	12.70	7.625	7.500	4.803	8.347 B	65%	793	835	876	1043	1127	1252	1336
	49.00	47.99	0.557	14.15	7.511	7.386	5.945	9.768 B	69%	928	977	1026	1221	1319	1465	1563
9 3/8 <i>238.13</i>	52.00	51.03	0.595	15.11	7.435	7.310	7.394	9.768 B	65%	928	977	1026	1221	1319	1465	1563
	39.00		0.400	10.16	8.575	8.450	4.331	6.501 B	58%	618	650	683	813	878	975	1040
	40.00		0.420	10.67	8.595	8.410	4.803	6.915 B	59%	657	692	726	864	934	1037	1106

VAM® FJL TECHNICAL DATA

Size OD		Nominal Weight				Pipe				Connection			Tensile Performance (1000 lb)					
in mm	lb/ft	lb/ft	Plain End Weight	Wall Thickness		ID Nominal	Drift Diameter	Pin ID	Pin Length	Joint critical cross section	Joint tensile Efficiency	L80	R95	P110	Q125	140	150	
				in	mm													in	in	sq.in	%
9 5/8 <i>244.48</i>	36.00	34.86	0.352	8.94	8.921	8.765	8.831	2.982	5.484 P	53%	521	548	576	685	740	823	877	
	40.00	38.94	0.395	10.03	8.835	8.679	8.748	3.780	6.681 P	58%	635	668	701	835	902	1002	1069	
	43.50	42.89	0.435	11.05	8.755	8.599	8.669	4.370	7.784 P	62%	739	778	817	973	1051	1168	1245	
9 5/8 <i>244.48</i>	47.00	46.14	0.472	11.99	8.681	8.525	8.638	4.370	8.798 P	65%	836	880	924	1100	1188	1320	1408	
	53.50	52.85	0.545	13.84	8.535	8.500 A	8.567	5.276	10.126 B	65%	962	1013	1063	1266	1367	1519	1620	
	58.40	57.38	0.595	15.11	8.435	8.375 A	8.362	6.260	11.499 B	68%	1092	1150	1207	1437	1552	1725	1840	
9 7/8 <i>250.83</i>	59.40	58.64	0.609	15.47	8.407	8.251	8.362	6.626	11.499 B	67%	1092	1150	1207	1437	1552	1725	1840	
	61.10	60.08	0.625	15.88	8.375	8.219	8.362	6.260	11.499 B	65%	1092	1150	1207	1437	1552	1725	1840	
	62.80	61.74	0.625	15.88	8.625	8.469	8.579	6.260	12.372 B	68%	1175	1237	1299	1547	1670	1856	1980	
10 3/4 <i>273.05</i>	66.40	65.05	0.661	16.79	8.553	8.397	8.579	6.260	12.372 B	65%	1175	1237	1299	1547	1670	1856	1980	
	67.50	66.60	0.678	17.22	8.519	8.363	8.457	6.732	13.042 B	67%	1239	1304	1369	1630	1761	1956	2087	
	40.50	38.88	0.350	8.89	10.050	9.894	9.969	2.874	5.981 P	52%	588	598	628	748	807	897	957	
11 3/4 <i>298.45</i>	45.50	44.22	0.400	10.16	9.950	9.875 A	9.866	3.858	7.553 P	58%	718	755	793	944	1020	1133	1208	
	51.00	49.50	0.450	11.43	9.850	9.694	9.768	4.606	9.108 P	63%	865	911	956	1138	1230	1366	1457	
	55.50	54.21	0.495	12.57	9.760	9.625 A	9.685	4.606	10.401 B	65%	988	1040	1092	1300	1404	1560	1664	
11 3/4 <i>298.45</i>	60.70	59.40	0.545	13.84	9.660	9.504	9.587	5.276	11.461 B	66%	1089	1146	1203	1433	1547	1719	1834	
	65.70	64.53	0.595	15.11	9.560	9.404	9.488	5.906	12.451 B	66%	1183	1245	1307	1556	1681	1868	1992	
	47.00	45.56	0.375	9.53	11.000	10.844	10.961	3.386	7.488 B	56%	711	749	786	936	1011	1123	1198	
11 7/8 <i>301.63</i>	54.00	52.57	0.435	11.05	10.880	10.724	10.835	4.961	9.233 B	60%	877	923	970	1154	1247	1385	1477	
	60.00	58.81	0.489	12.42	10.772	10.625 A	10.717	4.252	10.985 B	63%	1044	1098	1153	1373	1483	1648	1758	
	65.00	63.97	0.534	13.56	10.682	10.625 A	10.701	4.921	12.152 B	65%	1154	1215	1276	1519	1641	1823	1944	
11 7/8 <i>301.63</i>	71.80	70.19	0.582	14.78	10.711	10.555	10.740	5.630	13.514 B	65%	1284	1351	1419	1689	1824	2027	2162	

VAM® FJL TORQUE VALUES

Size (OD)	Nom. a Weight lb/ft	Wall Thickness in mm	35 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi						
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.				
			ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m						
2 3/8" 60.33	4.60	0.190	460	510	560	530	580	630	690	710	650	720	790	850	720	790	860	930	990	760	830	900	760	830	910		
			620	680	760	700	780	860	930	1020	840	930	1020	1100	1180	1260	1340	1420	1500	1080	1170	1260	1350	1440	1530	1620	
			0.218	490	540	590	560	710	720	800	880	760	830	910	990	1070	1150	1230	1310	1390	980	1060	1140	1220	1300	1380	1460
			5.54	670	740	810	790	890	970	1050	1130	1020	1100	1180	1260	1340	1420	1500	1580	1660	1240	1320	1400	1480	1560	1640	1720
			0.254	490	540	590	560	720	790	870	950	850	940	1030	1110	1200	1290	1380	1470	1560	1140	1220	1300	1380	1460	1540	1620
			6.45	670	740	810	800	900	1000	1080	1160	1060	1150	1240	1330	1420	1510	1600	1690	1780	1240	1320	1400	1480	1560	1640	1720
			0.280	650	720	800	880	770	870	960	1050	940	1030	1120	1210	1300	1390	1480	1570	1660	1330	1420	1510	1600	1690	1780	1870
			7.11	890	980	1080	1190	1060	1180	1300	1420	1280	1420	1560	1700	1840	1980	2120	2260	2400	1420	1560	1700	1840	1980	2120	2260
			0.336	720	800	880	970	850	950	1050	1150	1050	1150	1250	1350	1450	1550	1650	1750	1850	1450	1550	1650	1750	1850	1950	2050
			8.53	970	1080	1190	1300	1140	1270	1400	1530	1410	1570	1730	1900	2070	2240	2410	2580	2750	1530	1680	1830	1980	2130	2280	2430
2 7/8" 73.03	6.40	0.217	650	720	790	790	870	950	890	980	1070	980	1080	1170	1260	1350	1440	1530	1620	1180	1270	1360	1450	1540	1630	1720	
			890	980	1080	1080	1180	1300	1420	1540	1660	1780	1900	2020	2140	2260	2380	2500	2620	1660	1780	1900	2020	2140	2260	2380	
			0.276	750	830	910	910	1010	1110	1050	1160	1270	1170	1300	1430	1560	1690	1820	1950	1310	1450	1590	1730	1870	2010	2150	
			7.01	1020	1130	1240	1230	1370	1510	1410	1570	1730	1890	2050	2210	2370	2530	2690	2850	1780	1960	2140	2320	2500	2680	2860	3040
			0.308	990	1080	1180	1170	1300	1430	1310	1450	1590	1730	1870	2010	2150	2290	2430	2570	2710	1830	1970	2110	2250	2390	2530	2670
			7.82	1320	1470	1620	1590	1770	1950	1760	1960	2160	2360	2560	2760	2960	3160	3360	3560	3760	2200	2450	2700	2950	3200	3450	3700
			0.362	1010	1120	1230	1370	1520	1670	1500	1680	1820	1960	2100	2240	2380	2520	2660	2800	2940	1930	2100	2270	2440	2610	2780	2950
			9.19	1370	1520	1670	1650	2060	2270	2030	2260	2490	2720	2950	3180	3410	3640	3870	4100	4330	2470	2750	3030	3310	3590	3870	4150
			0.405	1050	1160	1270	1500	1680	1820	1630	1810	1990	2170	2350	2530	2710	2890	3070	3250	3430	2110	2300	2490	2680	2870	3060	3250
			10.29	1410	1570	1730	2030	2260	2490	2200	2450	2700	2950	3200	3450	3700	3950	4200	4450	4700	2570	2830	3100	3370	3640	3910	4180
3 1/2" 88.90	7.70	0.216	850	940	1030	980	1080	1180	1050	1160	1270	1170	1300	1430	1560	1690	1820	1950	2080	1310	1450	1590	1730	1870	2010	2150	
			1140	1270	1400	1320	1470	1620	1770	1920	2070	2220	2370	2520	2670	2820	2970	3120	3270	1750	1900	2050	2200	2350	2500	2650	
			0.254	990	1080	1180	1110	1230	1350	1170	1300	1430	1560	1690	1820	1950	2080	2210	2340	2470	1850	2000	2150	2300	2450	2600	2750
			6.45	1320	1470	1620	1540	1690	1840	1590	1770	1950	2130	2310	2490	2670	2850	3030	3210	3390	2290	2500	2710	2920	3130	3340	3550
			0.289	1050	1160	1270	1240	1370	1500	1310	1460	1590	1740	1890	2040	2190	2340	2490	2640	2790	1950	2100	2250	2400	2550	2700	2850
			7.34	1410	1570	1730	1670	1860	2050	1780	1980	2180	2380	2580	2780	2980	3180	3380	3580	3780	2350	2550	2750	2950	3150	3350	3550
			0.375	1170	1300	1430	1570	1740	1910	1760	1950	2140	2330	2520	2710	2900	3090	3280	3470	3660	2450	2640	2830	3020	3210	3400	3590
			9.53	1590	1770	1950	2110	2350	2590	2380	2650	2920	3200	3480	3760	4040	4320	4600	4880	5160	2650	2930	3210	3490	3770	4050	4330
			0.413	1240	1370	1500	1700	1880	2080	1890	2100	2310	2520	2730	2940	3150	3360	3570	3780	3990	2550	2760	2970	3180	3390	3600	3810
			10.49	1670	1860	2050	2250	2550	2810	2560	2840	3120	3400	3680	3960	4240	4520	4800	5080	5360	2650	2860	3070	3280	3490	3700	3910
0.449	1310	1450	1590	1830	2030	2230	2020	2240	2460	2680	2900	3120	3340	3560	3780	4000	4220	2750	2970	3190	3410	3630	3850	4070			
11.40	1760	1960	2160	2470	2750	3030	2740	3040	3340	3640	3940	4240	4540	4840	5140	5440	5740	2850	3060	3270	3480	3690	3900	4110			
0.476	1370	1520	1670	1980	2170	2380	2160	2390	2620	2850	3080	3310	3540	3770	4000	4230	4460	2950	3180	3410	3640	3870	4100	4330			
12.09	1850	2060	2270	2650	2940	3230	2920	3240	3560	3880	4200	4520	4840	5160	5480	5800	6120	3050	3280	3510	3740	3970	4200	4430			



VAM® FLL TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	55 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi																						
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.																				
In	lb/ft	In	ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m																						
4" 101.60	9.50	0.228	910	1010	1110	1170	1300	1430	1370	1520	1670	1570	1740	1910	1700	1880	2060	2080	2080	2240	2460	2220	2460	2700	2240	2230	2020	2180	2380	2160	2380	2620	2460	2700	2820	3240	3560						
			5.74	1230	1370	1510	1590	1770	1950	1850	2060	2270	2110	2350	2590	2290	2550	2810	2810	2810	2970	3240	3510	3300	3560	3830	3500	3770	4040	4310	4580	4850	5120	5390	5660	5930	6200	6470					
		10.90	0.262	1050	1180	1270	1310	1450	1590	1440	1590	1740	1630	1810	1990	1790	1970	2150	2150	2150	2330	2600	2870	2670	2950	3220	2950	3230	3500	3770	4040	4310	4580	4850	5120	5390	5660	5930	6200	6470			
				6.66	1410	1570	1730	1780	1960	2160	1940	2160	2380	2220	2450	2700	2470	2750	3030	3030	3030	3210	3490	3770	3570	3850	4130	3850	4130	4410	4690	4970	5250	5530	5810	6090	6370	6650	6930	7210	7490		
		11.30	0.288	1310	1450	1590	1370	1520	1670	1500	1680	1820	1700	1880	2060	1860	2040	2220	2220	2220	2400	2680	2960	2760	2940	3120	2940	3120	3400	3680	3960	4240	4520	4800	5080	5360	5640	5920	6200	6480	6760	7040	
				7.28	1780	1960	2160	1850	2050	2270	2030	2260	2490	2290	2550	2810	2560	2840	3120	3120	3120	3300	3580	3860	3660	3940	4220	4500	4220	4500	4780	5060	5340	5620	5900	6180	6460	6740	7020	7300	7580	7860	8140
		13.20	0.330	1760	1950	2140	2020	2240	2460	2280	2530	2780	2480	2750	3020	2680	2970	3260	3260	3260	3450	3740	4030	3740	4030	4320	4610	4320	4610	4900	5190	5480	5770	6060	6350	6640	6930	7220	7510	7800	8090		
				8.38	2380	2630	2820	2740	3040	3340	3090	3430	3770	3360	3730	4100	3620	4020	4420	4420	4420	4620	4910	5200	4910	5200	5490	5780	5490	5780	6070	6360	6650	6940	7230	7520	7810	8100	8390	8680	8970	9260	
		14.80	0.380	2020	2240	2460	2340	2600	2860	2540	2820	3100	2740	3040	3340	2930	3250	3570	3570	3570	3770	4070	4370	4070	4370	4670	4970	4670	4970	5270	5570	5870	6170	6470	6770	7070	7370	7670	7970	8270			
				9.65	2740	3040	3340	3160	3530	3890	3440	3820	4200	3710	4120	4530	3970	4410	4850	4850	4850	5100	5400	5700	5400	5700	6000	6300	6000	6300	6600	6900	7200	7500	7800	8100	8400	8700	9000	9300	9600	9900	
		16.60	0.430	2160	2390	2620	2620	2810	2990	2800	3110	3420	3000	3330	3660	3260	3600	3940	3940	3940	4140	4440	4740	4440	4740	5040	5340	5040	5340	5640	5940	6240	6540	6840	7140	7440	7740	8040	8340	8640			
				10.92	2920	3240	3560	3530	3920	4310	3800	4220	4640	4060	4510	4960	4400	4860	5310	5310	5310	5510	5810	6110	5810	6110	6410	6710	6410	6710	7010	7310	7610	7910	8210	8510	8810	9110	9410	9710	10010		
4 1/2" 114.30	11.60	0.250	1570	1740	1910	1980	2170	2380	2160	2390	2620	2420	2660	2940	2660	2970	3260	3260	3260	3460	3760	4060	3760	4060	4360	4660	4360	4660	4960	5260	5560	5860	6160	6460	6760	7060	7360	7660	7960	8260			
			6.35	2110	2350	2590	2650	2940	3230	2920	3240	3560	3270	3630	3990	3680	4020	4420	4420	4420	4620	4920	5220	4920	5220	5520	5820	5520	5820	6120	6420	6720	7020	7320	7620	7920	8220	8520	8820	9120			
		12.80	0.271	1630	1810	1990	2020	2240	2460	2220	2460	2700	2480	2750	3020	2740	3040	3340	3340	3340	3540	3840	4140	3840	4140	4440	4740	4440	4740	5040	5340	5640	5940	6240	6540	6840	7140	7440	7740	8040	8340		
				6.68	2220	2450	2700	2740	3040	3340	3000	3330	3660	3360	3730	4100	3710	4120	4530	4530	4530	4730	5030	5330	5030	5330	5630	5930	5630	5930	6230	6530	6830	7130	7430	7730	8030	8330	8630	8930	9230		
		13.50	0.290	1700	1880	2060	2080	2310	2540	2280	2530	2780	2540	2820	3100	2800	3110	3420	3420	3420	3620	3920	4220	3920	4220	4520	4820	4520	4820	5120	5420	5720	6020	6320	6620	6920	7220	7520	7820	8120	8420		
				7.37	2290	2530	2810	2830	3140	3450	3090	3430	3770	3440	3820	4200	3800	4220	4640	4640	4640	4840	5140	5440	5140	5440	5740	6040	5740	6040	6340	6640	6940	7240	7540	7840	8140	8440	8740	9040	9340		
		15.10	0.337	1960	2170	2380	2280	2530	2780	2480	2750	3020	2740	3040	3340	3000	3330	3660	3660	3660	3860	4160	4460	4160	4460	4760	5060	4760	5060	5360	5660	5960	6260	6560	6860	7160	7460	7760	8060	8360			
				8.56	2650	2940	3230	3060	3430	3770	3360	3730	4100	3710	4120	4530	4060	4510	4960	4960	4960	5160	5460	5760	5460	5760	6060	6360	6060	6360	6660	6960	7260	7560	7860	8160	8460	8760	9060	9360			
		17.00	0.380	2060	2310	2540	2480	2750	3020	2740	3040	3340	3000	3330	3660	3260	3600	3940	3940	3940	4140	4440	4740	4440	4740	5040	5340	5040	5340	5640	5940	6240	6540	6840	7140	7440	7740	8040	8340	8640			
				9.65	2830	3140	3450	3380	3730	4100	3710	4120	4530	4060	4510	4960	4400	4860	5310	5310	5310	5510	5810	6110	5810	6110	6410	6710	6410	6710	7010	7310	7610	7910	8210	8510	8810	9110	9410	9710			
		18.80	0.430	2220	2460	2700	2680	2970	3260	2930	3250	3570	3330	3690	4050	3590	3960	4370	4370	4370	4570	4870	5170	4870	5170	5470	5770	5470	5770	6070	6370	6670	6970	7270	7570	7870	8170	8470	8770				
				10.92	3000	3330	3660	3620	4020	4420	3970	4410	4850	4260	4700	5140	4550	5000	5450	5450	5450	5650	5950	6250	5950	6250	6550	6850	6550	6850	7150	7450	7750	8050	8350	8650	8950	9250	9550	9850			
	21.50	0.500	2340	2600	2860	3000	3330	3660	3280	3620	3960	3650	4050	4450	4000	4400	4800	4800	4800	5000	5300	5600	5300	5600	5900	6200	5900	6200	6500	6800	7100	7400	7700	8000	8300	8600	8900	9200	9500				
			12.70	3180	3530	3880	4060	4510	4960	4400	4860	5310	5760	6210	5600	6060	6510	6510	6510	6710	7010	7310	7010	7310	7610	7910	7610	7910	8210	8510	8810	9110	9410	9710	10010	10310	10610	10910					
	23.70	0.560	2480	2750	3020	3000	3330	3660	3520	3810	4100	3810	4340	4770	4230	4700	5170	5170	5170	5370	5670	5970	5670	5970	6270	6570	6270	6570	6870	7170	7470	7770	8070	8370	8670	8970	9270	9570					
			14.22	3360	3720	4100	4060	4510	4960	4600	5000	5300	5800	6200	5600	6000	6400	6400	6400	6600	6900	7200	6900	7200	7500	7800	7500	7800	8100	8400	8700	9000	9300	9600	9900	10200	10500	10800					
5" 127.00	13.00	0.253	1310	1450	1590	1630	1810	1990	1560	1700	1840	2160	2380	2620	2420	2660	2940	2940	2940	3140	3420	3700	3420	3700	3980	4260	3980	4260	4540	4820	5100	5380	5660	5940	6220	6500	6780	7060	7340				
			6.43	1760	1950	2																																					

VAM® FJL TORQUE VALUES

Size (OD)	Nominal Weight lb/ft	Wall Thickness in/mm	55 k/si			72-80-85 k/si			90-95-100 k/si			105-110-115 k/si			120-125-130 k/si			135-140 k/si			145-150-155 k/si		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
			ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m		
6" / 127.00	20.30	0.408	2340	2600	2860	3160	3540	3890	3390	3760	4130	3590	3960	4370	3780	4200	4620	4040	4480	4920	4370	4850	5330
			3180	3530	3880	4330	4810	5290	4600	5100	5600	4900	5400	5900	5100	5700	6300	5500	6100	6700	5900	6600	7300
	20.80	0.422	2420	2680	2940	3450	3830	4210	3690	3980	4370	3710	4120	4530	3850	4270	4690	4110	4680	5010	4430	4920	5410
			3270	3630	3990	4700	5200	5700	5000	5400	5900	5200	5600	6200	5200	5800	6400	5900	6500	7000	6000	6700	7400
	21.40	0.437	2480	2750	3020	3520	3910	4300	3780	4200	4620	3910	4340	4770	4040	4480	4920	4230	4700	5170	4500	4990	5480
			3380	3730	4100	4890	5300	5800	5100	5700	6300	5300	5900	6500	5500	6100	6700	5800	6400	7000	6100	6800	7500
	23.20	0.478	N/A	N/A	N/A	N/A	N/A	N/A	3910	4300	4770	4230	4700	5170	4630	5140	5650	4760	5280	5800	4880	5420	5960
			12.14						5300	5900	6500	5900	6400	7000	6300	7000	7700	6500	7200	7900	6700	7400	8100
	24.10	0.500	N/A	N/A	N/A	3850	4050	4450	4040	4480	4920	4430	4920	5410	4780	5280	5800	4680	5420	5960	5020	5570	6120
			12.70			4920	5500	6100	5500	6100	6700	6000	6700	7400	6500	7200	7900	6700	7400	8100	6800	7600	8400
6 1/2" / 159.70	15.50	0.275	1890	2100	2310	2420	2680	2940	2740	3040	3340	3130	3470	3810	3450	3830	4210	3760	4200	4620	4040	4480	4920
			2560	2940	3120	3270	3630	3990	3710	4120	4530	4240	4710	5180	4700	5200	5700	5100	5700	6300	5500	6100	6700
	17.00	0.304	2020	2240	2480	2540	2820	3100	2870	3180	3490	3180	3540	3890	3590	3960	4370	3650	4270	4690	4170	4630	5090
			2740	3040	3340	3440	3820	4220	3680	4100	4450	4330	4810	5290	4600	5040	5500	4200	4800	5200	4600	5100	5600
	20.00	0.361	2480	2750	3020	3190	3540	3890	3680	4050	4450	4040	4480	4920	4500	4980	5480	4880	5420	5960	5340	5930	6520
			3390	3730	4100	4330	4810	5290	4900	5500	6100	5500	6100	6700	6100	6800	7500	6700	7400	8100	7200	8000	8800
	23.00	0.415	3130	3470	3810	3850	4270	4690	3970	4410	4850	4370	4850	5330	4780	5280	5800	5140	5710	6280	5540	6150	6760
			4240	4710	5180	5200	5800	6400	5400	6000	6600	5900	6600	7300	6500	7200	7900	6900	7700	8500	7500	8300	9100
	26.00	0.478	3450	3830	4210	4170	4630	5090	4430	4920	5410	4690	5210	5730	5080	5640	6200	5480	6080	6660	5980	6610	7180
			4700	5200	5700	5700	6300	6900	6000	6700	7400	6400	7100	7800	6900	7600	8400	7400	8200	9000	8000	8900	9700
28.40	0.530	3620	3910	4300	4430	4920	5410	5080	5640	6200	5280	5860	6440	5400	6000	6600	5800	6440	7080	6180	6870	7550	
		4800	5300	5800	6000	6700	7400	6200	7000	7800	7100	7900	8700	7300	8100	8900	7800	8700	9600	8400	9300	10200	
29.70	0.562	N/A	N/A	N/A	5080	5640	6200	5340	5930	6520	5670	6290	6910	5960	6610	7180	6190	6900	7550	6510	7230	7950	
		14.27			6900	7600	8400	7200	8000	8900	7900	8900	9400	7900	8900	9700	8400	9300	10200	8900	9900	10800	
32.00	0.610	4760	5280	5800	5930	6580	7230	6120	6800	7480	6510	7230	7950	7170	7960	8750	7630	8700	9750	8460	9400	10340	
		6500	7200	7900	8000	8900	9800	8300	9200	10100	8600	9600	10600	9700	10800	11900	10600	11800	13000	11400	12700	14000	
6 5/8" / 165.28	23.20	0.300	3130	3470	3810	4230	4700	5170	4680	5420	5960	5540	6150	6760	6190	6970	7550	6940	7590	8340	7470	8300	9130
			4240	4710	5180	5600	6100	6600	6000	7000	8100	7500	8300	9100	8400	9300	10200	9000	10300	11300	10200	11200	12400
	24.00	0.352	3330	3690	4050	4370	4850	5330	5020	5570	6120	5670	6290	6910	6320	7020	7720	6940	7590	8340	7470	8300	9130
			4500	5000	5500	5900	6500	7100	6800	7600	8400	7800	8600	9400	8500	9500	10500	9000	10300	11300	10200	11200	12400
	28.00	0.417	3590	3980	4370	4690	5210	5730	5340	5930	6520	5980	6650	7310	6510	7230	7950	7170	7980	8750	7830	8760	9570
			4900	5400	5900	6400	7100	7800	7200	8000	8900	8100	9000	9900	8900	9900	10900	9700	10900	11900	10900	11900	13000
	32.00	0.475	4560	5080	5560	5920	6570	7230	5870	6390	6910	6320	7020	7720	6840	7690	8340	7470	8300	9130	8160	9050	9860
			6200	6900	7600	8400	9200	10000	8600	9500	10500	9500	10500	11500	10500	11500	12500	11500	12500	13500	12500	13500	14500





VAM® FLL TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	55 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi								
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.						
In	lb/ft	In	ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m								
6 5/8" 169.28	35.00	0.525	4630	5140	5650	5340	5930	6520	5990	6650	7310	6510	7230	7950	7170	7980	8750	7830	8700	9570	7830	8700	9570	8460	9400	10340	9400	10340	11150
			13.34	6300	7000	7700	7200	8000	8800	8100	9000	9900	8900	9800	10800	9700	10800	11900	10600	11800	13000	10600	11900	13000	11400	12700	14000	11400	12700	14000
7" 177.80	23.00	0.317	3520	3910	4300	5280	5880	6440	6080	6730	7400	6640	7580	8340	7470	8300	9130	8460	9400	10340	9400	10340	11150	10450	11500	12650	11450	12650	13850
			8.05	4800	5300	5800	7100	7900	8700	8200	9100	10000	9300	10300	11300	10200	11200	12200	11100	12300	13200	12200	13200	14200	13200	14200	15200	14200	15200	16200
8 1/8" 206.38	32.00	0.453	4300	4770	5240	6060	6730	7400	6840	7590	8340	7470	8300	9130	8460	9400	10340	9400	10340	11150	10450	11500	12650	11450	12650	13850	11450	12650	13850
			11.51	5800	6500	7200	8200	9100	10000	9300	10300	11300	10200	11200	12200	11100	12300	13200	12200	13200	14200	13200	14200	15200	14200	15200	16200	15200	16200	17200
7 5/8" 193.68	26.40	0.328	4300	4770	5240	6390	7090	7790	7170	7980	8750	7830	8700	9570	8780	9700	10600	9700	10800	11900	11000	12300	13200	12300	13200	14200	13200	14200	15200
			8.33	5800	6500	7200	8600	9600	10600	10200	11300	12400	11400	12700	14000	12800	14200	15600	14200	15600	17000	15600	17000	18400	17000	18400	19800	18400	20200
8 1/8" 206.38	32.00	0.375	4500	4980	5480	6510	7230	7950	7470	8300	9130	8460	9400	10340	9400	10340	11150	10450	11500	12650	11450	12650	13850	12650	13850	15050	13850	15050	16250
			9.53	6100	6800	7500	8800	9800	10800	10200	11300	12400	11400	12700	14000	12800	14200	15600	14200	15600	17000	15600	17000	18400	17000	18400	19800	18400	20200
8 1/8" 206.38	32.00	0.430	4820	5350	5880	6840	7590	8340	7830	8700	9570	8780	9700	10600	9700	10800	11900	11000	12300	13200	12300	13200	14200	13200	14200	15200	14200	15200	16200
			10.92	6600	7300	8000	9300	10300	11300	10600	11800	13000	11800	13200	14500	13200	14700	16200	14700	16200	17600	16200	17600	19000	17600	19000	20400	19000	20400
8 1/8" 206.38	35.00	0.485	5020	5570	6120	7170	7980	8750	8150	9050	9950	9150	10150	11150	10100	11200	12300	11200	12300	13200	12300	13200	14200	13200	14200	15200	14200	15200	16200
			11.81	6800	7600	8400	9700	10800	11900	11100	12300	13500	12300	13700	15100	13700	15200	16700	15200	16700	18200	16700	18200	19700	18200	19700	21200	19700	21200
8 1/8" 206.38	39.00	0.500	5340	5930	6520	7470	8300	9130	8460	9400	10340	9600	10500	11500	10450	11500	12650	11500	12650	13850	12650	13850	15050	13850	15050	16250	15050	16250	17450
			12.70	7200	8000	8800	10200	11300	12400	11400	12700	14000	12800	14200	15600	14100	15700	17300	15700	17300	18900	17300	18900	20500	18900	20500	22100	20500	22100
8 1/8" 206.38	42.80	0.562	6250	6940	7630	7830	8700	9670	8780	9750	10720	9850	10850	11850	10850	11850	13050	11850	13050	14300	13050	14300	15600	14300	15600	17000	15600	17000	18400
			14.27	8500	9400	10300	10600	11800	13000	11100	12300	13500	14500	13200	14600	16000	14600	16200	17800	16200	17800	19400	17800	19400	21000	19400	21000	22600	21000	22600
8 1/8" 206.38	45.30	0.595	7170	7980	8750	7830	8700	9570	9150	10150	11150	10100	11200	12300	11450	12650	13850	12650	13850	15050	13850	15050	16250	15050	16250	17450	16250	17450	18650
			15.11	9700	10800	11900	10600	11800	13000	12300	13500	14700	13700	15100	16500	15200	16700	18200	16700	18200	20000	18200	20000	21800	20000	21800	23600	21800	23600
8 1/8" 206.38	47.10	0.625	7830	8700	9570	9600	10500	11500	11000	12300	13300	12450	13750	15050	13700	15050	16400	15050	16400	17800	16400	17800	19200	17800	19200	20600	19200	20600	22000
			15.88	10600	11800	13000	12800	14200	15600	14200	15600	17000	18400	16700	18600	20500	18600	20500	22400	20500	22400	24300	22400	24300	26200	24300	26200	28100	26200	28100
8 1/8" 206.38	32.00	0.375	5040	5600	6160	6840	7600	8360	7830	8700	9570	8620	9600	10780	9650	10850	12050	9650	10850	12050	10850	12050	13250	10850	12050	13250	10850	12050	13250
			9.53	6800	7600	8400	9300	10300	11300	10600	11800	13000	12000	13300	14600	13300	14600	16000	14600	16000	17400	16000	17400	18800	17400	18800	20200	18800	20200	21600

VAM® FJL TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	55 ksa			72-80-85 ksa			90-95-100 ksa			105-110-115 ksa			120-125-130 ksa			135-140 ksa			145-150-155 ksa		
			in	lb/ft	ft.lb	min.	opti.	max.	min.	opti.	max.	min.	opti.	max.	min.	opti.	max.	min.	opti.	max.	min.	opti.	max.
8 5/8" 219.08	32.00	0.352	5490	6080	6680	8150	9050	9650	9600	10500	11650	10850	11850	13050	12100	13400	14700	13050	14450	15850	14400	15900	17400
			8.94	7400	8200	9000	11100	12300	13500	12800	14200	15600	14600	16200	17800	16300	18100	19900	17800	19600	21600	19400	21600	23800
8 3/8" 206.13	36.00	0.400	5740	6370	7000	8460	9400	10340	9850	10850	11850	11100	12300	13500	12450	13750	15050	12450	13750	15050	14400	15900	17400
			10.16	7700	8600	9500	11400	12700	14000	13200	14700	16200	15000	16700	18400	16700	18600	20300	16700	18600	20300	19400	21600	23800
8 1/2" 219.08	40.00	0.450	5990	6650	7310	8780	9750	10720	10100	11200	12300	11100	12300	13500	12450	13750	15050	12450	13750	15050	14400	15900	17400
			11.43	8100	9000	9800	11900	13200	14500	13700	15200	16700	15000	16700	18400	16700	18600	20300	16700	18600	20300	19400	21600	23800
8 3/8" 206.13	44.00	0.500	6390	7090	7790	9150	10150	11150	10450	11550	12650	11700	13000	14300	13050	14450	15850	13700	15200	16700	14400	15900	17400
			12.70	8600	9500	10400	12500	13700	15100	14100	15700	17300	15900	17700	19500	17600	19600	21600	17600	19600	21600	19400	21600	23800
8 1/2" 219.08	48.00	0.557	6840	7580	8340	9850	10850	11850	10850	11950	13050	12100	13400	14700	13050	14450	15850	12700	14100	15500	14400	15900	17400
			14.15	9300	10300	11300	13200	14700	16200	14600	16200	17800	16300	18100	19900	17800	19600	21600	17800	19600	21600	19400	21600	23800
8 3/8" 206.13	52.00	0.595	7170	7980	8750	10100	11200	12200	11450	12650	13850	12700	14100	15500	13700	15200	16700	14400	15900	17400	14400	15900	17400
			15.11	9700	10800	11900	13700	15200	16700	15500	17200	19100	21000	18500	20600	22700	19400	21600	23800	19400	21600	23800	19400	21600	23800
8 1/2" 219.08	56.00	0.632	7470	8280	9090	10450	11550	12550	10450	11550	12650	12100	13400	14700	13400	14850	16300	14400	15900	17400	14400	15900	17400
			16.17	9300	10300	11300	13200	14700	16200	14100	15700	17300	15900	17700	19500	18100	20100	22100	18100	20100	22100	19900	22100	24300
8 3/8" 206.13	60.00	0.670	7770	8600	9430	10850	11950	13050	11700	13000	14300	13700	15200	16700	14400	15900	17400	14400	15900	17400	14400	15900	17400
			17.26	9700	10700	11700	13600	15100	16600	14500	16200	17800	16500	18300	20000	18500	20600	22700	18500	20600	22700	19400	21600	23800
8 1/2" 219.08	64.00	0.708	8170	9030	9890	11350	12500	13650	12700	14100	15500	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400
			18.35	10100	11100	12100	14000	15500	17000	15900	17700	19500	17600	19600	21600	23800	21600	23800	21600	23800	21600	19400	21600	23800
8 3/8" 206.13	68.00	0.746	8570	9470	10370	11850	13050	14250	13700	15050	16300	15000	16700	18400	14400	15900	17400	14400	15900	17400	14400	15900	17400
			19.43	10500	11500	12500	14400	15900	17400	16300	18100	19900	17200	19100	21000	19400	21600	23800	19400	21600	23800	19400	21600	23800
8 1/2" 219.08	72.00	0.784	8970	9900	10830	12350	13600	14850	14300	15750	17100	16500	18000	19500	14400	15900	17400	14400	15900	17400	14400	15900	17400
			20.51	10900	11900	12900	14800	16300	17800	16700	18600	20300	18500	20600	22700	19400	21600	23800	19400	21600	23800	19400	21600	23800
8 3/8" 206.13	76.00	0.822	9370	10330	11290	12850	14150	15450	14900	16450	17800	17200	18750	20200	14400	15900	17400	14400	15900	17400	14400	15900	17400
			21.59	11300	12300	13300	15200	16700	18200	17100	19000	20700	18900	20900	22900	19400	21600	23800	19400	21600	23800	19400	21600	23800
8 1/2" 219.08	80.00	0.860	9770	10770	11770	13350	14700	16050	15400	17050	18400	17800	19450	20900	14400	15900	17400	14400	15900	17400	14400	15900	17400
			22.67	11700	12700	13700	15600	17100	18600	17500	19400	21100	19600	21500	23400	19400	21600	23800	19400	21600	23800	19400	21600	23800
8 3/8" 206.13	84.00	0.898	10170	11190	12210	13800	15200	16550	15900	17650	19000	18400	19150	20700	14400	15900	17400	14400	15900	17400	14400	15900	17400
			23.75	12100	13100	14100	16000	17500	19000	17900	19800	21500	20000	21900	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800
8 1/2" 219.08	88.00	0.936	10570	11610	12650	14250	15700	17050	16400	18250	19600	19000	20850	22200	14400	15900	17400	14400	15900	17400	14400	15900	17400
			24.83	12500	13500	14500	16400	17900	19400	18300	20200	21900	20400	22300	24200	19400	21600	23800	19400	21600	23800	19400	21600	23800
8 3/8" 206.13	92.00	0.974	10970	12030	13090	14700	16200	17550	16900	18850	20200	19600	21450	22800	14400	15900	17400	14400	15900	17400	14400	15900	17400
			25.91	12900	13900	14900	16800	18300	19800	18700	20600	22300	20800	22700	24600	19400	21600	23800	19400	21600	23800	19400	21600	23800
8 1/2" 219.08	96.00	1.012	11370	12450	13530	15150	16600	17950	17300	19350	20700	20100	21950	23400	14400	15900	17400	14400	15900	17400	14400	15900	17400
			26.99	13300	14300	15300	17200	18700	20200	19100	21000	22900	21400	23300	25200	19400	21600	23800	19400	21600	23800	19400	21600	23800
8 3/8" 206.13	100.00	1.050	11770	12870	13970	15600	17100	18450	17800	19950	21300	20700	22550	24000	14400	15900	17400	14400	15900	17400	14400	15900	17400
			28.07	13700	14700	15700	17600	19100	20600	19500	21400	23300	21800	23700	25600	19400	21600	23800	19400	21600	23800	19400	21600	23800
8 1/2" 219.08	104.00	1.088	12170	13290	14410	16050	17500	18850	18200	20450	21800	21200	23050	24500	14400	15900	17400	14400	15900	17400	14400	15900	17400
			29.15	14100	15100	16100	18000	19500	21000	20000	21900	23800	22300	24200	26100	19400	21600	23800	19400	21600	23800	19400	21600	23800
8 3/8" 206.13	108.00	1.126	12570	13710	14850	16500	18000	19350	18700	21050	22400	21800	23650	25100	14400	15900	17400	14400	15900	17400	14400	15900	17400
			30.23	14500	15500	16500	18400	19900	21400	20400	22300	24200	22700	24600	26500	19400	21600	23800	19400	21600	23800	19400	21600	23800
8 1/2" 219.08	112.00	1.164	12970	14130	15290	16950	18400	19750	19100	21450	22800	22200	24050	25500	14400	15900	17400	14400	15900	17400	14400	15900	17400
			31.31	14900	15900	16900	18800	20300	21800	20800	22700	24600	23100	25000	26900	19400	21600	23800	19400	21600	23800	19400	21600	23800
8 3/8" 206.13	116.00	1.202	13370	14550	15730	17400	18900	20250	20600	23050	24400	23800	25650	27100	14400	15900	17400	14400	15900	17400	14400	15900	17400
			32.39	15300	16300	17300	19200	20700	22200	21200	23100	25000	23500	25400	27300	19400	21600	23800	19400	21600	23800	19400	21600	23800
8 1/2" 219.08	120.00	1.240	13770	14970	16170	17850	19300	20650	21000	23450	24800												



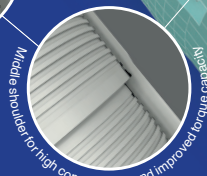
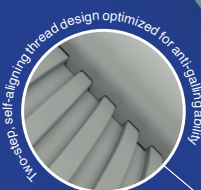
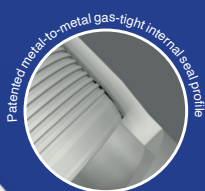
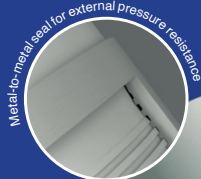
VAM® FUL TORQUE VALUES

Size (OD)	Wall Thickness	55 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi					
		min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.			
In	In	ft.lb						ft.lb						ft.lb						ft.lb					
mm	mm	N/m						N/m						N/m						N/m					
9 7/8" 250.83	0.650	10450	11550	12850	13700	15200	16700	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400			
		16.51	14100	15700	17300	18500	20600	22700	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800		
		0.661	10450	11550	12850	13700	15200	16700	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400		
67.50	0.678	10850	11950	13050	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400			
		16.79	14100	15700	17300	18500	20600	22700	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800		
		17.22	10850	11950	13050	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400		
10 3/4" 273.05	0.350	8480	9400	10340	13050	14450	15850	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400			
		8.89	11400	12700	14000	17600	19600	21600	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800		
		0.400	8780	9750	10720	13050	14450	15850	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400		
51.00	0.450	9150	10150	11150	13050	14450	15850	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400			
		11.43	12300	13700	15100	17600	19600	21600	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800		
		0.495	9500	10500	11500	13700	15200	16700	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400		
60.70	0.545	9850	10850	11850	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400			
		13.84	13200	14700	16200	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800		
		0.595	10450	11550	12650	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400		
11 3/4" 298.45	0.375	10100	11200	12300	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400			
		9.53	13700	15200	16700	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800		
		0.435	10450	11550	12650	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400		
60.00	0.489	11100	12300	13500	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400			
		12.42	15000	16700	18400	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800		
		0.534	11450	12650	13850	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400		
11 7/8" 301.63	0.562	11700	13000	14300	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400	14400	15900	17400			
		14.78	15900	17700	19500	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800	19400	21600	23800		

VAM® SLIJ-3

BEST-IN-CLASS PERFORMANCE FOR DEEP OFFSHORE

VAM® SLIJ-3 is the latest generation of VAM® semi-flush premium connections, introducing higher torque and compression capacity for an overall superior performance in ultra-deep offshore environments.



**HIGH
PERFORMANCE**



ROBUST RUNNING



**OPTIMIZES
WELL DESIGN**

SUCCESS IN THE GULF OF MEXICO

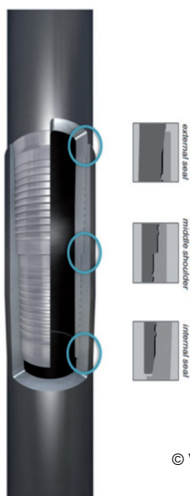
More than 2,000 joints of 7 5/8" VAM® SLIJ-3 were successfully installed for an offshore project of a major operator in the Gulf of Mexico. VAM® SLIJ-3 was praised for its consistent torque-turn graphs and its robust running, making it our highest performance semi-flush casing connection to date.

TO LEARN MORE, SCAN THE QR CODE



3.11 VAM® SLIJ-II

Application



© Vallourec Oil and Gas France

VAM® SLIJ-II is the semi-flush premium connection for Conventional applications as well as extreme environments such as HPHT (high pressure - high temperature).

Machined on plain-end non-upset pipe, its slim OD is below 3% above pipe body, making it ideal for tight clearance wells. VAM® SLIJ-II combines maximum external and internal pressure resistance with increased compression.

Looking ahead on the outcoming testing industry standards, the VAM® SLIJ-II product line has been tested and validated as per API RP 5C5:2017 CAL II which includes the gas sealability having load points with bending, internal pressure, external pressure at ambient and high temperature (180° C).

Applicable Range

- Available in sizes from 4-1/2" to 16"
- Yield strengths from 80 ksi to 140 ksi
- Standard, alternative and special drifts
- Carbon, Sour Service, High Collapse and Martensitic stainless steel (13%Cr, Super 13%Cr and beyond)

Applications

- Production and intermediate casing.
- Production tie-back.
- Production and Drilling liner.
- Contingency string.

Beyond the VAM® SLIJ-II standard design, there are several derivative designs (VAM® SLIJ-II-KT, VAM® SLIJ-II-KA, VAM® SLIJ-II-ND, VAM® SLIJ-II-NA).

These derivatives designs are usually meant to provide superior M&B or sealability performance (such as latest API RP 5C5 testing protocol) and/or compliance with special drifts usually required and/or odd sizes with optimized design rules.

Note that VAM® SLIJ-II-ND in 9-7/8" 66.9# has been already standardized, instead of the VAM® SLIJ-II design.

Performances

- Internal and external pressure resistance up to pipe body ratings
- Tension rating up to 80% of pipe body yield strength.
- Compression rating equal to 100% of the joint strength (structural)
- Excellent jump-out resistance with 10 degree hooked load flank.
- Sealability validated to API 5C5:2017 and field proven in extreme deepwater wells.

Benefits

- Field-Proven & Easy running: demonstrated, with more than 1,000,000 joints run in 20 years;
- High clearance integral design, reference for HT-HP projects;

- Dual gas tight sealing system to isolate internal and external pressure;
- Reliable connection for production and intermediate casing, drilling liners and tie-backs.

Thread Compound

Special care should be taken not to over dope the connection. A thin, even layer of thread compound has to be applied using a moustache brush, either equally distributed between pin and box (general case) or on pin only (optional field practice). In any case, there should not be any excess of thread compound: the thread profile should be clearly visible; no heavy patch of compound should be present adjacent to the shoulder.

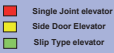
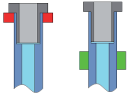
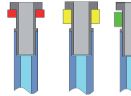
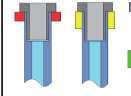
For the recommended running compounds please refer to Recommended running compounds for VAM® SLIJ-II can be found on the Vallourec Website (http://www.vallourec.com/OCTG/EN/E-Library/general_information/Pages/default.aspx).

In case another running compound is intended to be used, please contact VAM® Technical Support Team to obtain an analysis of your specific case prior to applying or running the pipes.

Running

As VAM® SLIJ-II is an integral connection, it requires a special lifting equipment to be handled based on the design. Therefore Non specific VAM® SLIJ-II lifting equipment shall not be used.

The lifting equipment has to be set in the box of the joint to simulate a coupling face.

	HANDLING PLUG	LIFTING SUB	LIFTING PLUG
Lifting Tool capacity	3 pipes max	As per tool strength	As per tool strength
Max weight of the lifting tool	Max 25 kg	Depends on pipe OD (can be higher than 50 kg)	Depends on pipe OD (can be higher than 50 kg)
Elevator type			
Single Joint elevator	✓	✓	✓ (special ID)
Side Door elevator	✗	✓	✓ (special ID)
Slip Type elevator	✓ (on pipe OD)	✓ (on tool)	✓ (on pipe OD)
 <ul style="list-style-type: none"> Single Joint elevator Side Door Elevator Slip Type elevator 			

In the case of Single Joint elevator and Side Door elevator, a "fit-test" is recommended to control the matching between ID of the equipment and box OD of VAM® SLIJ-II prior to running.

For more information on any subject, please contact the VAM® Technical Support Team through [Mr. Help](#) at www.vamservices.com

NB: Humping phenomenon (small bump on the curve before shouldering point) has been observed in a few instances on 14" VAM® SLIJ-II. It has been validated by R&D tests that there is no impact on performance up to 5% (as a % of the optimum torque) of humping value above the shouldering point. Therefore, and for 14" VAM® SLIJ-II only, an acceptance criteria up to 5% humping above shoulder can be used. If you need assistance to carry out operations, please contact your local VAM® Field Service Centre.



VAM® SLH-II TECHNICAL DATA

Size (OD)	Isolated design (if any)	Nominal Weight	Wall Thickness		Inside Diameter	Drift Diameter	Pipe body section	Box OD	Pin ID	Make up Loss		Joint Efficiency %	Joint Yield Strength (1000 lb)			
			in	mm						in	in		L80 N80	R95 T95	C110 P110	O125
4 1/2" <i>114.30</i>		15.10	0.337	8.56	3.701	4.407	4.646	3.765	4.470	4.470	70.9	250	297	344	390	
		17.00	0.380	9.65	3.740	4.918	4.646	3.679	4.473	4.473	73.7	290	345	399	453	
		18.90	0.430	10.92	3.640	3.515	5.498	4.654	3.579	5.243	74.2	326	388	449	510	
		21.50	0.500	12.70	3.500	3.375	6.283	4.661	3.439	5.728	75.6	380	451	522	594	
		18.00	0.362	9.19	4.276	4.151	5.275	5.098	4.216	4.557	71.6	302	359	416	472	
6" <i>127.00</i>		20.30	0.408	10.36	4.184	4.059	5.886	5.136	4.124	4.810	75.1	354	420	486	552	
		20.80	0.422	10.72	4.156	4.031	6.069	5.146	4.096	4.857	76.1	370	439	508	577	
		21.40	0.437	11.10	4.126	4.001	6.264	5.158	4.066	5.050	77.1	387	459	532	604	
		23.20	0.478	12.14	4.044	3.919	6.791	5.190	3.984	5.155	77.2	419	498	577	655	
		24.10	0.500	12.70	4.000	3.875	7.069	5.193	3.940	5.213	77.4	437	520	602	684	
5 1/2" <i>139.70</i>		26.70	0.562	14.27	3.876	3.751	7.836	5.203	3.816	5.505	77.6	486	578	669	760	
		29.20	0.625	15.88	3.750	3.625	8.590	5.214	3.690	5.813	77.8	535	635	735	836	
		20.00	0.361	9.17	4.778	4.653	5.828	5.594	4.719	4.539	70.8	330	392	454	516	
		23.00	0.415	10.54	4.670	4.545	6.630	5.635	4.611	4.861	74.8	397	471	545	620	
		23.80	0.437	11.10	4.626	4.501	6.951	5.653	4.567	5.076	76.3	424	504	583	663	
6 5/8" <i>168.28</i>		26.00	0.476	12.09	4.548	4.423	7.513	5.678	4.489	5.346	77.6	467	554	642	729	
		26.80	0.500	12.70	4.500	4.375	7.854	5.706	4.441	5.420	78.1	491	583	675	767	
		28.40	0.530	13.46	4.440	4.315	8.275	5.719	4.381	5.495	78.6	520	618	716	813	
		29.70	0.562	14.27	4.376	4.251	8.718	5.733	4.317	5.579	79.2	552	656	760	863	
		32.00	0.612	15.54	4.276	4.151	9.398	5.742	4.217	5.854	79.3	596	708	820	931	
6 7/8" <i>174.63</i>		32.60	0.625	15.88	4.250	4.125	9.572	5.748	4.191	5.886	79.6	610	724	838	953	
		28.00	0.417	10.59	5.791	5.666	8.133	6.751	5.735	5.061	73.4	478	567	657	746	
		32.00	0.475	12.07	5.675	5.550	9.177	6.785	5.619	5.422	77.0	565	671	777	883	
		33.00	0.500	12.70	5.625	5.500	9.621	6.822	5.569	5.480	76.9	592	703	814	925	
		34.50	0.525	13.34	5.450	5.450	10.061	6.841	5.519	5.557	78.1	629	746	864	982	
6 7/8" <i>174.63</i>		36.70	0.562	14.27	5.501	5.376	10.705	6.869	5.444	5.823	79.5	681	809	937	1 065	
		40.20	0.625	15.88	5.375	5.250	11.781	6.920	5.319	6.107	80.3	757	899	1 041	1 183	
		43.70	0.687	17.45	5.251	5.126	12.816	6.948	5.194	6.455	81.2	833	989	1 145	1 301	
		32.70	0.478	12.14	5.919	5.794	9.606	7.061	5.864	5.250	75.5	580	689	798	907	

VAM® SLLHJ TECHNICAL DATA

Size (OD)	Isolated design (if any)	Nominal Weight		Collapse Pressures (psi)					Minimum Internal Yield Pressure (psi)				
		lb/ft	any	80 ksi	95 ksi	110 ksi	125 ksi	125 ksi	80 ksi	95 ksi	110 ksi	125 ksi	
4 1/2" <i>114.30</i>		15.10		11 080	12 760	14 340	15 830	10 480	12 450	14 420	16 380		
		17.00		12 370	14 690	17 010	19 330	11 820	14 040	16 260	18 470		
		18.90		13 830	16 420	19 010	21 610	13 380	15 890	18 390	20 900		
		21.50		15 800	18 770	21 730	24 690	15 560	18 470	21 390	24 310		
		18.00		10 500	12 030	13 470	14 820	10 140	12 040	13 940	15 840		
5" <i>127.00</i>		20.30		11 990	14 240	16 490	18 550	11 420	13 570	15 710	17 850		
		20.80		12 360	14 680	17 000	19 320	11 820	14 030	16 250	18 460		
		21.40		12 760	15 150	17 550	19 940	12 240	14 530	16 820	19 120		
		23.20		13 830	16 430	19 020	21 620	13 380	15 890	18 400	20 910		
		24.10		14 400	17 100	19 800	22 500	14 000	16 630	19 250	21 880		
5 1/2" <i>139.70</i>		26.70		15 960	18 960	21 950	24 940	15 740	18 690	21 640	24 590		
		29.20		17 500	20 780	24 060	27 340	17 500	20 780	24 060	27 340		
		20.00		8 830	10 020	11 110	12 090	9 190	10 910	12 640	14 360		
		23.00		11 160	12 930	14 540	16 060	10 560	12 540	14 530	16 510		
		23.80		11 700	13 900	15 940	17 680	11 120	13 210	15 300	17 380		
6 5/8" <i>168.28</i>		26.80		12 650	15 020	17 390	19 760	12 120	14 390	16 660	18 930		
		26.80		13 220	15 700	18 180	20 660	12 730	15 110	17 500	19 890		
		28.40		13 930	16 540	19 160	21 770	13 490	16 020	18 550	21 080		
		29.70		14 680	17 430	20 180	22 940	14 310	16 990	19 670	22 350		
		32.00		15 820	18 790	21 760	24 720	15 580	18 500	21 420	24 340		
6 7/8" <i>174.63</i>		32.60		16 120	19 140	22 160	25 180	15 910	18 890	21 880	24 860		
		28.00		8 170	9 220	10 160	11 000	8 810	10 460	12 120	13 770		
		32.00		10 320	11 820	13 230	14 540	10 040	11 920	13 800	15 680		
		33.00		11 160	12 940	14 550	16 070	10 570	12 550	14 530	16 510		
		34.50		11 670	13 860	15 870	17 600	11 090	13 170	15 250	17 330		
	36.70		12 420	14 750	17 080	19 410	11 880	14 100	16 330	18 560			
	40.20		13 670	16 230	18 800	21 360	13 210	15 680	18 160	20 640			
	43.70		14 870	17 660	20 450	23 240	14 520	17 240	19 960	22 680			
	32.70		9 790	11 170	12 470	13 660	9 730	11 560	13 380	15 210			

VAM® SLLH-I TECHNICAL DATA

Size (OD)	Isolated design (if any)	Nominal Weight	Wall Thickness		Inside Diameter	Drift Diameter	Pipe body section	Box OD	Pin ID	Make up Loss	Joint Efficiency %	Joint Yield Strength (1000 lb)			
			in	mm								L80 N80	R95 T95	C110 P110	Q125
7" <i>177.80</i>		26.00	0.362	9.19	6.276	6.151	7.549	7.084	6.220	4.580	68.9	416	494	572	650
		29.00	0.408	10.36	6.184	6.059	8.449	7.119	6.128	5.050	72.6	491	583	675	767
		32.00	0.463	11.51	6.094	6.000 A	9.317	7.162	6.053	5.176	74.2	553	657	761	864
		35.00	0.498	12.65	6.004	5.879	10.177	7.198	5.948	5.473	76.8	625	742	860	977
		38.00	0.540	13.72	5.920	5.795	10.962	7.231	5.864	5.776	79.0	692	822	962	1 082
		41.00	0.590	14.99	5.820	5.695	11.881	7.264	5.764	5.917	80.0	761	903	1 046	1 188
		42.70	0.625	15.88	5.750	5.625	12.517	7.299	5.694	6.128	80.6	807	968	1 110	1 261
		44.00	0.640	16.26	5.720	5.595	12.788	7.309	5.684	6.157	80.8	827	982	1 137	1 292
		45.40	0.670	17.02	5.660	5.535	13.324	7.318	5.604	6.428	81.0	863	1 025	1 187	1 348
		46.40	0.687	17.45	5.626	5.501	13.625	7.323	5.570	6.472	80.9	882	1 048	1 213	1 378
		49.50	0.730	18.54	5.540	5.415	14.379	7.333	5.484	6.562	80.9	931	1 106	1 280	1 455
7 5/8" <i>193.68</i>		29.70	0.375	9.53	6.875	6.750	8.541	7.711	6.820	4.822	69.2	473	562	650	739
		33.70	0.430	10.92	6.765	6.640	9.720	7.754	6.711	5.169	73.2	569	676	783	890
		39.00	0.500	12.70	6.625	6.500	11.192	7.818	6.570	5.525	76.2	682	810	938	1 065
		42.80	0.562	14.27	6.501	6.376	12.470	7.866	6.446	5.887	79.0	789	936	1 064	1 232
		45.30	0.595	15.11	6.435	6.310	13.141	7.889	6.380	6.157	80.1	842	1 000	1 158	1 316
		47.10	0.625	15.88	6.375	6.250	13.744	7.920	6.320	6.168	80.1	881	1 046	1 211	1 376
		51.20	0.687	17.45	6.251	6.126	14.974	7.962	6.196	6.539	81.4	975	1 158	1 341	1 524
		52.10	0.700	17.78	6.225	6.100	15.229	7.967	6.170	6.770	81.6	994	1 180	1 366	1 553
		52.80	0.712	18.08	6.201	6.076	15.463	7.976	6.146	6.802	82.0	1 014	1 204	1 394	1 584
		55.30	0.750	19.05	6.125	6.000	16.199	7.989	6.070	6.899	82.4	1 068	1 268	1 468	1 668
		59.20	0.812	20.62	6.001	5.876	17.380	7.991	5.946	7.214	81.3	1 130	1 342	1 554	1 766
7 3/4" <i>196.85</i>		46.10	0.595	15.11	6.560	6.500 S	13.374	8.019	6.555	6.128	78.8	843	1 001	1 159	1 317
		46.90	0.615	15.62	6.520	6.395	13.785	8.036	6.465	6.154	79.5	877	1 041	1 206	1 370
		47.60	0.625	15.88	6.500	6.375	13.990	8.045	6.446	6.167	80.0	895	1 063	1 231	1 398
		48.60	0.640	16.26	6.470	6.345	14.296	8.056	6.415	6.413	80.5	921	1 094	1 266	1 439
8 5/8" <i>219.08</i>		36.00	0.400	10.16	7.825	7.700	10.336	8.721	7.772	5.083	72.0	579	687	796	904
		40.00	0.450	11.43	7.725	7.600	11.557	8.767	7.681	5.424	71.1	667	792	917	1 042
		44.00	0.500	12.70	7.625	7.500	12.763	8.809	7.572	5.535	75.0	766	910	1 053	1 197
	49.00	0.557	14.15	7.511	7.386	14.118	8.855	7.457	5.880	77.8	879	1 044	1 209	1 374	

VAM® SLH-J TECHNICAL DATA

Size (OD)	Isolated design (if any)	Nominal Weight lb/ft	Collapse Pressures (psi)				Minimum Internal Yield Pressure (psi)			
			80 ksi	95 ksi	110 ksi	125 ksi	80 ksi	95 ksi	110 ksi	125 ksi
7" <i>177.80</i>		26.00	5 410	5 890	6 230	6 450	7 240	8 600	9 960	11 310
		29.00	7 030	7 840	8 530	9 110	8 160	9 690	11 220	12 750
		32.00	8 610	9 740	10 780	11 710	9 060	10 760	12 460	14 160
		35.00	10 190	11 650	13 030	14 320	9 960	11 830	13 700	15 560
		38.00	11 390	13 430	15 130	16 740	10 800	12 830	14 850	16 880
		41.00	12 350	14 660	16 980	19 300	11 800	14 010	16 230	18 440
		42.70	13 010	15 450	17 890	20 330	12 500	14 840	17 190	19 530
		44.00	13 290	15 780	18 280	20 770	12 800	15 200	17 600	20 000
		45.40	13 850	16 450	19 040	21 640	13 400	15 910	18 430	20 940
		46.40	14 160	16 820	19 470	22 130	13 740	16 320	18 890	21 470
7 5/8" <i>192.68</i>		49.50	14 950	17 750	20 550	23 350	14 600	17 340	20 080	22 810
		29.70	4 790	5 130	5 350	5 670	6 890	8 180	9 470	10 760
		33.70	6 560	7 270	7 870	8 340	7 900	9 380	10 860	12 340
		39.00	8 820	10 000	11 060	12 060	9 180	10 900	12 620	14 340
		42.80	10 820	12 410	13 930	15 350	10 320	12 250	14 190	16 120
		45.30	11 510	13 670	15 440	17 110	10 920	12 970	15 020	17 070
		47.10	12 040	14 300	16 550	18 700	11 480	13 630	15 780	17 930
		51.20	13 120	15 580	18 040	20 500	12 610	14 980	17 340	19 710
		52.10	13 340	15 840	18 340	20 840	12 850	15 260	17 670	20 080
		52.80	13 550	16 080	18 620	21 160	13 070	15 520	17 980	20 430
7 3/4" <i>196.85</i>		55.30	14 190	16 850	19 510	22 170	13 770	16 350	18 930	21 520
		59.20	15 220	18 080	20 930	23 790	14 910	17 700	20 500	23 300
		46.10	11 340	13 320	15 000	16 600	10 750	12 760	14 780	16 790
		46.90	11 690	13 880	15 910	17 640	11 110	13 190	15 280	17 360
		47.60	11 860	14 090	16 310	18 160	11 290	13 410	15 520	17 640
		48.60	12 120	14 390	16 670	18 940	11 560	13 730	15 900	18 060
		36.00	4 100	4 360	4 690	4 930	6 490	7 710	8 930	10 140
		40.00	5 530	6 020	6 400	6 640	7 300	8 670	10 040	11 410
		44.00	6 950	7 740	8 420	8 980	8 120	9 640	11 160	12 680
		49.00	8 570	9 700	10 740	11 660	9 040	10 740	12 430	14 130

VAM® SLH-II TECHNICAL DATA

Size (OD)	Isolated design (if any)	Nominal Weight	Wall Thickness		Inside Diameter	Drift Diameter	Pipe body section	Box OD	Pin ID	Make-up Loss	Joint Efficiency %	Joint Yield Strength (1000 lb)			
			in	mm								L80 N80	R95 T95	C110 P110	Q125
8 5/8" <i>219.08</i>		49.10	0.562	14.27	7.501	7.376	8.557	8.857	7.448	5.909	78.0	888	1055	1221	1388
		52.00	0.595	15.11	7.435	7.310	15.010	8.880	7.381	6.176	78.6	944	1121	1298	1475
		54.00	0.625	15.88	7.375	7.250	15.708	8.913	7.322	6.383	78.9	992	1178	1364	1550
		58.70	0.687	17.45	7.251	7.126	17.132	8.955	7.198	6.545	80.6	1105	1312	1519	1727
9 5/8" <i>244.48</i>		63.50	0.750	19.05	7.125	7.000	18.555	8.982	7.072	6.916	81.2	1205	1431	1657	1883
		43.50	0.435	11.05	8.755	8.599	12.559	9.748	8.673	5.180	69.4	697	828	959	1090
		47.00	0.472	11.99	8.681	8.525	13.572	9.777	8.599	5.488	71.9	781	927	1073	1220
		53.50	0.545	13.84	8.535	8.500 A	15.546	9.855	8.558	6.039	74.6	927	1101	1275	1449
9 3/4"		58.40	0.595	15.11	8.435	8.375 A	16.879	9.882	8.433	6.135	76.8	1037	1231	1426	1620
		59.40	0.609	15.47	8.407	8.251	17.250	9.894	8.325	6.378	77.4	1068	1268	1469	1669
		61.10	0.625	15.88	8.375	8.219	17.671	9.905	8.293	6.423	77.8	1100	1307	1513	1719
		64.90	0.672	17.07	8.281	8.125	18.901	9.941	8.199	6.554	79.3	1198	1423	1648	1873
10"		70.30	0.734	18.64	8.157	8.001	20.502	9.977	8.075	6.916	80.4	1319	1567	1814	2061
		71.80	0.750	19.05	8.125	7.969	20.911	9.985	8.043	7.174	81.0	1354	1608	1861	2115
		75.60	0.797	20.24	8.031	7.875	22.104	10.013	7.949	7.315	81.8	1447	1718	1989	2260
		80.80	0.859	21.82	7.907	7.751	23.656	9.961	7.825	7.613	80.0	1514	1798	2081	2365
9 3/4" <i>247.65</i>		59.20	0.595	15.11	8.560	8.404	17.113	10.006	8.559	6.134	76.6	1049	1245	1442	1639
9 7/8" <i>250.83</i>		62.80	0.625	15.88	8.625	8.500 S	18.162	10.151	8.559	6.421	77.6	1128	1339	1551	1762
		65.30	0.650	16.51	8.575	8.42	18.838	10.174	8.559	6.509	78.6	1185	1407	1630	1852
9.934" <i>252.34</i>		67.50	0.678	17.22	8.519	8.363	19.590	10.181	8.559	6.517	76.3	1196	1420	1644	1868
		68.90	0.700	17.78	8.475	8.500 S	20.177	10.207	8.393	6.861	79.5	1284	1524	1765	2006
10.175" <i>258.45</i>	-ND	66.90	0.668	16.97	8.539	8.500 S	19.445	10.174	8.565	6.793	70.0	1089	1293	1497	1701
10" <i>254.00</i>		67.20	0.672	17.07	8.556	8.500 S	19.693	10.312	8.574	6.568	79.3	1249	1483	1717	1951
		68.70	0.688	17.48	8.624	8.500 S	20.127	10.325	8.559	6.821	79.9	1286	1527	1768	2009
10.175" <i>258.45</i>		81.00	0.800	20.32	8.575	8.500 S	23.562	10.572	8.561	7.617	81.7	1541	1830	2118	2407

* This odd diameter comes from Special drift requirement that drives for uncommon OD keeping API 5CT dimensional tolerances

S Special Drift (in Drift column)

VAM® SLII-II TECHNICAL DATA

Size (OD)	Isolated design (if any)	Nominal Weight	Collapse Pressures (psi)				Minimum Internal Yield Pressure (psi)			
			80 ksi	95 ksi	110 ksi	125 ksi	80 ksi	95 ksi	110 ksi	125 ksi
in mm	any)	lb/ft								
8 5/8" <i>219.08</i>		49.10	8 720	9 880	10 940	11 890	9 120	10 830	12 540	14 250
		52.00	9 660	11 010	12 280	13 440	9 660	11 470	13 280	15 090
		54.00	10 510	12 040	13 490	14 850	10 140	12 050	13 950	15 850
		58.70	11 730	13 930	16 010	17 760	11 150	13 240	15 330	17 420
		63.50	12 700	15 090	17 470	19 850	12 170	14 460	16 740	19 020
9 5/8" <i>244.48</i>		43.50	3 810	4 130	4 420	4 620	6 330	7 510	8 700	9 890
		47.00	4 760	5 090	5 300	5 630	6 870	8 150	9 440	10 730
		53.50	6 620	7 340	7 950	8 440	7 930	9 410	10 900	12 390
		58.40	7 900	8 880	9 770	10 540	8 650	10 280	11 900	13 520
		59.40	8 250	9 320	10 280	11 130	8 860	10 520	12 180	13 840
9 3/4" <i>247.65</i>		61.10	8 660	9 810	10 860	11 800	9 090	10 800	12 500	14 200
		64.90	9 860	11 260	12 570	13 780	9 770	11 610	13 440	15 270
		70.30	11 270	13 170	14 820	16 390	10 680	12 680	14 680	16 680
		71.80	11 500	13 650	15 400	17 060	10 910	12 950	15 000	17 050
		75.60	12 150	14 430	16 710	18 990	11 590	13 770	15 940	18 110
9 3/4" <i>247.65</i>		80.80	13 010	15 440	17 880	20 320	12 490	14 840	17 180	19 520
		59.20	7 700	8 650	9 490	10 220	8 540	10 150	11 750	13 350
		62.80	8 260	9 320	10 290	11 140	8 860	10 520	12 180	13 840
		65.30	8 880	10 070	11 170	12 160	9 220	10 940	12 670	14 400
		67.50	9 580	10 910	12 160	13 310	9 610	11 410	13 220	15 020
9.834"* <i>252.34</i>		68.90	10 120	11 580	12 940	14 210	9 920	11 780	13 650	15 510
		66.90	9 230	10 500	11 670	12 740	9 410	11 180	12 940	14 710
		67.20	9 220	10 480	11 650	12 720	9 410	11 170	12 940	14 700
		68.70	9 610	10 960	12 210	13 370	9 630	11 440	13 240	15 050
		81.00	11 590	13 760	15 650	17 340	11 010	13 070	15 140	17 200
10" <i>254.00</i>										
10.175" <i>258.45</i>										

VAM® SLLH-II TECHNICAL DATA

Size (OD)	Isolated design (if any)	Nominal Weight lb/ft	Wall Thickness		Inside Diameter in	Drift Diameter in	Pipe body section sq.in	Box OD in	Pin ID in	Make up Loss in	Joint Efficiency %	Joint Yield Strength (1000 lb)				
			in	mm								L80 N80	R95 T95	C110 P110	Q125	
10 3/4" 273.05		51.00	0.450	11.43	9.850	9.694	14.561	10.878	9.770	5.457	69.8	813	966	1119	1271	
		55.50	0.495	12.57	9.760	9.625 S	15.947	10.913	9.686	5.785	72.6	926	1099	1273	1446	
		60.70	0.545	13.84	9.660	9.504	17.473	10.962	9.580	6.025	73.9	1033	1227	1420	1614	
		65.70	0.595	15.11	9.560	9.404	18.982	11.002	9.561	6.376	76.2	1157	1374	1590	1807	
		71.10	0.650	16.51	9.450	9.294	20.625	11.045	9.370	6.557	78.4	1293	1535	1778	2020	
10 3/4" 273.05		73.20	0.672	17.07	9.406	9.250	21.276	11.063	9.326	6.820	79.2	1348	1600	1853	2106	
		75.90	0.700	17.78	9.350	9.194	22.101	11.081	9.270	6.886	79.3	1402	1665	1927	2190	
		79.20	0.734	18.64	9.282	9.126	23.096	11.102	9.202	6.962	79.5	1468	1744	2019	2295	
		80.80	0.750	19.05	9.250	9.094 S	23.562	11.114	9.170	7.220	79.9	1505	1787	2070	2352	
		85.30	0.797	20.24	9.156	9.000	24.921	11.144	9.076	7.368	81.0	1614	1917	2220	2523	
10 7/8" 276.23		97.10	0.922	23.42	8.906	8.750	28.467	11.187	8.826	8.125	81.8	1862	2211	2560	2909	
		72.00	0.656	16.66	9.563	9.500 S	21.060	11.165	9.561	6.539	76.2	1284	1525	1765	2006	
11 1/2" 292.10		98.50	0.860	21.84	9.780	9.655	28.747	11.904	9.723	8.433	80.3	1847	2193	2539	2885	
		54.00	0.435	11.05	10.880	10.724	15.463	11.858	10.804	5.476	67.6	837	994	1150	1307	
11 3/4" 298.45		60.00	0.489	12.42	10.772	10.625 S	17.300	11.900	10.689	5.843	71.2	966	1170	1355	1540	
		65.00	0.534	13.56	10.682	10.625 S	18.816	11.943	10.689	6.043	72.3	1088	1292	1495	1699	
		71.00	0.582	14.78	10.586	10.430	20.420	11.981	10.509	6.393	74.6	1218	1447	1675	1903	
		74.60	0.618	15.70	10.514	10.358	21.613	12.006	10.437	6.519	76.1	1317	1563	1810	2057	
		75.40	0.625	15.88	10.500	10.344	21.844	12.011	10.424	6.543	76.4	1335	1586	1836	2086	
11 7/8" 301.63		78.80	0.656	16.66	10.438	10.282	22.863	12.035	10.361	6.845	77.6	1418	1684	1950	2216	
		80.50	0.672	17.07	10.406	10.250	23.387	12.048	10.330	6.900	78.1	1462	1736	2010	2284	
		82.60	0.691	17.55	10.368	10.250 S	24.007	12.063	10.314	6.963	78.8	1513	1797	2081	2365	
		87.40	0.734	18.64	10.282	10.126	25.402	12.097	10.206	7.289	80.2	1629	1935	2240	2546	
		63.40	0.510	12.95	10.855	10.699	18.209	12.060	10.779	5.972	70.4	1026	1218	1410	1603	
12 1/16" 304.80		71.80	0.582	14.78	10.711	10.625 S	20.648	12.096	10.689	6.454	74.2	1225	1455	1685	1915	
		78.08	0.640	16.26	10.783	10.627	22.967	12.328	10.707	6.796	76.3	1401	1663	1926	2189	

VAM® SLJ-II TECHNICAL DATA

Size (OD)	Isolated design (if any)	Nominal Weight lb/ft	Collapse Pressures (psi)				Minimum Internal Yield Pressure (psi)			
			80 ksi	95 ksi	110 ksi	125 ksi	80 ksi	95 ksi	110 ksi	125 ksi
10 3/4"		51.00	3 220	3 490	3 660	3 740	5 860	6 960	8 060	9 160
		55.50	4 020	4 300	4 610	4 850	6 450	7 660	8 860	10 070
		60.70	5 160	5 580	5 880	6 070	7 100	8 430	9 760	11 090
		65.70	6 310	6 960	7 510	7 920	7 750	9 200	10 650	12 110
		71.10	7 560	8 480	9 300	9 990	8 470	10 050	11 640	13 230
		73.20	8 070	9 090	10 010	10 820	8 750	10 390	12 030	13 670
10 3/4"		75.90	8 710	9 860	10 920	11 880	9 120	10 830	12 530	14 240
		79.20	9 480	10 800	12 030	13 160	9 560	11 350	13 140	14 940
		80.80	9 850	11 240	12 550	13 760	9 770	11 600	13 430	15 260
		85.30	10 920	12 540	14 080	15 530	10 380	12 330	14 270	16 220
		97.10	12 550	14 900	17 250	19 600	12 010	14 260	16 510	18 760
		72.00	7 530	8 440	9 240	9 930	8 450	10 030	11 610	13 200
11 1/2"		98.50	11 070	12 730	14 300	15 790	10 470	12 430	14 400	16 360
11 3/4"		54.00	2 450	2 560	2 570	2 570	5 180	6 150	7 130	8 100
		60.00	3 180	3 440	3 610	3 680	5 830	6 920	8 010	9 100
		65.00	3 870	4 180	4 480	4 690	6 360	7 560	8 750	9 940
		71.00	4 880	5 240	5 470	5 760	6 930	8 230	9 530	10 840
		74.60	5 630	6 150	6 540	6 810	7 360	8 740	10 120	11 510
		75.40	5 780	6 320	6 750	7 050	7 450	8 840	10 240	11 640
11 3/4"		78.80	6 430	7 110	7 670	8 120	7 820	9 280	10 750	12 210
		80.50	6 760	7 510	8 150	8 670	8 010	9 510	11 010	12 510
		82.60	7 160	7 990	8 720	9 320	8 230	9 780	11 320	12 860
		87.40	8 060	9 080	10 000	10 800	8 750	10 390	12 030	13 660
		63.40	3 390	3 700	3 910	4 030	6 010	7 140	8 270	9 390
		71.80	4 750	5 080	5 290	5 630	6 860	8 150	9 430	10 720
12 1/16"		78.08	5 740	6 280	6 700	6 990	7 430	8 820	10 210	11 610

VAM® SLIJ-II TECHNICAL DATA

Size (OD)	Isolated design (if any)	Nominal Weight lb/ft	Wall Thickness		Inside Diameter in	Drift Diameter in	Pipe body section sq/in	Box OD		Pin ID	Make up Loss		Joint Efficiency %	Joint Yield Strength (1000 lb)			
			in	mm				in	in		in	in		L80 N80	R95 T95	C110 P110	Q125
12 1/8" <i>307.65</i>		87.70	0.720	18.29	10.685	10.625 S	25.798	12.451	10.689	10.689	7.248	78.8	1.626	1.930	2.235	2.540	
		86.70	0.672	17.07	11.406	11.250 S	25.498	13.013	11.314	6.891	74.3	1.517	1.801	2.085	2.370		
13 3/8" <i>339.73</i>		66.00	0.480	12.19	12.415	12.259	19.445	13.513	12.341	5.767	67.7	1.054	1.251	1.449	1.646		
		72.00	0.514	13.06	12.347	12.250 A	20.768	13.542	12.317	5.976	69.9	1.161	1.379	1.597	1.815		
13 3/4" <i>349.25</i>		77.00	0.550	13.97	12.275	12.119	22.160	13.573	12.201	6.057	71.9	1.275	1.514	1.753	1.992		
		80.70	0.580	14.73	12.215	12.059	23.314	13.590	12.141	6.164	73.2	1.366	1.622	1.878	2.134		
13 5/8" <i>346.08</i>		85.00	0.608	15.44	12.159	12.003	24.386	13.611	12.085	6.465	74.4	1.451	1.723	1.995	2.267		
		86.00	0.625	15.88	12.125	11.969	25.035	13.625	12.051	6.532	75.1	1.505	1.787	2.069	2.352		
13 7/8" <i>352.43</i>		92.00	0.672	17.07	12.031	11.875	26.818	13.661	11.957	6.896	76.9	1.649	1.959	2.268	2.577		
	-NA	88.20	0.625	15.88	12.375	12.250 S	25.525	14.063	12.319	7.747	74.6	1.523	1.809	2.095	2.380		
13 3/4" <i>349.25</i>	-KT	98.58	0.707	17.96	12.336	12.250 S	28.970	14.040	12.317	7.230	74.2	1.719	2.042	2.364	2.686		
		105.89	0.755	19.18	12.365	12.259 S	31.119	14.218	12.327	7.691	77.7	1.934	2.297	2.660	3.022		
14" <i>355.60</i>		82.50	0.562	14.27	12.876	12.69	23.726	14.199	12.772	6.406	71.8	1.362	1.618	1.873	2.129		
		93.00	0.650	16.51	12.700	12.51	27.261	14.263	12.596	6.901	74.9	1.634	1.940	2.246	2.553		
14 1/2" <i>365.00</i>		100.00	0.700	17.78	12.600	12.41	29.248	14.301	12.496	7.275	76.6	1.792	2.128	2.464	2.800		
		104.20	0.734	18.64	12.532	12.35	30.589	14.322	12.428	7.572	76.6	1.875	2.226	2.578	2.930		
15 1/2" <i>393.00</i>		106.00	0.750	19.05	12.500	12.31	31.220	14.332	12.398	7.628	77.1	1.924	2.285	2.646	3.007		
		112.50	0.797	20.24	12.406	12.250 S	33.058	14.368	12.318	7.999	78.7	2.081	2.471	2.861	3.251		
16" <i>406.40</i>		115.00	0.812	20.62	12.376	12.250 S	33.642	14.381	12.318	8.054	79.3	2.133	2.533	2.933	3.333		
		116.00	0.820	20.83	12.360	12.250 S	33.953	14.240	12.318	7.768	75.6	2.054	2.439	2.824	3.209		
16 1/2" <i>412.75</i>		84.00	0.49	12.57	14.910	14.823	24.112	16.250	15.010	5.985	66.3	1.279	1.518	1.758	1.998		
		95.00	0.57	14.38	14.769	14.681	27.444	16.250	14.769	6.455	70.6	1.536	1.824	2.111	2.399		
17" <i>426.75</i>		97.00	0.58	14.61	14.823	14.663	27.864	16.250	14.850	6.495	70.8	1.577	1.873	2.169	2.465		
		104.00	0.63	15.88	14.653	14.563	30.189	16.250	14.763	6.888	73.0	1.763	2.094	2.425	2.755		
17 1/2" <i>438.25</i>		109.00	0.66	16.66	14.673	14.501	31.622	16.250	14.688	7.199	73.9	1.870	2.220	2.571	2.922		
		118.00	0.71	18.16	14.470	14.383	34.334	16.250	14.570	7.630	76.3	2.095	2.488	2.881	3.274		

VAM® SLJ-II TECHNICAL DATA

Size (OD)	Isolated design (if any)	Nominal Weight lb/ft	Collapse Pressures (psi)				Minimum Internal Yield Pressure (psi)			
			60 ksi	95 ksi	110 ksi	125 ksi	80 ksi	95 ksi	110 ksi	125 ksi
12 1/8" 307.98		87.70	7 300	8 160	8 920	9 550	8 310	9 870	11 430	12 990
12 3/4" 323.85		86.70	5 660	6 180	6 580	6 850	7 380	8 760	10 150	11 530
13 3/8" 339.73		88.00	2 260	2 340	2 330	2 330	5 020	5 970	6 910	7 850
		72.00	2 670	2 830	2 880	2 880	5 380	6 390	7 400	8 410
		77.00	3 100	3 350	3 480	3 550	5 760	6 840	7 920	9 000
		80.70	3 460	3 780	4 000	4 140	6 070	7 210	8 350	9 490
		85.00	3 880	4 180	4 480	4 690	6 360	7 560	8 750	9 940
		86.00	4 190	4 430	4 770	5 030	6 540	7 770	9 000	10 220
		92.00	5 050	5 450	5 720	5 950	7 030	8 350	9 670	10 990
		98.00	5 920	6 490	6 950	7 280	7 530	8 940	10 350	11 760
13 5/8"		88.20	3 980	4 260	4 570	4 800	6 420	7 630	8 830	10 030
<i>346.08</i>	-NA	88.20	3 980	4 260	4 570	4 800	6 420	7 630	8 830	10 030
13 3/4"		98.58	5 340	5 800	6 130	6 330	7 200	8 550	9 900	11 250
<i>349.25</i>										
13 7/8"		105.89	6 080	6 690	7 180	7 540	7 620	9 050	10 470	11 900
<i>352.43</i>										
14"		82.50	2 940	3 160	3 270	3 300	5 620	6 670	7 730	8 780
<i>355.60</i>		93.00	4 120	4 370	4 700	4 950	6 500	7 720	8 940	10 160
		100.00	4 960	5 380	5 630	5 890	7 000	8 310	9 630	10 940
		104.20	5 590	6 100	6 480	6 740	7 340	8 720	10 090	11 470
		106.00	5 870	6 440	6 880	7 200	7 500	8 910	10 310	11 720
		112.60	6 700	7 430	8 060	8 560	7 970	9 460	10 960	12 450
		115.00	6 960	7 750	8 430	8 990	8 120	9 640	11 170	12 680
		116.00	7 100	7 920	8 630	9 230	8 200	9 740	11 280	12 810
16"		84.00	1 480	1 480	1 480	1 480	4 330	5 140	5 960	6 770
<i>406.40</i>		95.00	2 180	2 240	2 230	2 230	4 950	5 880	6 810	7 740
		97.00	2 270	2 350	2 340	2 340	5 030	5 970	6 920	7 860
		104.00	2 770	2 950	3 030	3 030	5 470	6 490	7 520	8 540
		109.00	3 080	3 320	3 470	3 520	5 740	6 820	7 890	8 970
		118.00	3 690	4 030	4 300	4 490	6 260	7 430	8 600	9 780

VAM® SLU-II TORQUE VALUES

Size (OD)	Isolated design (if any)	Nominal Weight lb/ft	Wall Thickness in mm	75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi		
				min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
				ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m		
4 1/2" 114.30		15.10	0.337	6 210	6 900	7 590	6 390	7 100	7 810	6 570	7 300	8 030	6 750	7 500	8 250
				8 500	9 400	10 300	8 600	9 600	10 600	8 900	9 900	10 900	9 200	10 200	11 200
				6 840	7 600	8 360	7 110	7 900	8 690	7 280	8 100	8 910	7 560	8 400	9 240
18.90		17.00	0.380	9 650	10 300	11 300	9 600	10 700	11 800	9 900	11 000	12 100	10 300	11 400	12 500
				8 640	9 600	10 560	8 910	9 900	10 890	9 180	10 200	11 220	9 540	10 600	11 660
				11 700	13 000	14 300	12 100	13 400	14 800	12 400	13 800	15 200	13 000	14 400	15 800
21.50		18.00	0.500	10 630	11 700	12 870	10 890	12 100	13 310	11 250	12 500	13 750	11 610	12 900	14 180
				14 300	15 900	17 500	14 800	16 400	18 000	15 200	16 900	18 600	15 800	17 500	19 300
				4 400	4 900	5 400	4 700	5 200	5 700	4 900	5 400	5 900	5 100	5 700	6 300
127.00	5"	20.30	0.408	6 000	6 700	7 400	6 300	7 000	7 700	6 700	7 400	8 100	6 900	7 700	8 500
				7 000	7 800	8 600	7 500	8 300	9 100	7 900	8 800	9 700	8 400	9 300	10 200
				5 500	6 100	6 700	5 800	6 500	7 200	6 200	6 900	7 600	6 600	7 300	8 000
21.40		20.80	0.422	10 720	11 700	12 700	9 900	10 900	11 900	8 400	9 300	10 200	8 900	9 900	10 900
				5 800	6 400	7 000	6 100	6 800	7 500	6 500	7 200	7 900	6 900	7 700	8 500
				7 800	8 700	9 600	8 300	9 200	10 100	8 800	9 800	10 800	9 400	10 400	11 400
23.20		24.10	0.478	6 400	7 100	7 800	6 700	7 500	8 300	7 200	8 000	8 800	7 800	8 600	9 400
				8 600	9 600	10 600	9 200	10 200	11 200	9 800	10 900	12 000	10 300	11 500	12 700
				6 700	7 400	8 100	7 200	8 000	8 800	7 600	8 500	9 400	8 100	9 000	9 900
26.70		26.70	0.562	9 100	10 100	11 100	9 700	10 800	11 900	10 300	11 500	12 700	10 900	12 100	13 300
				7 600	8 400	9 200	8 100	9 000	9 900	8 600	9 600	10 600	9 200	10 200	11 200
				10 300	11 400	12 500	11 000	12 200	13 400	11 700	13 000	14 300	12 400	13 800	15 200
29.20		29.20	0.625	8 500	9 600	10 500	9 200	10 200	11 200	9 700	10 800	11 900	10 300	11 500	12 700
				11 600	12 900	14 200	12 400	13 800	15 200	13 200	14 700	16 200	14 000	15 600	17 200
				5 300	5 900	6 500	5 600	6 200	6 800	5 900	6 500	7 200	6 100	6 800	7 500
139.70	5 1/2"	20.00	0.361	7 200	8 000	8 800	7 600	8 400	9 200	7 900	8 800	9 700	8 300	9 200	10 100
				8 415	9 200	10 000	8 600	9 400	10 200	8 700	9 600	10 500	9 000	9 900	
				10 540	11 400	12 300	9 400	10 400	11 400	9 900	11 000	12 100	10 400	11 600	12 800
23.80		23.80	0.437	6 900	7 700	8 500	7 400	8 200	9 000	7 900	8 800	9 700	8 400	9 300	10 200
				9 400	10 500	11 600	10 100	11 200	12 300	10 700	11 900	13 100	11 200	12 500	13 800
				7 800	8 700	9 600	8 400	9 300	10 200	8 900	9 800	10 900	9 400	10 500	11 600
26.00		26.00	0.476	10 600	11 800	13 000	11 300	12 600	13 900	12 000	13 400	14 700	12 800	14 200	15 600
				8 300	9 200	10 100	8 800	9 800	10 800	9 100	10 400	11 700	10 000	11 400	12 800
				11 200	12 400	13 600	12 000	13 300	14 600	12 700	14 100	15 500	13 400	14 900	16 400
26.80		26.80	0.500	11 200	12 400	13 600	12 000	13 300	14 600	12 700	14 100	15 500	13 400	14 900	16 400
				12 70											

VAM® SLLH-III TORQUE VALUES

Size (OD)	Isolated design (if any)	Nominal Weight lb/ft	Wall Thickness in mm	75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			
				min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	
				ft.lb N/m												
5 1/2" 139.70		28.40	0.530	8 800	9 800	10 800	9 400	10 500	11 600	10 100	11 200	12 300	10 700	11 800	13 100	
				12 000	13 300	14 600	12 800	14 200	15 600	13 700	15 200	16 700	14 500	16 100	17 700	
		29.70	0.562	9 400	10 500	11 600	10 200	11 300	12 400	10 800	12 000	13 200	11 500	12 800	14 100	
				12 900	14 300	15 700	13 800	15 300	16 800	14 700	16 300	17 900	15 600	17 300	19 000	
		32.00	0.612	10 400	11 600	12 800	11 200	12 400	13 600	11 900	13 200	14 500	12 600	14 000	15 400	
				15 54	14 100	15 700	17 300	15 100	16 800	18 500	16 100	17 900	19 700	17 100	19 000	20 900
		32.60	0.625	10 700	11 900	13 100	11 400	12 700	14 000	12 200	13 600	15 000	13 000	14 400	15 800	
				15 88	14 500	16 100	17 700	15 500	17 200	18 900	16 600	18 400	20 200	17 500	19 500	21 500
		28.00	0.417	8 600	9 600	10 600	9 200	10 200	11 200	9 800	10 800	12 000	10 300	11 500	12 700	
				10 59	11 700	13 000	14 300	12 500	13 900	15 300	13 300	14 800	16 300	14 100	15 700	17 300
32.00	0.475	10 400	11 600	12 800	11 200	12 400	13 600	12 000	13 300	14 600	12 700	14 100	15 500			
		12 07	14 100	15 700	17 300	15 200	16 900	18 600	16 200	18 000	19 800	17 200	19 100	21 000		
33.00	0.500	11 000	12 200	13 400	11 800	13 100	14 400	12 600	14 000	15 400	13 400	14 900	16 400			
		12 70	14 900	16 600	18 300	16 000	17 800	19 600	17 100	19 000	20 900	18 200	20 200	22 200		
34.50	0.525	11 800	13 100	14 400	12 600	14 000	15 400	13 500	15 000	16 500	14 400	16 000	17 600			
		13 34	15 900	17 700	19 500	17 100	19 000	20 900	18 300	20 300	22 300	19 400	21 600	23 800		
36.70	0.562	12 900	14 300	15 700	13 900	15 400	16 900	14 800	16 500	18 200	16 800	17 600	19 400			
		14 27	17 500	19 400	21 300	18 800	20 900	23 000	20 200	22 400	24 600	21 500	23 900	26 300		
40.20	0.625	14 800	16 400	18 000	16 800	17 700	19 500	17 100	19 000	20 900	18 200	20 200	22 200			
		15 89	20 100	22 300	24 500	21 600	24 000	26 400	23 500	25 700	28 300	24 700	27 400	30 100		
43.70	0.687	16 600	18 400	20 200	17 800	19 800	21 800	19 200	21 300	23 400	20 400	22 700	25 000			
		17 45	22 500	25 000	27 500	24 200	26 900	29 600	25 900	28 800	31 700	27 600	30 700	33 800		
32.70	0.478	11 900	13 100	14 300	11 500	12 700	14 000	12 100	13 500	14 900	13 000	14 400	15 800			
		12 13	14 490	16 100	17 710	15 600	17 300	19 000	16 500	18 300	20 100	17 500	19 500	21 500		
26.00	0.382	8 700	9 700	10 700	9 100	10 100	11 100	9 500	10 600	11 700	9 900	11 000	12 100			
		9 19	11 600	13 100	14 400	12 300	13 700	15 100	12 900	14 300	15 700	13 500	15 000	16 500		
29.00	0.408	10 400	11 600	12 800	10 800	12 100	13 300	11 400	12 700	14 000	12 000	13 300	14 600			
		10 36	14 100	15 700	17 300	14 800	16 500	18 200	15 500	17 200	18 900	16 200	18 000	19 800		
32.00	0.453	11 800	13 200	14 500	12 600	14 000	15 400	13 400	14 800	16 400	14 100	15 700	17 300			
		11 51	16 100	17 900	19 700	17 100	19 000	20 900	18 200	20 200	22 200	19 200	21 300	23 400		
35.00	0.498	13 600	15 100	16 600	14 600	16 200	17 800	15 500	17 300	18 900	16 400	18 200	20 000			
		12 65	18 400	20 500	22 600	19 700	21 800	24 100	21 000	23 300	25 600	22 100	24 600	27 100		
38.00	0.540	15 300	17 000	18 700	16 300	18 100	19 900	17 400	19 300	21 200	18 400	20 400	22 400			
		13 72	20 700	23 000	25 300	22 100	24 600	27 100	23 600	26 200	28 800	24 900	27 700	30 500		



VAM® SLII-II TORQUE VALUES

Size (OD)	Isolated design (if any)	Nominal Weight lb/ft	Wall Thickness in	75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi		
				min.	opti.	max.	min.	opti.	max.	min.	opti.	max.	min.	opti.	max.
				ft.lb									N.m		
				in									mm		
7 5/8" 193.68		41.00	0.590	17 100	19 000	20 900	19 400	20 400	22 400	19 600	21 800	24 000	20 800	23 100	25 400
		42.70	0.625	18 500	20 800	22 700	19 800	22 000	24 200	21 100	23 800	25 900	22 800	25 300	27 800
		44.00	0.640	19 100	21 200	23 300	20 400	22 700	25 000	21 100	23 500	25 900	22 800	25 300	27 800
		45.40	0.670	20 200	22 400	24 600	21 100	23 500	25 900	22 800	25 300	27 800	24 400	27 100	29 800
		46.40	0.687	20 800	23 100	25 400	22 800	25 300	27 800	24 400	27 100	29 800	26 000	28 900	31 800
		49.50	0.730	22 800	25 300	27 800	24 400	27 100	29 800	26 000	28 900	31 800	27 600	30 700	33 800
		29.70	0.375	10 300	11 400	12 500	10 800	12 000	13 200	11 300	12 600	13 900	11 900	13 200	14 500
		33.70	0.430	12 800	14 000	15 400	13 200	14 700	16 300	14 700	16 300	17 900	16 100	17 900	19 700
		39.00	0.500	15 400	17 100	18 800	16 500	18 300	20 100	17 500	19 400	21 300	18 500	20 600	22 700
		42.80	0.562	18 100	20 100	22 100	19 400	21 600	23 800	20 800	23 100	25 400	22 800	25 300	27 800
46.30	0.595	19 600	21 800	24 000	21 100	23 500	25 900	22 800	25 300	27 800	24 400	27 100	29 800		
47.10	0.625	21 100	23 500	25 900	22 800	25 300	27 800	24 400	27 100	29 800	26 000	28 900	31 800		
51.20	0.687	24 400	27 100	29 800	26 000	28 900	31 800	27 600	30 700	33 800	29 200	32 500	35 800		
52.10	0.700	24 400	27 100	29 800	26 000	28 900	31 800	28 900	31 800	34 700	29 200	32 500	35 800		
52.80	0.712	24 400	27 100	29 800	26 000	28 900	31 800	27 600	30 700	33 800	29 200	32 500	35 800		
55.30	0.750	28 000	28 900	31 800	27 600	30 700	33 800	29 200	32 500	35 800	31 000	34 400	37 800		
59.20	0.812	29 200	32 500	35 800	31 000	34 400	37 800	32 600	36 200	39 800	34 200	38 000	41 800		
					39 700	44 100	48 500	41 900	46 600	51 300	44 100	49 000	53 900	56 700	

VAM® SLLH-I TORQUE VALUES

Size (OD)	Isolated design (if any)	Nominal Weight lb/ft	Wall Thickness mm	75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140-145 ksi				
				min.	opti.	max.	min.	opti.	max.	min.	opti.	max.	min.	opti.	max.	min.	opti.	max.		
In mm			In mm	ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m				
7 3/4" 196.85		46.10	0.595	19 400	21 600	23 800	20 800	23 100	25 400	22 800	25 300	27 800	24 400	27 100	29 800	26 000	28 900	31 800		
				26 400	29 300	32 200	28 200	31 300	34 400	30 900	34 300	37 700	33 100	36 800	40 500	35 300	39 200	43 100		
		46.90	0.615	20 500	22 800	25 100	22 800	25 300	27 800	24 400	27 100	29 800	26 000	28 900	31 800	27 800	30 700	33 800		
				15.62	27 800	30 900	34 000	30 900	34 300	37 700	33 100	36 800	40 500	35 300	39 200	43 100	37 400	41 600	45 800	
		47.60	0.625	21 100	23 500	25 900	22 800	25 300	27 800	24 400	27 100	29 800	26 000	28 900	31 800	27 800	30 700	33 800		
				15.88	28 700	31 900	35 100	30 900	34 300	37 700	33 100	36 800	40 500	35 300	39 200	43 100	37 400	41 600	45 800	
		48.60	0.640	21 100	23 500	25 900	22 800	25 300	27 800	24 400	27 100	29 800	26 000	28 900	31 800	27 800	30 700	33 800		
				16.26	28 700	31 900	35 100	30 900	34 300	37 700	33 100	36 800	40 500	35 300	39 200	43 100	37 400	41 600	45 800	
		8 5/8" 219.08		36.00	0.400	11 500	12 800	14 100	12 300	13 700	15 100	13 000	14 500	16 000	13 800	15 300	16 800	14 600	16 300	18 000
					10.16	16 700	17 400	19 100	16 600	18 500	20 400	17 600	19 600	21 600	18 700	20 800	22 900	19 900	22 100	24 300
40.00	0.450	13 600		15 100	16 600	14 700	16 300	17 900	19 500	15 700	17 400	19 100	16 800	18 500	20 400	18 000	20 000	22 100		
		11.43		18 400	20 500	22 600	19 800	22 000	24 200	21 200	23 600	26 000	22 600	25 100	27 600	24 600	27 200	29 800		
44.00	0.500	15 700		17 500	19 300	17 100	19 000	20 900	22 800	18 400	20 400	22 400	19 700	21 900	24 100	20 900	23 200	25 500		
		12.70		21 300	23 700	26 100	23 100	25 700	28 300	24 900	27 700	30 500	26 700	29 700	32 700	28 700	31 900	34 900		
49.00	0.557	18 300		20 300	22 300	19 900	22 100	24 300	26 500	21 100	23 500	25 900	22 800	25 300	27 800	24 600	27 200	29 800		
		14.15		24 700	27 500	30 300	27 000	30 000	33 000	28 700	31 900	35 100	30 900	34 300	37 700	33 100	36 800	40 500		
49.10	0.562	18 500		20 600	22 700	20 200	22 500	24 800	27 100	21 100	23 500	25 900	22 800	25 300	27 800	24 600	27 200	29 800		
		14.27		25 200	28 000	30 800	27 400	30 500	33 600	28 700	31 900	35 100	30 900	34 300	37 700	33 100	36 800	40 500		
52.00	0.595	20 100	22 300	24 500	21 400	23 500	25 900	28 300	22 800	25 300	27 800	24 400	27 100	29 800	26 000	28 900	31 800			
		15.11	27 200	30 200	33 200	28 700	31 900	35 100	30 900	34 300	37 700	33 100	36 800	40 500	35 300	39 200	43 100			
54.00	0.625	21 100	23 500	25 900	22 800	25 300	27 800	30 200	24 400	27 100	29 800	26 000	28 900	31 800	27 800	30 700	33 800			
		15.88	28 700	31 900	35 100	30 900	34 300	37 700	33 100	36 800	40 500	35 300	39 200	43 100	37 400	41 600	45 800			
58.70	0.687	24 400	27 100	29 800	26 000	28 900	31 800	34 700	27 800	30 700	33 600	29 200	32 500	35 800	29 200	32 500	35 800			
		17.45	33 100	36 800	40 500	35 300	39 200	43 100	37 500	41 700	45 900	39 700	44 100	48 500	42 900	47 300	51 700			
63.50	0.750	27 600	30 700	33 800	29 200	32 500	35 800	39 100	31 000	34 400	37 800	32 600	36 200	39 800	32 600	36 200	39 800			
		19.05	37 500	41 700	45 900	39 700	44 100	48 500	41 900	46 600	51 300	44 100	49 000	53 900	47 500	52 400	57 300			
9 5/8" 244.48		43.50	0.435	13 400	14 900	16 400	14 400	16 000	17 600	15 500	17 200	18 900	16 500	18 300	20 100	17 800	19 700	21 600		
			11.05	18 200	20 200	22 200	19 600	21 800	24 000	21 000	23 300	25 600	22 400	24 900	27 400	24 200	26 800	29 400		
47.00		0.472	15 100	16 800	18 500	16 400	18 200	20 000	21 800	17 500	19 500	21 500	18 700	20 800	22 900	20 000	22 300	24 600		
			11.99	20 500	22 800	25 100	22 100	24 600	27 100	23 800	26 400	29 000	25 500	28 300	31 100	27 800	30 700	33 600		
53.50		0.545	18 300	20 300	22 300	20 000	22 200	24 400	26 600	21 100	23 500	25 900	22 800	25 300	27 800	24 600	27 100	29 600		
			13.84	24 700	27 500	30 300	27 200	30 200	33 200	28 700	31 900	35 100	30 900	34 300	37 700	33 000	36 400	39 800		
58.40		0.595	20 700	23 000	25 300	22 800	25 300	27 800	30 300	24 400	27 100	29 800	26 000	28 900	31 800	27 800	30 700	33 800		
			15.11	28 000	31 100	34 200	30 900	34 300	37 700	33 100	36 800	40 500	35 300	39 200	43 100	37 400	41 600	45 800		



VAM® SLJU-II TORQUE VALUES

Size (OD)	Isolated design (if any)	Nominal Weight (lbf)	Wall Thickness (in)	75-80 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140-145 ksi		
				min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
in	mm			ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m		
9 5/8" 244.48		59.40	0.609	21 100	23 500	25 900	22 800	25 300	27 800	24 400	27 100	29 800	26 000	28 900	31 800	27 600	30 700	33 800
				28 700	31 900	35 100	30 900	34 300	37 700	33 100	36 800	40 500	35 300	39 200	43 100	37 400	41 600	45 800
61.10		61.10	0.625	22 800	25 300	27 800	24 400	27 100	29 800	26 000	28 900	31 800	27 600	30 700	33 800	29 300	32 500	35 800
				30 900	34 300	37 700	33 100	36 800	40 500	35 300	39 200	43 100	37 500	41 700	45 900	39 700	44 100	48 500
64.90		64.90	0.672	24 400	27 100	29 800	26 000	28 900	31 800	27 600	30 700	33 800	29 200	32 500	35 800	31 000	34 400	37 800
				33 100	36 800	40 500	35 300	39 200	43 100	37 500	41 700	45 900	39 700	44 100	48 500	41 900	46 600	51 300
70.30		70.30	0.734	27 600	30 700	33 800	28 200	32 500	35 800	31 000	34 400	37 800	32 600	36 200	39 800	34 200	37 800	41 500
				37 500	41 700	45 900	39 700	44 100	48 500	41 900	46 600	51 300	44 100	49 000	53 900	48 500	53 000	58 000
71.80		71.80	0.750	29 200	32 500	35 800	31 000	34 400	37 800	32 600	36 200	39 800	34 200	38 000	41 800	36 000	39 800	43 800
				39 700	44 100	48 500	41 900	46 600	51 300	44 100	49 000	53 900	48 500	53 000	58 000	52 900	58 000	64 700
75.60		75.60	0.787	31 000	34 400	37 800	32 600	36 200	39 800	34 200	38 000	41 800	35 800	39 800	43 800	38 000	42 000	46 000
				41 900	46 600	51 300	44 100	49 000	53 900	48 500	53 000	58 000	52 900	58 000	64 700	59 300	65 000	71 000
80.80		80.80	0.859	34 200	38 000	41 800	35 800	39 800	43 800	37 400	41 600	45 800	39 000	43 400	47 800	41 500	46 000	51 300
				46 300	51 500	56 700	49 600	54 000	59 400	50 800	56 400	62 000	52 900	58 800	64 700	55 900	62 000	68 000
9 3/4" 247.65		59.20	0.595	20 700	23 000	25 300	22 800	25 300	27 800	24 400	27 100	29 800	26 000	28 900	31 800	27 600	30 700	33 800
				28 100	31 200	34 300	30 900	34 300	37 700	33 100	36 800	40 500	35 300	39 200	43 100	37 500	41 700	45 900
9 7/8" 250.83		62.80	0.625	22 800	25 300	27 800	24 400	27 100	29 800	26 000	28 900	31 800	27 600	30 700	33 800	29 300	32 500	35 800
				30 900	34 300	37 700	33 100	36 800	40 500	35 300	39 200	43 100	37 500	41 700	45 900	39 700	44 100	48 500
65.30		65.30	0.650	24 400	27 100	29 800	26 000	28 900	31 800	27 600	30 700	33 800	29 200	32 500	35 800	31 000	34 400	37 800
				33 100	36 800	40 500	35 300	39 200	43 100	37 500	41 700	45 900	39 700	44 100	48 500	41 900	46 600	51 300
66.90		66.90	0.668	24 400	27 100	29 800	26 000	28 900	31 800	27 600	30 700	33 800	29 200	32 500	35 800	31 000	34 400	37 800
				33 100	36 800	40 500	35 300	39 200	43 100	37 500	41 700	45 900	39 700	44 100	48 500	41 900	46 600	51 300
67.50		67.50	0.678	24 400	27 100	29 800	26 000	28 900	31 800	27 600	30 700	33 800	29 200	32 500	35 800	31 000	34 400	37 800
				33 100	36 800	40 500	35 300	39 200	43 100	37 500	41 700	45 900	39 700	44 100	48 500	41 900	46 600	51 300
68.90		68.90	0.700	27 600	30 700	33 800	29 200	32 500	35 800	31 000	34 400	37 800	32 600	36 200	39 800	34 200	37 800	41 500
				37 500	41 700	45 900	39 700	44 100	48 500	41 900	46 600	51 300	44 100	49 000	53 900	48 500	53 000	58 000
9.834" 252.34		66.80	0.668	27 600	30 700	33 800	28 200	32 500	35 800	31 000	34 400	37 800	32 600	36 200	39 800	34 180	37 880	41 580
				37 500	41 700	45 900	39 700	44 100	48 500	41 900	46 600	51 300	44 100	49 000	53 900	48 500	53 000	58 000
10" 254.00		67.20	0.672	24 400	27 100	29 800	26 000	28 900	31 800	27 600	30 700	33 800	29 200	32 500	35 800	31 000	34 400	37 800
				33 100	36 800	40 500	35 300	39 200	43 100	37 500	41 700	45 900	39 700	44 100	48 500	41 900	46 600	51 300
68.70		68.70	0.688	28 000	28 900	31 800	27 600	30 700	33 800	29 200	32 500	35 800	31 000	34 400	37 800	32 600	36 200	39 800
				35 300	39 200	43 100	27 600	30 700	33 800	29 200	32 500	35 800	31 000	34 400	37 800	32 600	36 200	39 800
10.175" 258.45		81.00	0.800	32 600	36 200	39 800	34 200	38 000	41 800	35 800	39 800	43 800	37 400	41 600	45 800	41 500	46 000	51 300
				44 100	49 000	53 900	46 300	51 500	56 700	48 500	53 900	59 300	50 800	56 400	62 000	55 900	62 000	68 000

VAM® SLLH-I TORQUE VALUES

Size (OD)	Isolated design (if any)	Nominal Weight lb/ft	Wall Thickness In mm	75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140-145 ksi				
				min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.		
In mm				ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m				
10.3/4" 273.05		51.00	0.450	14 800	16 400	18 000	16 200	18 000	19 800	17 700	19 700	21 700	19 200	21 300	23 400	-	-	-		
		55.50	0.495	16 900	18 800	20 700	18 700	20 800	22 900	20 400	22 700	25 000	27 800	26 000	28 900	31 600	-	-	-	
		60.70	0.545	19 400	21 600	23 800	21 100	23 500	25 900	22 800	25 300	27 800	30 900	24 400	27 100	29 800	-	-	-	
		65.70	0.595	21 100	23 500	25 900	22 800	25 300	27 800	24 400	27 100	29 800	32 900	26 000	28 900	31 800	27 600	30 700	33 800	
		71.10	0.650	23 700	26 300	28 900	25 300	28 000	30 700	26 800	29 600	32 500	35 600	28 200	31 200	34 300	31 000	34 000	37 000	
		72.00	0.656	24 400	27 100	29 800	26 000	28 800	31 800	27 600	30 700	33 800	37 500	29 200	32 500	35 800	31 000	34 400	37 800	
		73.20	0.672	25 000	28 000	31 000	27 600	30 700	33 800	29 200	32 500	35 800	39 700	31 000	34 400	37 800	32 600	36 200	39 800	
		75.90	0.700	27 600	30 700	33 800	29 200	32 500	35 800	31 000	34 400	37 800	41 900	34 200	38 000	41 800	34 200	38 000	41 800	
		79.20	0.734	29 200	32 500	35 800	31 000	34 400	37 800	32 600	36 200	39 800	44 100	36 200	39 800	43 400	36 200	39 800	43 400	
		80.80	0.750	29 200	32 500	35 800	31 000	34 400	37 800	32 600	36 200	39 800	44 100	36 200	39 800	43 400	36 200	39 800	43 400	
10.7/8" 276.23	-NA	85.30	0.797	32 600	36 200	39 800	34 200	38 000	41 800	35 800	39 800	43 800	37 400	41 800	45 800	37 400	41 800	45 800		
		97.10	0.922	39 100	43 400	47 700	40 700	45 200	49 700	42 300	47 000	51 700	43 900	48 900	53 700	43 900	48 900	53 700		
		72.00	0.656	24 400	27 100	29 800	26 000	28 800	31 800	27 600	30 700	33 800	37 500	29 200	32 500	35 800	29 200	32 500	35 800	
		98.50	0.860	33 100	36 800	40 500	35 300	39 200	43 100	37 500	41 700	45 900	49 000	43 100	47 500	51 500	44 100	48 500	52 500	
		11.1/2" 282.1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		11.3/4" 288.45		14 800	16 400	18 000	16 300	18 100	19 900	17 700	19 700	21 700	19 300	21 400	23 500	21 000	23 100	25 200	27 300	
		60.00	0.489	17 500	19 400	21 300	19 300	21 500	23 700	21 100	23 500	25 900	28 900	26 000	28 900	31 900	29 000	31 900	34 900	
		65.00	0.534	19 300	21 500	23 700	21 100	23 500	25 900	22 800	25 300	27 800	30 900	24 400	27 100	29 800	24 400	27 100	29 800	
		11.1/2" 282.1		26 200	29 100	32 000	28 700	31 900	35 100	29 700	33 300	37 000	33 100	36 800	40 500	33 100	36 800	40 500	33 100	36 800



VAM® SLU-II TORQUE VALUES

Size (OD)	Isolated design (if any)	Nominal Weight (lb/ft)	Wall Thickness (in)	75-80 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140-145 ksi		
				min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.
in			in	ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m		
11 3/4" 298.45		71.00	0.562	22.80	25.30	27.80	24.40	27.10	29.80	26.00	28.90	31.80	27.60	30.70	33.80	-	-	-
				30.90	34.30	37.70	33.10	36.80	40.50	35.30	39.20	43.10	37.50	41.70	45.90	37.50	41.70	45.90
74.80		74.80	0.618	24.40	27.10	29.80	26.00	28.90	31.80	27.60	30.70	33.80	29.20	32.50	35.80	-	-	-
				33.10	36.80	40.50	35.30	39.20	43.10	37.50	41.70	45.90	39.70	44.10	48.50	39.70	44.10	48.50
75.40		75.40	0.625	24.40	27.10	29.80	26.00	28.90	31.80	27.60	30.70	33.80	29.20	32.50	35.80	-	-	-
				33.10	36.80	40.50	35.30	39.20	43.10	37.50	41.70	45.90	39.70	44.10	48.50	39.70	44.10	48.50
78.80		78.80	0.656	26.00	28.90	31.80	27.60	30.70	33.80	29.20	32.50	35.80	31.00	34.40	37.80	-	-	-
				35.30	39.20	43.10	37.50	41.70	45.90	39.70	44.10	48.50	41.90	46.00	51.30	41.90	46.00	51.30
80.50		80.50	0.672	26.00	30.70	33.80	29.20	32.50	35.80	31.00	34.40	37.80	32.60	36.20	39.80	-	-	-
				37.50	41.70	45.90	39.70	44.10	48.50	41.90	46.00	51.30	44.10	49.00	53.90	44.10	49.00	53.90
82.80	-KA	82.80	0.691	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
87.40		87.40	0.734	31.00	34.40	37.80	32.60	36.20	39.80	34.20	38.00	41.80	46.30	51.50	56.70	35.80	39.80	43.80
				41.90	46.00	51.30	44.10	49.00	53.90	48.50	53.00	57.50	62.00	66.50	71.00	75.50	80.00	84.50	89.00
71.80	11 7/8" 301.63	71.80	0.562	22.80	25.30	27.80	24.40	27.10	29.80	26.00	28.90	31.80	27.60	30.70	33.80	-	-	-
				30.90	34.30	37.70	33.10	36.80	40.50	35.30	39.20	43.10	37.50	41.70	45.90	37.50	41.70	45.90
78.08	12 1/16" 306.40	78.08	0.640	26.00	28.90	31.80	27.60	30.70	33.80	29.20	32.50	35.80	31.00	34.40	37.80	-	-	-
				35.30	39.20	43.10	37.50	41.70	45.90	39.70	44.10	48.50	41.90	46.00	51.30	41.90	46.00	51.30
87.70	12 1/8" 307.98	87.70	0.720	29.20	32.50	35.80	31.00	34.40	37.80	32.60	36.20	39.80	34.20	38.00	41.80	-	-	-
				39.70	44.10	48.50	41.90	46.00	51.30	44.10	49.00	53.90	46.30	51.50	56.70	46.30	51.50	56.70
86.70	12 3/4" 323.85	86.70	0.672	27.60	30.70	33.80	29.20	32.50	35.80	31.00	34.40	37.80	32.60	36.20	39.80	-	-	-
				37.50	41.70	45.90	39.70	44.10	48.50	41.90	46.00	51.30	44.10	49.00	53.90	44.10	49.00	53.90
68.00	13 3/8" 339.73	68.00	0.480	18.10	20.10	22.10	20.30	22.80	24.90	22.80	25.30	27.80	24.40	27.10	29.80	-	-	-
				24.60	27.30	30.00	27.50	30.60	33.70	30.90	34.30	37.70	33.10	36.80	40.50	33.10	36.80	40.50
72.00		72.00	0.514	19.30	21.40	23.50	21.10	23.50	25.90	22.80	25.30	27.80	24.40	27.10	29.80	-	-	-
				26.10	29.00	31.90	28.70	31.90	35.10	30.90	34.30	37.70	33.10	36.80	40.50	33.10	36.80	40.50
77.00		77.00	0.550	21.10	23.50	25.90	22.80	25.30	27.80	24.40	27.10	29.80	26.00	28.90	31.80	-	-	-
				28.70	31.90	35.10	30.90	34.30	37.70	33.10	36.80	40.50	35.30	39.20	43.10	35.30	39.20	43.10
80.70		80.70	0.560	22.80	25.30	27.80	24.40	27.10	29.80	26.00	28.90	31.80	27.60	30.70	33.80	-	-	-
				30.90	34.30	37.70	33.10	36.80	40.50	35.30	39.20	43.10	37.50	41.70	45.90	37.50	41.70	45.90
85.00		85.00	0.608	24.40	27.10	29.80	26.00	28.90	31.80	27.60	30.70	33.80	29.20	32.50	35.80	-	-	-
				33.10	36.80	40.50	35.30	39.20	43.10	37.50	41.70	45.90	39.70	44.10	48.50	39.70	44.10	48.50
86.00		86.00	0.625	26.00	28.90	31.80	27.60	30.70	33.80	29.20	32.50	35.80	31.00	34.40	37.80	-	-	-
				35.30	39.20	43.10	37.50	41.70	45.90	39.70	44.10	48.50	41.90	46.00	51.30	41.90	46.00	51.30

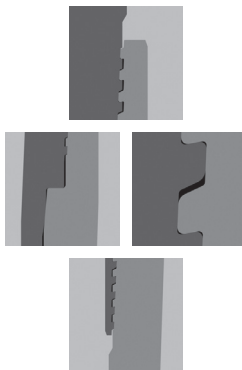
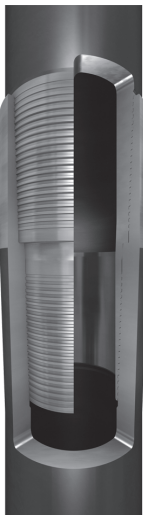
VAM® SLLHJ TORQUE VALUES

Size (OD) In mm	Isolated design (if any)	Nominal Weight lb/ft	Wall Thickness In mm	75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140-145 ksi							
				min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.		
				ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m			ft.lb N/m							
13 3/16* 349.25 339.73		92.00	0.672	29 200	32 500	35 800	31 000	34 400	37 800	32 800	36 200	39 600	34 200	38 000	41 800	-	-	-	-	-			
				39 700	44 100	48 500	41 900	46 600	51 300	44 100	49 000	53 900	46 300	51 500	56 700	48 500	53 900	59 300	-	-	-	-	
				31 000	34 400	37 800	32 800	36 200	39 600	34 200	38 000	41 800	35 800	39 600	43 800	35 800	39 600	43 800	-	-	-	-	
13 3/4* 346.08	-KT	98.56	0.707	41 900	46 600	51 300	44 100	49 000	53 900	46 300	51 500	56 700	48 500	53 900	59 300	-	-	-	-	-			
				32 600	36 200	39 800	34 200	38 000	41 800	35 800	39 600	43 800	38 000	42 000	46 000	39 800	43 800	-	-	-	-		
				44 100	49 000	53 900	46 300	51 500	56 700	48 500	53 900	59 300	48 500	53 900	59 300	31 000	34 400	37 800	-	-	-		
13 5/8* 346.08		88.20	0.825	26 000	28 900	31 800	27 600	30 700	33 800	29 200	32 500	35 800	31 000	34 400	37 800	-	-	-	-	-			
				35 300	39 200	43 100	37 500	41 700	45 900	39 700	44 100	48 500	41 900	46 600	51 300	44 100	49 000	53 900	-	-	-		
				49 770	55 300	60 930	49 770	55 300	60 930	53 640	59 600	65 560	67 480	74 980	82 480	72 720	80 900	88 980	-	-	-		
13 7/8* 352.43	-KT	105.89	0.765	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
				26 000	28 900	31 800	27 600	30 700	33 800	29 200	32 500	35 800	29 200	32 500	35 800	31 000	34 400	37 800	-	-	-		
14* 355.60		82.50	0.562	35 300	39 200	43 100	37 500	41 700	45 900	39 700	44 100	48 500	41 900	46 600	51 300	-	-	-	-	-			
				32 600	36 200	39 800	34 200	38 000	41 800	35 800	39 600	43 800	37 400	41 800	45 800	39 000	43 400	47 700	-	-	-		
				48 500	53 900	59 300	50 800	56 400	62 000	52 900	58 800	64 700	55 200	61 300	67 400	47 300	53 000	59 300	50 800	56 400	62 000	-	-
14* 355.60		100.00	0.700	35 800	39 800	43 800	37 400	41 800	45 800	39 000	43 400	47 700	40 700	45 200	49 700	-	-	-	-	-			
				48 500	53 900	59 300	50 800	56 400	62 000	52 900	58 800	64 700	55 200	61 300	67 400	47 300	53 000	59 300	50 800	56 400	62 000	-	-
				37 400	41 800	45 800	39 000	43 400	47 700	40 700	45 200	49 700	42 300	47 000	51 700	43 900	48 800	53 700	-	-	-		
14* 355.60		104.20	0.734	48 500	53 900	59 300	50 800	56 400	62 000	52 900	58 800	64 700	55 200	61 300	67 400	-	-	-	-	-			
				37 400	41 800	45 800	39 000	43 400	47 700	40 700	45 200	49 700	42 300	47 000	51 700	43 900	48 800	53 700	-	-	-		
				50 800	56 400	62 000	52 900	58 800	64 700	55 200	61 300	67 400	47 300	53 000	59 300	50 800	56 400	62 000	-	-	-		
14* 355.60		106.00	0.750	39 000	43 400	47 700	40 700	45 200	49 700	42 300	47 000	51 700	43 900	48 800	53 700	-	-	-	-	-			
				48 500	53 900	59 300	50 800	56 400	62 000	52 900	58 800	64 700	55 200	61 300	67 400	47 300	53 000	59 300	50 800	56 400	62 000	-	-
				52 900	58 800	64 700	55 200	61 300	67 400	47 300	53 000	59 300	50 800	56 400	62 000	48 500	53 900	59 300	50 800	56 400	62 000	-	-
14* 355.60		112.60	0.797	43 900	48 800	53 700	44 900	49 900	54 900	44 900	49 900	54 900	44 900	49 900	54 900	-	-	-	-	-			
				59 600	66 200	72 800	60 900	67 700	74 500	60 900	67 700	74 500	60 900	67 700	74 500	60 900	67 700	74 500	-	-	-		
				60 900	67 700	74 500	60 900	67 700	74 500	44 900	49 900	54 900	44 900	49 900	54 900	44 900	49 900	54 900	-	-	-		
14* 355.60		115.00	0.812	44 900	49 900	54 900	44 900	49 900	54 900	44 900	49 900	54 900	44 900	49 900	54 900	-	-	-	-	-			
				60 900	67 700	74 500	60 900	67 700	74 500	60 900	67 700	74 500	60 900	67 700	74 500	60 900	67 700	74 500	-	-	-		
				60 900	67 700	74 500	60 900	67 700	74 500	44 900	49 900	54 900	44 900	49 900	54 900	44 900	49 900	54 900	-	-	-		
16* 406.40		84.00	0.485	31 000	34 400	37 800	32 600	36 200	39 800	34 200	38 000	41 800	35 800	39 600	43 800	-	-	-	-	-			
				41 900	46 600	51 300	44 100	49 000	53 900	46 300	51 500	56 700	48 500	53 900	59 300	48 500	53 900	59 300	-	-	-		
				35 800	39 800	43 800	37 400	41 800	45 800	39 000	43 400	47 700	40 700	45 200	49 700	42 300	47 000	51 700	-	-	-		
16* 406.40		97.00	0.575	48 500	53 900	59 300	50 800	56 400	62 000	52 900	58 800	64 700	55 200	61 300	67 400	-	-	-	-	-			
				40 700	45 200	49 700	42 300	47 000	51 700	43 900	48 800	53 700	44 900	49 900	54 900	44 900	49 900	54 900	-	-	-		
				55 200	61 300	67 400	52 900	58 800	64 700	55 200	61 300	67 400	47 300	53 000	59 300	50 800	56 400	62 000	-	-	-		
16* 406.40		104.00	0.625	40 700	45 200	49 700	42 300	47 000	51 700	43 900	48 800	53 700	44 900	49 900	54 900	-	-	-	-	-			
				55 200	61 300	67 400	52 900	58 800	64 700	55 200	61 300	67 400	47 300	53 000	59 300	50 800	56 400	62 000	-	-	-		
				42 300	47 000	51 700	43 900	48 800	53 700	44 900	49 900	54 900	44 900	49 900	54 900	44 900	49 900	54 900	-	-	-		
16* 406.40		108.00	0.658	57 300	63 700	70 100	59 600	66 200	72 800	60 900	67 700	74 500	60 900	67 700	74 500	-	-	-	-	-			
				44 900	49 900	54 900	44 900	49 900	54 900	44 900	49 900	54 900	44 900	49 900	54 900	44 900	49 900	54 900	-	-	-		
				60 900	67 700	74 500	60 900	67 700	74 500	60 900	67 700	74 500	60 900	67 700	74 500	60 900	67 700	74 500	-	-	-		
16* 406.40		118.00	0.715	44 900	49 900	54 900	44 900	49 900	54 900	44 900	49 900	54 900	44 900	49 900	54 900	-	-	-	-	-			
				60 900	67 700	74 500	60 900	67 700	74 500	60 900	67 700	74 500	60 900	67 700	74 500	60 900	67 700	74 500	-	-	-		
				60 900	67 700	74 500	60 900	67 700	74 500	44 900	49 900	54 900	44 900	49 900	54 900	44 900	49 900	54 900	-	-	-		



3.12 VAM® SG

Application



© Vallourec Oil and Gas France

Description:

Integral Semi-Flush
Premium Joint
4" – 5 ½"

Applications:

A single Semi-Flush
premium solution for the
full string length

Enhanced torque and
tension resistance
compared to current
Semi-Flush connections

A highly competitive
solution for Shale play
economics

Main features:

- ⇨ Seal protected from rough handling
- ⇨ Enhanced torque resistance
- ⇨ Reliable running ability
- ⇨ Fit for Shale Rig handling systems
- ⇨ Deep stabbing dual step thread

VAM® SG TECHNICAL DATA

Size (OD)	Nominal Weight		Wall Thickness		Nominal ID	API Drift Diameter	Pipe Body Section	Box OD	Pin ID	Make-up Loss	Threads per inch	Joint Efficiency %	Joint Yield Strength (1000 lb)		
	in	lb/ft	in	mm									C95 T95	C110 P110	Q125
4	11.60	13.20	0.286	7.26	3.428	3.303	sq.in	4.149	3.361	4.509	8	83.0	263	305	346
101.60			0.330	8.38	3.340	3.215	3.805	4.175	3.273	4.955	8	84.0	304	352	400
4 1/2	15.10		0.337	8.56	3.826	3.701	4.407	4.678	3.759	6.696	8	90.0	377	436	496
114.30															
5	21.40	23.20	0.437	11.10	4.126	4.001	6.264	5.252	4.059	6.502	7	90.0	536	620	705
127.00			0.478	12.14	4.044	3.919	6.791	5.276	3.977	7.103	7	91.0	587	680	772
5 1/2	23.00	26.00	0.415	10.54	4.670	4.545	6.630	5.720	4.603	6.502	7	90.0	567	656	746
139.70			0.476	12.09	4.548	4.423	7.513	5.720	4.481	7.443	7	90.0	642	744	845

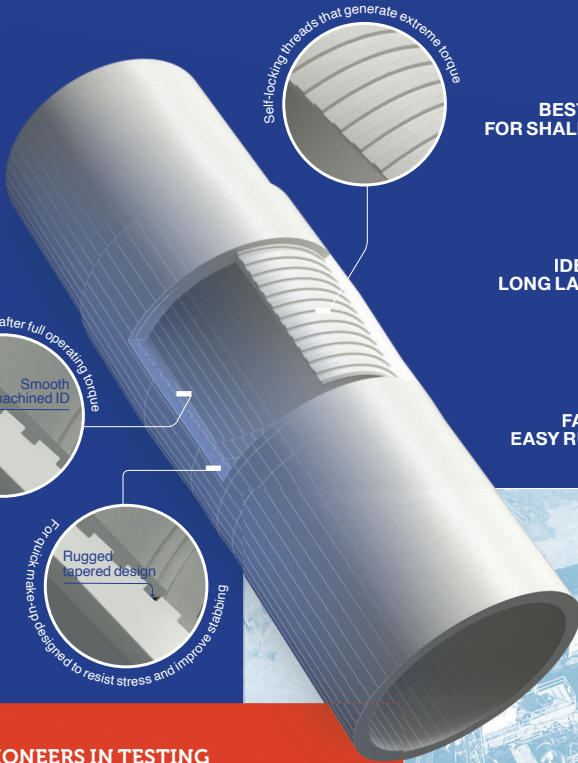
VAM® SG TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	90-95-100 ksi			105-110-115 ksi			120-125-130 ksi		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
in mm	lb/ft	in mm	ft.lb N.m			ft.lb N.m			ft.lb N.m		
4 101.60	11.60	0.286	7 100	7 600	8 100	7 200	8 100	9 000	7 500	8 750	10 000
		7.26	9 626	10 304	10 982	9 762	10 982	12 202	10 169	11 863	13 558
4 1/2 114.30	13.20	0.330	7 800	8 625	9 450	7 950	9 225	10 500	8 100	9 825	11 550
		8.38	10 575	11 694	12 812	10 779	12 507	14 236	10 992	13 321	15 660
5 127.00	15.10	0.337	5 200	5 550	5 900	5 300	5 900	6 500	5 400	6 250	7 100
		8.56	7 100	7 500	7 900	7 200	7 900	8 800	7 400	8 400	9 600
5 1/2 139.70	21.40	0.437	8 700	9 650	10 600	8 900	10 250	11 600	9 100	10 950	12 800
		11.10	11 800	13 000	14 300	12 100	13 800	15 700	12 400	14 800	17 300
5 1/2 139.70	23.20	0.478	10 200	11 050	11 900	10 500	11 800	13 100	10 800	12 550	14 300
		12.14	13 900	14 900	16 100	14 300	15 900	17 700	14 700	17 000	19 300
5 1/2 139.70	23.00	0.415	8 700	9 850	11 000	8 900	10 550	12 200	9 100	11 200	13 300
		10.54	11 800	13 300	14 900	12 100	14 300	16 500	12 400	15 100	18 000
5 1/2 139.70	26.00	0.476	11 300	11 900	12 500	11 600	12 700	13 800	11 900	13 450	15 000
		12.09	15 400	16 100	16 900	15 800	17 200	18 700	16 200	18 200	20 300

VAM® SPRINT-SF

EXTREME TORQUE DESIGNED FOR SHALE PLAY CHALLENGES

VAM® SPRINT-SF is a cost-effective innovative semi-flush connection with outstanding pressure ratings and ultra high torque, making it ideal for challenging shale plays with tight clearance requirements.



**BEST VALUE
FOR SHALE PLAYS**



**IDEAL FOR
LONG LATERALS**



**FAST AND
EASY RUNNING**

Transition ensures full drillability even after full operating torque

Smooth machined ID

Self-locking threads that generate extreme torque

Rugged tapered design
For quick make-up designed to resist stress and improve stabbing

PIONEERS IN TESTING "FIT FOR SHALE"

VAM® SPRINT-SF was tested using "Fit for Shale" VAM® protocol that simulates real-world conditions during the life of the well. Done at the full product ratings and following API RP 5C5:2017 and API 5SF requirements, it demonstrated performance in sealability (MTS), torque make up, fatigue cycles, high temperatures, internal pressure & combined loads cycles, as well as gas testing at 80% of its envelope.

TO LEARN MORE, SCAN THE QR CODE



3.13 VAM® EDGE SF



VAM® EDGE SF is a gas-tight semi-flush premium connection with increased tension and torque capacity, making it ideal for production casing in the Shale plays.

The tapered two-step thread design technology means that it stabs deep with no risk of cross-threading. The gas-tight metal seal is located between the two thread steps, thus protecting it from handling damage.

VAM® EDGE SF's high tension rating plus extremely high torque capacity make it ideal to run a full string length as production casing in Shale wells with extended horizontal sections.

Applicable Range

- Available in sizes from 4 1/2" to 5 1/2"
- Carbon steel, 95 – 140 ksi (including High Collapse grades)

Applications

- Production casing
- Oil & Gas shale plays
- Extended Reach, Horizontal with long laterals (10,000 ft and beyond).

Performances

- Internal pressure resistance up to pipe body ratings
- Collapse rating: 70% API 5C3
- Tension rating: up to 83% of pipe body yield strength (depending on size/weight)
- Compression rating: up to 83% of pipe body
- Bending rating: 40° / 100 ft
- Excellent jump-out resistance with a dove-tailed locking thread form
- Sealability validated to API 5C5 2017 CAL II, plus a fit for purpose shale test program including fatigue testing.

Benefits

- Torque capacity ideal for longer laterals pushing 10,000 ft
- Single solution for vertical and horizontal sections of Shale wells
- High clearance semi-flush design
- Compatible with environmentally friendly thread compounds.

Running

VAM® EDGE SF is an integral connection therefore it does not have a coupling face to lift on. For this reason lifting plugs or subs are required. It is recommended to place the tong grips at least 6 inches above the pin threads and, if using a tong with integral back-up to grip the box at a distance of at least 12 inches from the box face.

Thread Compound

The applicable thread compounds for VAM® EDGE SF are API modified thread compounds and Jet-Lube Seal-Guard™. Application of the thread compound shall be uniform. The thread form shall be visible after application. The thread compound shall be applied on the pin and on the box evenly and shall entirely cover the machined profile, including run-out threads. Knurling marks are not to be covered.

Size (OD)	Nominal weight	Wall thickness	Minimum Volume		Maximum Volume	
			(cm ³)	(in ³)	(cm ³)	(in ³)
4 1/2" <i>114.30</i>	13.50	0.29	10	0.61	13	0.79
	15.10	0.337	11	0.67	15	0.92
5" <i>127.00</i>	18.00	0.362	12	0.73	16	0.98
	21.40	0.437	13	0.79	17	1.04
	23.20	0.478	13	0.79	17	1.04
5 1/2" <i>139.00</i>	20.00	0.361	14	0.85	19	1.16
	23.00	0.415	13	0.79	17	1.04
	26.00	0.476	15	0.92	20	1.22

Make-up criteria / Torques

The term “locked flanked torque” is used in place of “shouldering torque”, as for most other VAM® connections, due to the specificity of this connection and its thread profile. It is recommended that VAM® EDGE SF is made-up to its optimum torque in the field. Nevertheless, if it is necessary for the application, it is allowed to use the MTS (Maximum Torque with Sealability) as per below:

- VAM® EDGE SF is made-up to the optimum torque and after that when rotating the string the torque applied on it shall not exceed the MTS.
- VAM® EDGE SF is made-up to a torque in between the maximum torque and the MTS and again when in-service down-hole, the connection shall not be submitted to a torque higher than the MTS to keep the full sealability performance.

MTS = Maximum Torque with Sealability. This maximum torque level can be applied either on the rig make-up, or during rotation downhole, keeping full connection sealability performances.

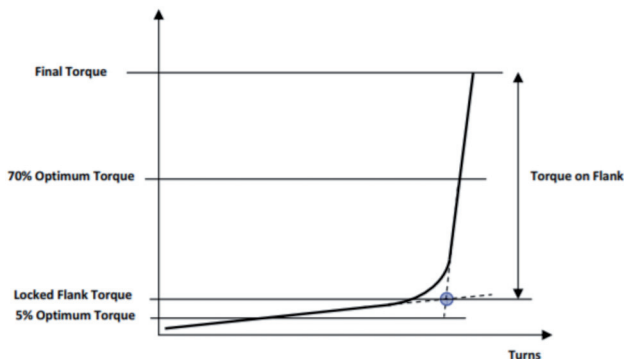
MTV = Maximum Torsional Value. It is the torque value where significant yielding occurs. Performances and drift ability of the connection may be compromised, a reasonable safety factor shall be applied when considering use of these values.

Determination of “locked flank torque”

- Automatic “locked flank torque” determination is acceptable but must display a value close to manual or visual determination. In case of automatic determination, a visual spot check shall be periodically performed in order to verify that there is no discrepancy.

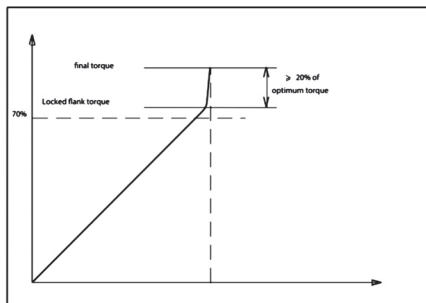
General criteria:

- Minimum locked flank torque = 5 % of the optimum torque
- Maximum locked flank torque = 70 % of the optimum torque



Criteria if the locked flank torque exceeds 70% of the optimum torque

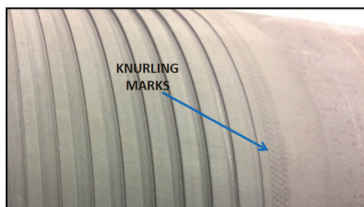
- Final torque shall be between optimum and maximum.
- Measure the torque on flank (final torque – locked flank torque) with the graph.
- If the torque on flank is higher than 20% of the optimum torque, the connection is acceptable.
- If the torque on flank is lower than 20% of the optimum torque, the connection may be broken out, cleaned, visually checked (no galling, no damage, no geometrical defect) and, if acceptable, made-up again to a final torque between the optimum and the maximum torque; it can be accepted with the same acceptance criteria for torque on flank



Make-Up Position Indicator

VAM® EDGE SF has a knurling mark on the pin OD that serves as a make-up position indicator. The following must be observed as a part of the overall VAM® EDGE SF acceptance make-up criteria:

- Knurling marks on the pin OD must be at least covered by the lip of the box.
- If make-up is short, break out connection, inspect for defects, and re-make at maximum torque with minimum dope.
- If make-up exceeds (covers) knurling mark, break out the connection and inspect for damages. Evaluate the make-up chart for over-torque. If graph and connection are good remake at minimum torque with maximum dope. The acceptance criteria for the curve must still be respected.
- If on a re-make the connection still fails to achieve the proper position, both pin and box connections are to be laid down and rejected.



GOOD MAKE UP	MAKE UP EXCEEDS KNURL MARK	SHORT MAKE UP
PIN	PIN	PIN
ACCEPT	REJECT	REJECT

VAM® EDGE SF TECHNICAL DATA

Size (OD)	Nominal Weight	Wall Thickness		Drift Diameter	Box OD	Pin ID	Efficiency	Connection Yield Strength (kips)			Internal Yield Pressure (psi)			External Pressure Resistance (psi)		
		in	mm					95 ksi	110 ksi	125 ksi	95 ksi	110 ksi	125 ksi	95 ksi	110 ksi	125 ksi
4 1/2" <i>114.30</i>	13.50	0.290	7.37	3.795	4.725	3.848	74.0	269	312	355	11 020	12 760	14 500	6 760	7 480	8 120
	15.10	0.337	8.56	3.701	4.725	3.754	76.0	318	369	419	12 810	14 830	16 850	8 940	10 050	11 090
5" <i>127.00</i>	18.00	0.362	9.19	4.151	5.252	4.204	79.0	396	458	521	12 040	13 940	15 840	8 410	9 430	10 370
	21.40	0.437	11.10	4.001	5.252	4.054	83.0	494	572	650	14 530	16 820	19 120	10 610	12 290	13 960
5 1/2" <i>139.00</i>	23.20	0.478	12.14	3.919	5.252	3.972	83.0	535	620	705	15 890	18 400	20 910	11 500	13 310	15 290
	20.00	0.361	9.17	4.653	5.765	4.706	79.0	438	506	576	10 910	12 640	14 350	7 010	7 770	8 460
	23.00	0.415	10.54	4.545	5.765	4.598	82.0	517	598	680	12 540	14 530	16 510	9 050	10 180	11 350
	26.00	0.476	12.09	4.423	5.765	4.476	83.0	593	686	779	14 390	16 660	18 930	10 510	12 170	13 830

VAM® EDGE SF TORQUE VALUES

Size (OD)	Nominal weight	Wall thickness	95 - 140 ksi		
			Min.	Opt.	Max.
In mm	Lb/ft	In mm	ft.lb N/m		
4 1/2" 114.30	13.50	0.280	12 400	13 400	14 400
		7.37	16 800	18 150	19 500
	15.10	0.337	13 800	14 800	15 800
		8.56	18 700	20 050	21 400
5" 127.00	18.00	0.362	16 200	17 200	18 200
		9.19	22 000	23 300	24 500
	21.40	0.437	17 700	18 450	19 200
	23.20	0.478	17 700	18 450	19 200
		11.10	24 000	25 000	26 000
		12.14	24 000	25 000	26 000
5 1/2" 139.00	20.00	0.361	16 950	17 950	18 950
		9.17	23 000	24 000	25 700
	23.00	0.415	17 700	18 450	19 200
	26.00	0.476	24 000	25 000	26 000
		10.54	24 000	25 000	26 000
		12.09	17 700	18 450	19 200
		12.09	24 000	25 000	26 000

VAM® EDGE SF MTY VALUES

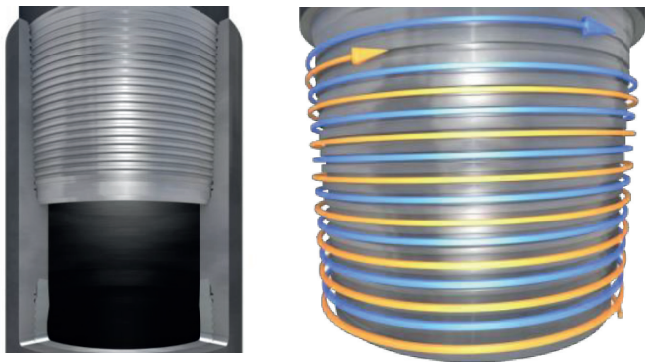
Size (OD)	Nominal weight	Wall thickness	Maximum Torsional Value		
			95 ksi	110 ksi	125 ksi
In mm	Lb/ft	In mm	ft.lb N/m		
4 1/2" 114.30	13.50	0.280	19 500	22 000	25 000
		7.37	26 450	29 850	33 900
	15.10	0.337	22 000	24 500	27 500
		8.56	29 850	33 200	37 300
5" 127.00	18.00	0.362	22 000	24 500	28 000
		9.19	29 800	33 200	37 500
	21.40	0.437	22 000	25 000	28 000
	23.20	0.478	22 000	25 500	28 500
		11.10	29 800	33 800	37 900
		12.14	29 800	34 500	38 600
5 1/2" 139.00	20.00	0.361	25 500	29 000	32 500
		9.17	34 500	39 300	44 000
	23.00	0.415	26 000	30 000	33 000
	26.00	0.478	28 000	32 000	35 500
		10.54	35 200	40 600	44 700
		12.09	37 900	43 300	48 100

VAM® EDGE SF MTS VALUES

Size (OD)	Nominal weight	Wall thickness	Maximum Torque with Sealiability		
			95 ksi	110 ksi	125 ksi
In mm	Lb/ft	In mm	ft.lb N/m		
4 1/2" 114.30	13.50	0.280	17 750	20 000	22 500
		7.37	24 050	27 100	30 500
	15.10	0.337	20 000	22 500	25 000
		8.56	27 100	30 500	33 900
5" 127.00	18.00	0.362	20 000	22 500	25 250
		9.19	27 100	30 500	34 200
	21.40	0.437	23 750	27 000	30 250
	23.20	0.478	20 250	23 000	25 750
		11.10	32 200	36 600	41 000
		12.14	27 400	31 100	34 900
5 1/2" 139.00	20.00	0.361	23 250	26 250	29 500
		9.17	31 500	35 600	40 000
	23.00	0.415	23 750	27 000	30 250
	26.00	0.476	25 500	29 000	32 500
		10.54	32 200	36 600	41 000
		12.09	34 500	39 300	44 000

Higher torques may be available with specified thread compounds. Please contact your VAM® representative for more information.

3.14 VAM® LOX



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Application

VAM® LOX is a premium threaded and coupled casing designed for surface casing and conductors pipes. The VAM® LOX connection provides great performances and fast running for high end applications (HPHT wells, Deep wells, offshore wells).

VAM® LOX allows for gas-tightness thanks to its metal-to-metal seal. Structural integrity is ensured as the connection is as-strong-as the pipe. It is suitable for surface casing applications that may experience gas kicks or shallow gas loads.

Design features and performances

- It is available on 18 5/8" and 20". Other sizes available upon request.
- Available for API 5CT carbon grades from 55 ksi to 125 ksi including proprietary sour service.
- Seal ability validated with combined loads cycles up to API RP 5C5 4th edition 2017 CAL I with gas. Validated with API modified thread compound and Bestolife 4010NM (yellow rated thread compound)
- Internal metal to metal seal provides internal and external pressure tightness under combined loads.
- Maximum tension and compression resistance (100% of the connection yield strength).
- Suitable for applications where fatigue loads are expected.
- Easy running properties thanks to fast make-up with double start thread, improved stabbing.
- Internal shoulder that provides high torque and high compression capability.

VAM® LOX benefits

Operational benefits

- Standard make-up equipment and procedure as per other OCTG T&C premium connections with usual casing power tongs.
- Fast make-up thanks to double start thread and robust thread profile. Make-up in less than 3 turns.
- No lifting sub equipment needed as standard elevators are used on the coupling face.
- Easy to repair: No need for welding the connector as connection is directly threaded on the pipe
- No anti-break-out device needed due to reliable high break-out ratio. Save time during running
- Flush ID to ease drilling tools and casing string running inside.

Dope quantities

The minimum quantity of compound should be shared between Pin and Box ends as follows:

- 50% on Box (never leave the box without any dope)
- 50% on Pin
- Dope should be applied evenly in order to get a uniform coating on all parts of the connection.
- If a dope applicator is used for the box end it shall be adjusted to apply the above recommended quantity of dope.

Thread Compound

Size (OD)	Nominal Weight	Minimum dope volume		Maximum dope volume	
		(cm ³)	(in ³)	(cm ³)	(in ³)
18 5/8"	87.50	92	5.7	138	8.5
	96.50	97	6.0	145	8.9
	114.00	109	6.7	163	10.0
	136.00	122	7.5	183	11.2
	139.00	125	7.7	187	11.5
	147.00	129	7.9	193	11.9
	150.50	131	8.1	196	12.0
	155.00	134	8.2	201	12.4
20"	94.00	99	6.1	148	9.1
	106.50	107	6.6	160	9.7
	133.00	124	7.6	186	11.4
	147.00	133	8.2	199	12.1
	155.50	138	8.5	207	12.7
	169.00	146	9.0	219	13.5

VAM® LOX TECHNICAL DATA

Size (OD)	Specific design (if any)	Nominal Weight lb./ft.	Wall Thickness		API Drift Diameter inch.	Coupling OD (reg) inch.	Coupling ID (reg) inch.	Make-up Loss inch.	Coupling Length inch.	Pipe Body Section sq.in.	Coupling CCS sq.in.	Regular Yield Strength (1000 lb.)							
			inch	mm								55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi
18.56" 473.075		87.50	0.455	17.565	19.362	17.817	5.630	13.268	24.859	25.388	1.368	1.989	2.113	2.238	2.362	2.486	2.735	3.108	
			<i>11.05</i>																
			96.50	0.465	17.468	19.433	17.731	5.984	13.976	27.640	28.299	1.521	2.212	2.350	2.488	2.626	2.764	3.041	3.455
				<i>12.32</i>															
			114.00	0.579	17.280	19.559	17.569	6.654	15.315	32.827	33.569	1.806	2.627	2.791	2.955	3.119	3.283	3.611	4.104
				<i>14.71</i>															
			136.00	0.693	17.052	19.709	17.541	7.480	16.969	39.040	39.861	2.148	3.124	3.319	3.514	3.709	3.905	4.295	4.881
				<i>17.60</i>															
			136.00	0.720	16.998	19.744	17.493	7.677	17.362	40.501	41.352	2.228	3.241	3.443	3.646	3.848	4.051	4.456	5.063
				<i>18.29</i>															
			147.00	0.755	16.926	19.791	17.432	7.913	17.835	42.396	43.327	2.332	3.391	3.603	3.815	4.027	4.239	4.663	5.299
				<i>19.16</i>															
		150.50	0.775	16.886	19.815	17.397	8.071	18.150	43.460	44.351	2.391	3.477	3.685	3.912	4.129	4.347	4.781	5.433	
			<i>19.69</i>																
		155.00	0.800	16.838	19.846	17.353	8.228	18.465	44.800	45.702	2.464	3.584	3.808	4.032	4.256	4.480	4.928	5.600	
			<i>20.32</i>																
20" 508		94.00	0.438	18.937	20.744	19.187	5.669	13.346	26.917	27.506	1.481	2.154	2.288	2.423	2.558	2.692	2.961	3.365	
			<i>11.13</i>																
			106.50	0.500	18.813	20.831	19.080	6.142	14.291	30.631	31.340	1.685	2.451	2.604	2.757	2.910	3.064	3.370	3.829
				<i>12.70</i>															
			133.00	0.635	18.543	21.012	18.847	7.126	16.260	38.631	39.465	2.125	3.091	3.264	3.477	3.670	3.864	4.250	4.829
				<i>16.13</i>															
			147.00	0.709	18.395	21.110	18.901	7.638	17.283	42.969	43.891	2.364	3.438	3.653	3.868	4.083	4.297	4.727	5.372
				<i>18.01</i>															
			165.50	0.760	18.313	21.165	18.829	7.953	17.913	45.357	46.365	2.495	3.629	3.856	4.083	4.309	4.536	4.990	5.670
				<i>19.05</i>															
			166.00	0.812	18.189	21.244	18.721	8.386	18.780	48.949	49.954	2.693	3.916	4.161	4.406	4.651	4.895	5.385	6.119
				<i>20.62</i>															
	SC95	166.00	0.812	18.189	21.142	18.721	8.386	18.780	48.949	48.546	2.693	3.916	4.161	4.406	4.651	4.895	5.385	6.119	
			<i>20.62</i>																

VAM® LOX TORQUE VALUES

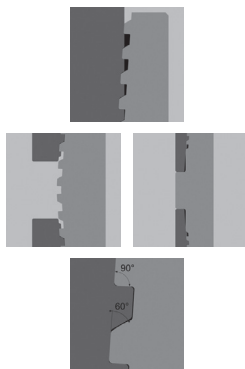
Size (OD)	Nominal Weight	Wall Thickness	55-125 ksi		
			min.	opti.	max.
in mm	lb/ft	in mm	ft. lbs. N.m.		
18 5/8	87.50	0.435	27 100	32 000	34 100
		11.05	36 800	43 400	46 200
	96.50	0.485	33 300	38 500	40 300
		12.32	45 200	52 200	54 600
	114.00	0.579	44 900	51 600	53 900
		14.71	60 900	70 000	73 000
	136.00	0.693	60 500	69 600	72 600
		17.60	82 100	94 400	98 400
	139.00	0.72	65 300	75 100	78 400
		18.29	88 600	101 800	106 200
	147.00	0.755	70 300	80 900	84 400
		19.18	95 400	109 700	114 400
	150.50	0.775	73 300	84 300	88 000
		19.69	99 400	114 300	119 300
	155.00	0.800	76 900	88 400	92 300
		20.32	104 300	119 900	125 100
20	94.00	0.438	22 300	25 800	29 300
		11.13	30 300	35 000	39 700
	106.50	0.500	34 300	37 800	41 300
		12.70	46 600	51 300	55 900
	133.00	0.635	49 100	52 600	56 100
		16.13	66 600	71 300	76 000
	147.00	0.709	58 300	61 800	65 300
		18.01	79 100	83 800	88 500
	155.50	0.750	66 900	70 400	73 900
		19.05	90 800	95 400	100 100
	169.00	0.812	73 500	77 000	80 500
		20.62	99 700	104 400	109 100

VAM® LOX TORQUE TABLE - ISOLATED SPECIAL PRODUCTS

Size (OD)	Nominal Weight	VAM® LOX Isolated & Special Products	Wall Thickness	55-125 KSI		
				min.	opti.	max.
in mm	lb/ft		in mm	ft. lbs. N.m.		
20	133	VAM® LOX-NA	0.635	60 500	64 000	67 500
			16.13	82 000	86 700	91 500
20	169	VAM® LOX-SC95	0.750	73 500	77 000	80 500
			19.05	99 700	104 400	109 100

3.15 BIG OMEGA[®]

Application



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Design Principles

BIG OMEGA[®] Casing can be delivered in OD's ranging from 14 in. to 26 in. and in lengths corresponding to API ranges 1 to 3 (including pup joints).

BIG OMEGA[®] is a threaded & coupled connection. The pin thread is cut directly into the pipe, so any problem associated with weld-on connectors is eliminated.

Standard coupling OD complies with standard rules; it can be increased for higher grades and / or thicker wall thicknesses if matching internal pressure resistance is required for pipe body vs. connection (-MS option).

An internal torque shoulder (-IS option) is available upon request for applications requiring high torque, bending and/or high axial compression performance.

BIG OMEGA[®] Casing is a mill threaded pipe. It is available in normalized or quenched and tempered condition in both API and Vallourec standard, low temperature and sour service proprietary grades.

BIG OMEGA[®] Casing possesses the rugged Vallourec developed thread profile featuring:

- 3TPI versus Buttress 5TPI which avoids any cross-threading and considerably speeds up running time
- Taper 1:7.5 versus Buttress 1:12 for easier stabbing and quicker running
- Load flank perpendicular to thread cone
- Stabbing flank 30°
- Crests and roots parallel to cone
- Enhanced thread height 0.0846 in. (2,15 mm) versus Buttress which eliminates jump-out under highest tensile loads

Outside diameter BIG OMEGA[®]

The outside diameter of the BIG OMEGA[®] Casing according to API 5CT. The inside diameter of the auxiliary elevator with the picked up BIG OMEGA[®] Casing should be fixed aligned with the axis of the casing already installed in the rotary table. The elevator should be hung up freely moving at a swivel, which turns easily during make-up.

Dope Quantities

BIG OMEGA[®] casing in grades J 55 Through to N80 is usually made up with API modified or non-metallic thread compounds. Grades 95 ksi and higher grades require make up with Jet Lube Run-N-Seal or equivalent. 100 % dope quantity should be applied to the pin or box end. 120g to 150g of dope should be applied for all dimensions independent of the dope type.

Make up of BIG OMEGA[®]

The capacity of the power tong must be at least 60% higher than the guiding torque to allow breaking of a connection or to make up joints with thread locking compound.

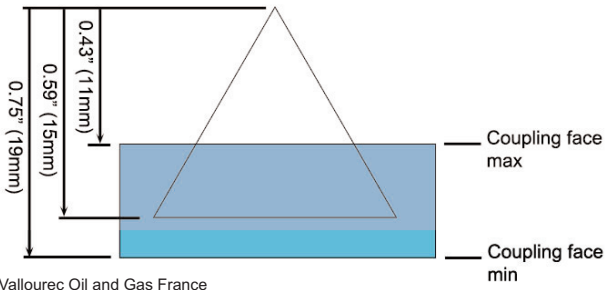
Stab casing carefully to avoid injuring threads. A good crew coordination is essential.

BIG OMEGA[®] Connections must be made up with a certain torque value.

- A triangle is hard-stamped on each thread. The location is marked by a long white line on the pin-end side.
- To find the proper torque at least 10 power make-ups to the base of this triangle should be carried out on each running job. The average torque value of these make-ups is the proper torque to run the total casing string.
- Power make-up procedure should not be interrupted until the proper torque value is reached.
- Every connection should be checked for correct power make-up position (see sketch): the coupling face after power make-up must be within the tolerance area of 0.433"(11 mm) to 0.748"(19 mm) referred to the apex of triangle

BIG OMEGA[®]-IS has to be made-up with specified make-up torque. It is highly recommended to use torque-turn monitoring when running BIG OMEGA[®]-IS. In such case, clear evidence of shoulder will allow accepting the proper make-up. In order to ensure correct makeup of BIG OMEGA[®]-IS on rigs without torque-turn equipment, these connections are also supplied with hard-stamped triangle stamps as a standard.

Make-up position.



For proper make-up of BIG OMEGA[®], the coupling face has to reach the base of the triangle.

Make-up torque table as guide for choice of power tong capacity.

A guiding torque recommendation is listed in the table below for choice of power tong capacity.

OD		Guiding make-up torque values with API mod. thread compound All grades	
in	mm	ft.lb	N.m
14	355.66	12 000	16 500
16	406.40	13 000	17 500
18 5/8	473.10	15 000	20 500
20	508.00	16 000	22 000
24	609.60	17 000	23 500
24 1/2	622.30	18 000	25 000
26	660.40	20 000	27 500

Commonly experienced torque factors:

API modified thread compound : 1.0

Jet LubeTF 15 : 0.9

Bakerlock : 1.3

Jet Lube Run-N-Seal : 1.0

BIG OMEGA® TECHNICAL DATA

Size (OD) in mm	Nominal Weight lb/ft	Wall Thickness		API Drift Diameter	Coupling Length	Pipe Body Section		Coupling OD (reg) in	Collapse Resistance (psi)				Internal Yield Pressure Pipe Body (psi)				Connection Leak Resistance (psi)				
		in	mm			in	sq.in		type	K-55	N-80	R-95	P-110	K-55	N-80	R-95	P-110	K-55	N-80	R-95	P-110
14" 355.60	82.50	0.562	14.27	12.889	10.630	15.0	23.726	Reg	2420	2940	3160	3270	3860	5620	6670	7730	4480	6140	8220	9050	
	94.80	0.656	16.66	12.501	10.630	15.0	27.500	Reg	3530	4220	4450	4790	4510	6650	7790	9020	4490	6140	8220	9050	
	94.80	0.656	16.66	12.501	10.630	15.5	27.500	MS	3530	4220	--	--	4510	6650	--	--	5730	7830	--	--	
	99.00	0.688	17.48	12.437	10.630	15.0	28.773	Reg	3900	4780	5120	5330	4730	6880	8170	9460	4490	6140	8220	9050	
	99.00	0.688	17.48	12.437	10.630	15.5	28.773	MS	3900	4780	--	5330	4730	6880	--	9460	5730	7830	--	11530	
	110.00	0.772	19.61	12.269	10.630	32.082	15.0	48.900	Reg	4890	6260	6910	7440	5310	7720	9170	10620	4490	6140	8220	9050
	110.00	0.772	19.61	12.269	10.630	32.082	15.5	MS	4890	6260	6910	7440	5310	7720	9170	10620	5730	7830	10470	11530	
	75.00	0.438	11.13	14.937	10.630	21.414	17.0	Reg	1020	--	--	--	2630	--	--	--	3720	--	--	--	--
	84.00	0.495	12.57	14.823	10.630	24.112	17.0	Reg	1410	1480	--	--	2960	4330	--	--	3720	4880	--	--	--
	94.50	0.562	14.27	14.889	10.630	27.257	17.0	Reg	1870	2140	2190	2190	3380	4820	5840	6760	4110	5390	6360	7650	8580
109.00	0.656	16.66	14.501	10.630	31.622	17.0	Reg	2560	3080	3320	3470	3950	5740	6820	7890	4110	5390	6360	7650	8580	
109.00	0.656	16.66	14.501	10.630	31.622	17.5	MS	--	3080	3320	3470	--	5740	6820	7890	--	6910	8140	9790	--	
118.00	0.715	18.16	14.383	10.630	34.334	17.0	Reg	3170	3680	4030	4300	4300	6260	7430	8600	4110	5390	6360	7650	8580	
118.00	0.715	18.16	14.383	10.630	34.334	17.5	MS	3170	3680	4030	4300	4300	6260	7430	8600	5270	6910	8140	9790	--	
128.00	0.781	19.84	14.251	10.630	37.341	17.0	Reg	3850	4700	5020	5240	4700	6830	8120	9400	4110	5390	6360	7650	8580	
128.00	0.781	19.84	14.251	10.630	37.341	17.5	MS	3850	4700	5020	5240	4700	6830	8120	9400	5270	6910	8140	9790	--	
147.00	0.906	23.01	14.001	10.630	42.982	17.0	Reg	5130	6620	7340	7950	5450	7930	9410	10900	4110	5390	6360	7650	8580	
147.00	0.906	23.01	14.001	10.630	42.982	18.0	MS	5130	6620	7340	7950	5450	7930	9410	10900	6340	8300	9790	11760	--	
18 5/8" 473.08	87.50	0.435	11.05	17.568	10.630	24.858	20.0	Reg	630	--	--	--	2250	--	--	3730	--	--	--	--	
	96.50	0.495	12.32	17.468	10.630	27.639	20.0	Reg	870	870	--	--	2510	3650	--	--	3730	5070	--	--	
	114.00	0.579	14.71	17.280	10.630	32.835	20.0	Reg	1420	1500	1500	1500	2990	4350	5170	5880	4030	5480	6850	7540	
	136.00	0.693	17.60	17.052	10.630	38.040	20.0	Reg	2090	2470	2590	2610	3580	5210	6190	7160	4030	5480	6850	7540	
	139.00	0.720	18.29	16.998	10.630	40.500	20.0	Reg	2250	2710	2870	2930	3720	5410	6430	7440	4030	5480	6850	7540	
	94.00	0.438	11.13	18.937	10.630	26.918	21.0	Reg	520	--	--	--	2110	--	--	--	2990	--	--	--	
	106.50	0.500	12.70	18.813	10.630	30.631	21.0	Reg	770	770	--	--	2410	3600	--	--	2690	4130	--	--	
	118.50	0.563	14.30	18.687	10.630	34.379	21.0	Reg	1100	1110	1110	1110	2710	3940	4680	5420	3300	4550	4550	5380	
	118.50	0.563	14.30	18.687	10.630	34.379	21.5	MS	--	--	1110	1110	--	--	4680	5420	--	--	5870	6960	
	133.00	0.635	16.13	18.543	10.630	36.831	21.0	Reg	1500	1600	1600	1600	3060	4450	5280	6110	3300	4550	4550	5380	
133.00	0.635	16.13	18.543	10.630	36.831	21.5	MS	--	--	1600	1600	--	--	5280	6110	--	--	5870	6960		
147.00	0.709	18.01	18.395	10.630	42.989	21.0	Reg	1900	2190	2250	2250	3410	4860	5890	6820	3300	4550	4550	5380		
147.00	0.709	18.01	18.395	10.630	42.989	21.5	MS	1900	2190	2250	2250	3410	4860	5890	6820	4260	5870	5870	6960		
156.00	0.750	19.02	18.313	10.630	45.357	21.0	Reg	2130	2520	2640	2670	3610	5230	6230	7220	3300	4550	4550	5380		
169.00	0.812	20.62	18.189	10.630	48.948	21.0	Reg	2500	3020	3240	3370	3910	5680	6750	7820	3300	4550	4550	5380		
169.00	0.812	20.62	18.189	10.630	48.948	21.5	MS	2500	3020	3240	3370	3910	5680	6750	7820	4260	5870	5870	6960		
169.00	0.812	20.62	18.189	10.630	48.948	22.0	MS	--	--	3240	3370	--	--	6750	7820	--	--	7110	8410		



BIG OMEGA® TECHNICAL DATA

Size (OD) In mm	Nominal Weight lb/ft mm	Wall Thickness		Pipe Body Yield Strength (ksi)					Joint Strength (lb)				
		in	mm	K-55	N-80	R-95	P-110	K-55	N-80	R-95	P-110		
												Pipe Body Yield Strength (ksi)					Joint Strength (lb)
14" 356.60	82.50	0.562	14.27	1305	1888	2254	2610	1560	1918	2152	2523		
	94.80	0.656	16.66	1513	2200	2613	3025	1808	2224	2494	2924		
	94.80	0.656	16.66	1513	2200	--	1808	2224	--	--	--		
	99.00	0.698	17.48	1653	2302	2733	3165	1892	2326	2609	3060		
	99.00	0.698	17.48	1653	2302	--	3165	1892	2326	--	3060		
16" 406.40	110.00	0.772	19.61	1765	2567	3048	3529	2109	2594	2910	3411		
	110.00	0.772	19.61	1765	2567	3048	3529	2109	2594	2910	3411		
	75.00	0.438	11.13	1178	--	--	1331	--	--	--	--		
	84.00	0.495	12.57	1326	1929	--	1499	1898	--	--	--		
	94.50	0.562	14.27	1499	2181	2589	2996	1694	2146	2434	2946		
18 5/8" 473.08	109.00	0.656	16.66	1739	2530	3004	3478	1965	2489	2823	3302		
	109.00	0.656	16.66	--	2530	3004	3478	--	2489	2823	3302		
	118.00	0.715	18.16	1888	2747	3262	3777	2134	2703	3065	3585		
	118.00	0.715	18.16	1888	2747	3262	3777	2134	2703	3065	3585		
	128.00	0.781	19.84	2054	2987	3547	4108	2321	2940	3334	3899		
20" 508.00	128.00	0.781	19.84	2054	2987	3547	4108	2321	2940	3334	3899		
	147.00	0.906	23.01	2363	3437	4081	4726	2670	3382	3807	4486		
	147.00	0.906	23.01	2363	3437	4081	4726	2670	3382	3807	4486		
	139.00	0.720	18.29	2228	3240	3848	4455	2326	3075	3541	4128		
	94.00	0.438	11.13	1480	--	--	1479	--	--	--	--		
20" 508.00	106.50	0.500	12.70	1685	2450	--	1683	2281	--	--	--		
	118.50	0.563	14.30	1891	2750	3266	3782	1889	2560	2973	3459		
	118.50	0.563	14.30	--	--	3266	3782	--	--	2973	3459		
	133.00	0.635	16.13	2125	3090	3670	4249	2123	2877	3340	3887		
	133.00	0.635	16.13	--	--	3670	4249	--	--	3340	3887		
20" 508.00	147.00	0.709	18.01	2363	3438	4082	4727	2361	3200	3715	4323		
	147.00	0.709	18.01	2363	3438	4082	4727	2361	3200	3715	4323		
	156.00	0.750	19.05	2495	3629	4309	4989	2492	3378	3822	4563		
	169.00	0.812	20.62	2692	3916	4650	5384	2689	3645	4232	4925		
	169.00	0.812	20.62	2692	3916	--	4650	5384	--	4232	4925		

BIG OMEGA® TECHNICAL DATA

Size (OD) In mm	Nominal Weight lb/ft	Wall Thickness		API Drift Diameter in	Make-up Loss in	Coupling Length		Pipe Body Section Seq In	Coupling OD (req) in	Collapse Resistance (psi)				Internal Yield Pressure Pipe Body (psi)				Connection Leak Resistance (psi)									
		in	mm			in	in			K-55	N-80	R-95	P-110	K-55	N-80	R-95	P-110	K-55	N-80	R-95	P-110						
24" 609.60	162.00	0.635	16.13	22.462*	4.815	10.630	46.611	25.0	Reg	920	920	--	--	2550	3700	--	--	2510	3980	--	--	2510	3980	--	--		
	174.00	0.688	17.48	22.356*	4.815	10.630	50.387	25.0	Reg	1160	1170	1170	1170	2760	4010	4770	5620	2510	3980	3980	4280	2510	3980	3980	4280		
	174.00	0.688	17.48	22.356*	4.815	10.630	50.387	25.5	MS	1160	1170	1170	1170	2760	4010	4770	5620	3260	5160	5160	5680	3260	5160	5160	5680		
	180.00	0.750	19.05	22.232*	4.815	10.630	54.782	25.0	Reg	1440	1530	1530	1530	3010	4380	5200	6020	2510	3980	3980	4280	2510	3980	3980	4280		
	188.00	0.750	19.05	22.232*	4.815	10.630	54.782	25.5	MS	1440	1530	1530	--	3010	4380	5200	--	3260	5160	5160	5680	3260	5160	5160	5680		
24 1/2" 622.30	140.00	0.531	13.49	23.17*	3.815	10.630	39.985	26.0	Reg	500	--	--	--	2090	--	--	--	--	2940	--	--	--	2940	--	--	6270	6740
	165.00	0.635	16.13	22.962*	4.815	10.630	47.609	25.5	Reg	860	860	--	--	2490	3630	--	--	2410	3830	--	--	2410	3830	--	--	4110	
	182.00	0.709	18.01	22.814*	4.815	10.630	52.992	25.5	Reg	1190	1210	1210	1210	2790	4050	4810	5670	2410	3830	3830	4110	2410	3830	3830	4110		
	182.00	0.709	18.01	22.814*	4.815	10.630	52.992	26.0	MS	1190	1210	1210	1210	2790	4050	4810	5670	3130	4960	4960	5330	3130	4960	4960	5330		
	207.00	0.812	20.62	22.608*	4.815	10.630	60.427	26.0	Reg	1650	1820	1830	1830	3190	4640	5510	6380	2410	3830	3830	4110	2410	3830	3830	4110		
26" 660.40	207.00	0.812	20.62	22.608*	4.815	10.630	60.427	26.0	MS	1650	1820	--	--	3190	4640	--	--	3130	4960	--	--	3130	4960	--	--	6180	6480
	207.00	0.812	20.62	22.608*	4.815	10.630	60.427	26.5	MS	--	--	1830	1830	--	--	5510	6380	--	--	6180	6480	--	--	6180	6480		
	207.00	0.750	19.05	24.232*	4.815	10.630	59.494	27.5	Reg	1180	1190	1190	--	2780	4040	4800	--	3120	4430	4430	--	3120	4430	4430	--	5390	
	223.00	0.812	20.62	24.108*	4.815	10.630	64.254	27.5	Reg	1440	1520	1520	--	3010	4370	5190	--	3120	4430	4430	--	3120	4430	4430	--	5390	
	237.00	0.886	22.00	24.000*	4.815	10.630	68.380	27.5	Reg	1670	1850	1860	1860	3210	4660	5540	6410	3120	4430	4430	5080	3120	4430	4430	5080		
27.00	207.00	1.000	25.40	23.732*	4.815	10.630	78.540	28.0	Reg	2230	2670	2830	2890	3700	5390	6390	7400	3120	4430	4430	5080	3120	4430	4430	5080		
	270.00	1.000	25.40	23.732*	4.815	10.630	78.540	28.0	MS	2230	2670	2830	2890	3700	5390	6390	7400	3120	4430	4430	5080	3120	4430	4430	5080		
	270.00	1.000	25.40	23.732*	4.815	10.630	78.540	28.5	MS	2230	2670	2830	2890	3700	5390	6390	7400	3120	4430	4430	5080	3120	4430	4430	5080		

* Special Drift

BIG OMEGA-IS-NA		BIG OMEGA-IS-NA		BIG OMEGA-IS-NA		BIG OMEGA-IS-NA		BIG OMEGA-IS-NA		BIG OMEGA-IS-NA		BIG OMEGA-IS-NA		BIG OMEGA-IS-NA		BIG OMEGA-IS-NA		BIG OMEGA-IS-NA		BIG OMEGA-IS-NA		BIG OMEGA-IS-NA		BIG OMEGA-IS-NA	
in	mm	lb/ft	in	mm	API Drift	Make-up	Coupling	Pipe Body	Coupling OD	Collapse Resistance	Internal Yield Pressure	Connection Leak Resistance	in	mm	lb/ft	in	mm	API Drift	Make-up	Coupling	Pipe Body	Coupling OD	Collapse Resistance	Internal Yield Pressure	Connection Leak Resistance
18 5/8"	473.08	96.50	0.485	12.32	17.500	5.772	12.882	27.639	19.6	Reg	870	870	870	870	2510	3650	4330	5010	2667	2667	2667	2667	2667	2667	2667

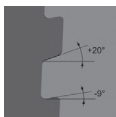


BIG OMEGA® TECHNICAL DATA

Size (OD) in mm	Nominal Weight lb/ft	Wall Thickness		Pipe Body Yield Strength (kbf)					Joint Strength (kbf)							
		in	mm	K-55	N-80	R-95	P-110	K-55	N-80	R-95	P-110					
24" 609.60	162.00	0.635	16.13	2664	3729	-	-	2315	3367	-	-	-				
	174.00	0.688	17.48	4031	4787	5543	5004	2502	3639	4322	5004	5004				
	174.00	0.688	17.48	2771	4031	4787	5543	2502	3639	4322	5004	5004				
	189.00	0.750	19.05	3013	4383	5204	6026	2720	3957	4699	5441	5441				
	189.00	0.750	19.05	3013	4383	5204	-	2720	3957	4699	-	-				
24 1/2" 622.30	189.00	0.750	19.05	-	-	-	6026	-	-	-	5441	5441				
	203.00	0.812	20.62	3253	4732	5619	6507	2937	4273	5074	5875	5875				
	203.00	0.812	20.62	3253	4732	-	-	2937	4273	-	-	-				
	203.00	0.812	20.62	-	-	5619	6507	-	-	-	5074	5875				
	140.00	0.531	13.49	2199	-	-	-	2027	-	-	-	-				
26" 660.40	165.00	0.635	16.13	2618	3809	-	-	2413	3510	-	-	-				
	182.00	0.709	18.01	2915	4239	5034	5829	2686	3907	4640	5373	5373				
	182.00	0.709	18.01	2915	4239	5034	5829	2686	3907	4640	5373	5373				
	207.00	0.812	20.62	3323	4834	5741	6647	3063	4456	5291	6126	6126				
	207.00	0.812	20.62	3323	4834	-	-	3063	4456	-	-	-				
26" 660.40	207.00	0.812	20.62	-	-	5741	6647	-	-	-	5291	6126				
	207.00	0.750	19.05	3272	4760	5652	-	3201	4655	5528	-	-				
	207.00	0.750	19.05	-	-	5652	-	-	-	5528	-	-				
	223.00	0.812	20.62	3534	5140	6104	-	3457	5028	5971	-	-				
	223.00	0.812	20.62	-	-	6104	-	-	-	5971	-	-				
18 5/8" 473.08	237.00	0.866	22.00	3761	5470	6496	7522	3679	5351	6354	7357	7357				
	237.00	0.866	22.00	-	-	6496	-	-	-	6354	-	-				
	270.00	1.000	25.40	4320	6283	7461	8639	4225	6146	7298	8450	8450				
	270.00	1.000	25.40	4320	6283	-	-	4225	6146	-	-	-				
	270.00	1.000	25.40	-	-	7461	8639	-	-	7298	8450	8450				
				BIG OMEGA-IS-NA									BIG OMEGA-IS-NA			
				96.50	0.485	12.32	1520	2211	2626	3040	1587	2099	2417	2817		

3.16 DINO VAM®

Application



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DINO VAM® is a cost effective T&C connection for surface and intermediate casing applications.

DINO VAM® was specifically designed to reduce rig operating costs by providing running reliability through deep stabbing, no cross-threading and quick make-up.

This connection provides sealing with coarse 3 TPI tapered hooked threads. It is immune to jump-in / jump-out.

DINO VAM® product line covers a wide range of diameters and wall thicknesses, for API material as well as for Sour Service materials.

DINO VAM® design allows faster make-up and provides more reliability during stabbing (no more cross-threading). These benefits were validated during offshore field trials supervised by different customers. Average cycle time for joint running is reduced by 25%!

- Make-up arrestor for torque control

A make-up arrestor positions the coupling accurately on the mill end. Pin to pin torque shoulder for positive torque stop on the field end allows both overtorque and compression resistance. In addition, pin to pin contact provides a smooth bore ID to minimize turbulence and high compression resistance.

- Hooked thread profile:

3 Thread Per Inch for fast Make-Up.

Negative load flank of -9° associated with a $+20^\circ$ stabbing flank for optimal structural performances under combined loads.

DINO VAM® thread profile was designed to prevent cross-threading: connection allow 40% more mis-alignment than Buttress connections.

Running DINO VAM® - Dope quantities

Size (OD)	Dope volume	
	(cm ³)	(in ³)
7	34	2.1
7 5/8	37	2.2
9 5/8	41	2.5
9 3/4	42	2.5
9 7/8	43	2.6
10 3/4	46	2.8
11 3/4	59	3.6
11 7/8	60	3.6
13 3/8	67	4.1
13 5/8	67	4.1
14	70	4.3
16	87	5.4

Running DINO VAM® – Acceptance criteria

No specific requirement for DINO VAM®.

Torque-turn chart monitoring is highly recommended as clear evidence of shouldering is required during make-up to ensure proper positioning of the pin-to-pin shoulder.

DINO VAM® TECHNICAL DATA

Size (OD) in	Nominal Weight lb/ft	Wall Thickness		API Drift Diameter in	Coupling OD (reg) in	Coupling ID (reg) in	Make-up Loss in	Coupling Length in	Pipe Body Section sq.in	Coupling CCS sq.in	Yield Strength (1000 lb)					Efficiency	
		in	mm								55 ksi	80 ksi	90 ksi	95 ksi	110 ksi		125 ksi
7" 177.80	20.00	0.272	6.91	6.331	7.657	6.605	3.973	7.961	5.749	8.661	151	316	460	517	546	632	719
	23.00	0.317	8.05	6.241	7.657	6.605	3.973	7.961	6.655	8.661	130	366	532	599	632	732	832
	26.00	0.362	9.19	6.151	7.657	6.605	3.973	7.961	7.549	8.661	115	415	604	679	717	830	944
	29.00	0.408	10.36	6.059	7.657	6.605	3.973	7.961	8.449	8.661	103	465	676	760	803	929	1056
	26.40	0.328	8.33	6.844	7.189	8.500	7.189	4.462	8.924	7.517	12.767	170	413	601	666	766	876	1006
9 3/8" 193.67 244.48	36.00	0.352	8.94	8.765	10.626	9.166	4.739	9.493	10.254	18.451	180	564	820	923	974	1128	1282
	40.00	0.396	10.03	8.750A	10.626	9.166	4.739	9.493	11.454	18.451	161	630	916	1031	1088	1260	1432
	43.50	0.435	11.05	8.589	10.626	9.166	4.739	9.493	12.559	18.451	147	691	1005	1130	1193	1381	1570
	47.00	0.472	11.99	8.525	10.626	9.166	4.739	9.493	13.572	18.451	136	746	1086	1221	1289	1493	1697
	53.50	0.545	13.84	8.500A	10.626	9.166	4.739	9.493	15.546	18.451	119	855	1244	1399	1477	1710	1943
7 5/8" 193.67	58.40	0.595	15.11	8.375A	10.626	9.166	4.739	9.493	16.879	18.451	109	928	1350	1519	1604	1857	2110
	59.40	0.609	15.47	8.251	10.626	9.001	4.570	9.156	17.250	20.401	118	949	1380	1553	1639	1898	2156
	61.10	0.625	15.88	8.219	10.626	9.001	4.570	9.156	17.671	20.401	115	972	1414	1590	1679	1944	2209
	64.90	0.672	17.07	8.125	10.626	9.001	4.570	9.156	18.901	20.401	108	1040	1512	1701	1796	2079	2363
	70.30	0.734	18.64	8.001	10.626	9.001	4.570	9.156	20.502	20.401	100	1122	1632	1836	1938	2244	2550
9 3/4" 247.65	71.80	0.750	19.05	7.969	10.626	9.001	4.570	9.156	20.911	20.401	98	1122	1632	1836	1938	2244	2550
	59.20	0.595	15.11	8.404	10.626	9.179	4.147	8.310	17.113	17.785	104	941	1389	1540	1626	1882	2139
	60.20	0.609	15.47	8.376	10.626	9.179	4.147	8.310	17.489	17.785	102	962	1399	1574	1661	1924	2186
	62.80	0.625	15.88	8.469	10.670	9.263	4.480	8.976	18.162	20.655	114	999	1453	1635	1725	1998	2270
	66.40	0.661	16.79	8.397	10.670	9.263	4.480	8.976	19.134	20.655	108	1052	1531	1722	1818	2105	2392
9 7/8" 250.83	67.50	0.678	17.22	8.363	10.670	9.263	4.480	8.976	19.590	20.655	105	1077	1567	1763	1861	2155	2449
	68.90	0.700	17.78	8.319	10.670	9.263	4.480	8.976	20.177	20.655	102	1110	1614	1816	1917	2219	2522
	70.50	0.720	18.29	8.279	10.670	9.263	4.480	8.976	20.708	20.655	100	1136	1652	1859	1962	2272	2582
	40.50	0.350	8.89	9.894	11.752	10.266	5.036	10.088	11.435	20.993	184	629	915	1029	1066	1258	1429
	45.50	0.400	10.16	9.875A	11.752	10.266	5.036	10.088	13.006	20.993	161	715	1040	1171	1236	1431	1626
10 3/4" 273.05	51.00	0.450	11.43	9.694	11.752	10.266	5.036	10.088	14.561	20.993	144	801	1165	1310	1363	1602	1820
	55.50	0.495	12.57	9.625A	11.752	10.266	5.036	10.088	15.947	20.993	132	877	1276	1435	1515	1754	1993
	60.70	0.545	13.84	9.504	11.752	10.266	5.036	10.088	17.473	20.993	120	961	1398	1573	1660	1922	2184
	65.70	0.595	15.11	9.404	11.752	10.266	5.036	10.088	18.962	20.993	111	1044	1519	1708	1803	2068	2373
	66.15	0.611	15.52	9.372	11.752	10.087	4.889	9.793	19.462	23.417	120	1070	1557	1752	1849	2141	2433
11 3/4" 298.45	73.20	0.672	17.07	9.250	11.752	10.087	4.889	9.793	21.276	23.417	110	1170	1709	1915	2021	2340	2660
	76.10	0.709	18.01	9.176	11.752	10.087	4.889	9.793	22.365	23.417	105	1230	1789	2013	2125	2460	2796
	79.20	0.734	18.64	9.126	11.752	10.087	4.889	9.793	23.096	23.417	101	1270	1848	2079	2194	2541	2887
	47.00	0.375	9.53	10.844	12.752	11.313	4.476	8.969	13.401	22.078	165	737	1072	1206	1273	1474	1675
	54.00	0.435	11.05	10.724	12.752	11.313	4.476	8.969	15.463	22.078	143	850	1237	1392	1469	1701	1933
13 3/8" 339.73	60.00	0.489	12.42	10.625A	12.752	11.153	4.357	8.729	17.300	24.388	141	952	1384	1557	1644	1903	2163
	65.00	0.534	13.56	10.625A	12.752	11.153	4.357	8.729	18.816	24.388	130	1035	1505	1693	1788	2070	2352
	71.00	0.582	14.78	10.430	12.752	11.153	4.357	8.729	20.420	24.388	119	1123	1634	1838	1940	2246	2553
	54.50	0.380	9.65	12.459	14.374	12.915	4.754	9.523	15.513	25.502	164	853	1241	1396	1474	1706	1939
	61.00	0.430	10.52	12.359	14.374	12.915	4.754	9.523	17.487	25.502	146	962	1399	1574	1661	1924	2186



DINO VAM® TECHNICAL DATA

Size (OD)	Nominal Weight	Wall Thickness		API Drift Diameter	Coupling OD (reg)	Coupling ID (reg)	Make-up Loss	Coupling Length	Pipe Body Section	Coupling CCS	Efficiency	Yield Strength (1000 lb)					
		in	mm									55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi
13 3/8" 339.73	68.00	0.480	12.19	12.259	14.374	12.915	4.754	9.523	19.445	25.502	131	1069	1556	1750	1847	2139	2431
	72.00	0.514	13.06	12.250A	14.374	12.915	4.754	9.523	20.768	25.502	123	1142	1661	1869	1973	2284	2596
	77.00	0.550	13.97	12.119	14.374	12.759	4.508	9.032	22.160	28.047	127	1219	1773	1994	2105	2438	2770
	80.70	0.580	14.73	12.059	14.374	12.759	4.508	9.032	23.314	28.047	120	1282	1865	2098	2215	2565	2914
	85.00	0.608	15.44	12.003	14.374	12.759	4.508	9.032	24.386	28.047	115	1341	1951	2195	2317	2662	3048
86.00	0.625	15.88	11.969	14.374	12.759	4.508	9.032	25.035	28.047	112	1377	2003	2253	2378	2754	3129	
13 5/8" 346.08	86.20	0.625	15.88	12.188	14.488	13.009	4.508	9.032	25.525	25.453	100	1400	2036	2291	2418	2800	3182
	82.50	0.562	14.27	12.689	15.043	13.257	5.520	11.056	23.726	33.094	139	1305	1898	2135	2254	2610	2966
	86.00	0.600	15.24	12.613	15.043	13.257	5.520	11.056	25.258	33.094	131	1389	2021	2273	2400	2778	3157
	93.00	0.650	16.51	12.513	15.043	13.257	5.520	11.056	27.261	33.094	121	1499	2181	2453	2590	2999	3408
	94.80	0.656	16.66	12.501	15.043	13.257	5.520	11.056	27.500	33.094	120	1513	2200	2475	2613	3025	3438
14" 355.60	99.00	0.688	17.48	12.413	15.043	13.257	5.520	11.056	28.773	33.094	115	1583	2302	2590	2733	3165	3597
	100.00	0.700	17.78	12.413	15.043	13.257	5.520	11.056	29.248	33.094	113	1609	2340	2632	2779	3217	3656
	106.00	0.750	19.05	12.313	15.043	13.257	5.520	11.056	31.220	33.094	106	1717	2498	2810	2966	3434	3903
	114.00	0.800	20.32	12.213	15.043	13.257	5.520	11.056	33.175	33.094	100	1820	2648	2978	3144	3640	4137
	65.00	0.375	9.53	15.063	17.000	10.424	15.502	5.204	10.424	18.408	31.414	171	1012	1473	1657	1749	2025	2301
16" 406.40	75.00	0.438	11.13	14.937	17.000	15.502	5.204	10.424	21.414	31.414	147	1178	1713	1927	2034	2356	2677
	84.00	0.495	12.57	14.823	17.000	15.502	5.204	10.424	24.112	31.414	130	1326	1929	2170	2291	2652	3014
	84.80	0.500	12.70	14.813	17.000	15.502	5.204	10.424	24.347	31.414	129	1339	1948	2191	2313	2678	3043
	94.50	0.562	14.27	14.689	17.000	15.218	5.835	11.686	27.257	37.602	138	1499	2181	2453	2589	2998	3407
	104.00	0.625	15.88	14.563	17.000	15.218	5.835	11.686	30.189	37.602	125	1660	2415	2717	2868	3321	3774
109.00	0.656	16.66	14.501	17.000	15.218	5.835	11.686	31.622	37.602	119	1739	2530	2846	3004	3478	3953	
128.00	0.781	19.84	14.251	17.000	15.218	5.835	11.686	37.341	37.602	101	2054	2987	3361	3547	4108	4668	

DINO VAM® TECHNICAL DATA (Option MS)

Size (OD)	Nominal Weight	Wall Thickness		Coupling OD (MS)	MS option Efficiency	Yield Strength (1000 lb)					
		Coupling				80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	
		in	mm								in
9 5/8" <i>244.48</i>	36.00	0.352	8.94	10.138	100	564	820	923	974	1128	1282
	40.00	0.395	10.03	10.213	100	630	916	1031	1088	1260	1432
	43.50	0.435	11.05	10.283	100	691	1005	1130	1193	1381	1570
	47.00	0.472	11.99	10.346	100	746	1086	1221	1289	1493	1697
	53.50	0.545	13.84	10.472	100	855	1244	1399	1477	1710	1943
	58.40	0.595	15.11	10.555	100	928	1350	1519	1604	1857	2110
	59.40	0.609	15.47	10.457	100	949	1380	1553	1639	1898	2156
	61.90	0.625	15.88	10.484	100	972	1414	1590	1679	1944	2209
	64.90	0.672	17.07	10.559	100	1040	1512	1701	1796	2079	2363
	70.30	0.734	18.64	10.657	100	1122	1632	1836	1938	2244	2550
9 3/4" <i>247.65</i>	71.80	0.750	19.05	10.685	100	1122	1632	1836	1938	2244	2550
	59.20	0.595	15.11	10.606	100	941	1369	1540	1626	1882	2139
	60.20	0.609	15.47	10.630	100	962	1399	1574	1661	1924	2186
9 7/8" <i>250.83</i>	62.80	0.625	15.88	10.748	100	999	1453	1635	1725	1998	2270
	66.40	0.661	16.79	10.803	100	1052	1531	1722	1818	2105	2392
	67.50	0.678	17.22	10.831	100	1077	1567	1763	1861	2155	2449
	68.90	0.700	17.78	10.866	100	1110	1614	1816	1917	2219	2522
	70.50	0.720	18.29	10.898	100	1136	1652	1859	1962	2272	2582
10 3/4" <i>273.05</i>	40.50	0.350	8.89	11.236	100	629	915	1029	1086	1258	1429
	45.50	0.400	10.16	11.327	100	715	1040	1171	1236	1431	1626
	51.00	0.450	11.43	11.417	100	801	1165	1310	1383	1602	1820
	55.50	0.495	12.57	11.496	100	877	1276	1435	1515	1754	1993
	60.70	0.545	13.84	11.583	100	961	1398	1573	1660	1922	2184
	65.70	0.595	15.11	11.665	100	1044	1519	1708	1803	2088	2373
	66.15	0.611	15.52	11.559	100	1070	1557	1752	1849	2141	2433
11 3/4" <i>298.45</i>	73.20	0.672	17.07	11.681	100	1170	1702	1915	2021	2340	2660
	76.10	0.709	18.01	11.720	100	1230	1789	2013	2125	2460	2796
	79.20	0.734	18.64	11.760	100	1270	1848	2079	2194	2541	2887
	47.00	0.375	9.53	12.327	100	737	1072	1206	1273	1474	1675
	54.00	0.435	11.05	12.437	100	850	1237	1392	1469	1701	1933
60.00	0.489	12.42	12.413	100	952	1384	1557	1644	1903	2163	
65.00	0.534	13.56	12.492	100	1035	1505	1693	1788	2070	2352	
71.00	0.582	14.78	12.575	100	1123	1634	1838	1940	2246	2553	



DINO VAM® TECHNICAL DATA (Option MS)

Size (OD)	Nominal Weight	Wall Thickness		Coupling OD (MS)	MS option Efficiency	Yield Strength (1000 lb)					
		in				55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi
		mm	mm			%					
13 3/8" <i>339.73</i>	54.50	0.380	9.65	13.941	100	853	1241	1396	1474	1706	1939
	61.00	0.430	10.92	14.031	100	962	1399	1574	1661	1924	2186
	68.00	0.480	12.19	14.122	100	1069	1556	1750	1847	2139	2431
	72.00	0.514	13.06	14.177	100	1142	1661	1869	1973	2284	2596
	77.00	0.550	13.97	14.134	100	1219	1773	1994	2105	2438	2770
	80.70	0.580	14.73	14.185	100	1282	1865	2098	2215	2565	2914
	85.00	0.608	15.44	14.236	100	1341	1951	2195	2317	2682	3048
	86.00	0.625	15.88	14.264	100	1377	2003	2253	2378	2754	3129
	88.20	0.625	15.88	14.516	100	1400	2036	2291	2418	2800	3182
	88.20	0.625	15.88	14.516	100	1400	2036	2291	2418	2800	3182
14" <i>355.60</i>	82.50	0.562	14.27	14.661	100	1305	1898	2135	2254	2610	2966
	86.00	0.600	15.24	14.732	100	1389	2021	2273	2400	2778	3157
	93.00	0.650	16.51	14.819	100	1499	2181	2453	2590	2999	3408
	94.80	0.656	16.66	14.831	100	1513	2200	2475	2613	3025	3438
	99.00	0.688	17.48	14.886	100	1583	2302	2590	2733	3165	3697
	100.00	0.700	17.78	14.906	100	1609	2340	2632	2779	3217	3656
	106.00	0.750	19.05	14.99	100	1717	2498	2810	2966	3434	3903
	114.00	0.800	20.32	15.075	100	1820	2648	2978	3144	3640	4137
	65.00	0.375	9.53	16.524	100	1012	1473	1657	1749	2025	2301
	75.00	0.438	11.13	16.638	100	1178	1713	1927	2034	2356	2677
16" <i>406.40</i>	84.00	0.495	12.57	16.744	100	1326	1929	2170	2291	2652	3014
	84.80	0.500	12.70	16.752	100	1339	1948	2191	2313	2678	3043
	94.50	0.562	14.27	16.63	100	1499	2181	2453	2589	2998	3407
	104.00	0.625	15.88	16.744	100	1660	2415	2717	2868	3321	3774
	109.00	0.656	16.66	16.799	100	1739	2530	2846	3004	3478	3953
	128.00	0.781	19.84	17.02	100	2054	2987	3361	3547	4108	4668

DINO VAM® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	55-65 ksi						75-80-85 ksi						90-95-100 ksi					
			M/I Side			Field & Accessories			M/I Side			Field & Accessories			M/I Side			Field & Accessories		
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
7"	20.00	0.272	f.t.b						f.t.b						f.t.b					
			N/m						N/m						N/m					
177.80			3 450	3 830	4 210	3 450	3 830	4 210	5 210	5 790	6 370	5 010	5 570	6 130	5 340	5 930	6 520	5 010	5 570	6 130
		6.91	4 680	5 200	5 720	4 680	5 200	5 720	7 020	7 800	8 580	6 840	7 600	8 360	7 200	8 000	8 800	6 840	7 600	8 360
	23.00	0.317	4 480	4 980	5 480	4 480	4 980	5 480	6 180	6 870	7 560	5 980	6 650	7 320	6 180	6 870	7 560	5 980	6 650	7 320
		8.05	6 120	6 800	7 480	6 120	6 800	7 480	8 370	9 300	10 230	8 100	9 000	9 900	8 370	9 300	10 230	8 100	9 000	9 900
	26.00	0.362	5 540	6 150	6 770	5 540	6 150	6 770	7 030	7 810	8 590	7 940	8 820	9 700	7 030	7 810	8 590	7 430	8 250	9 080
		9.19	7 470	8 300	9 130	8 010	8 900	9 790	9 540	10 600	11 660	10 800	12 000	13 200	9 540	10 600	11 660	10 480	11 200	12 320
	29.00	0.408	5 670	6 290	6 920	6 710	7 450	8 200	7 480	8 320	9 160	8 820	9 910	10 900	7 810	8 680	9 550	10 160	11 280	12 410
		10.36	7 650	8 500	9 350	9 090	10 100	11 110	10 170	11 300	12 430	12 060	13 400	14 740	10 620	11 800	12 980	13 770	15 300	16 830
7 5/8"	28.40	0.328	5 880	6 510	7 160	5 680	6 350	7 040	8 190	9 100	10 010	9 060	10 080	11 050	--	--	--	--	--	--
193.67		8.33	7 920	8 800	9 680	7 650	8 600	9 500	11 160	12 400	13 640	11 560	13 600	15 640	--	--	--	--	--	--
9 5/8"	36.00	0.352	4 680	5 210	5 730	4 240	4 980	5 740	6 060	6 730	7 400	5 590	6 380	7 170	6 510	7 230	7 950	6 480	7 300	8 140
244.48		8.94	6 400	7 100	7 800	5 750	6 600	7 450	8 200	9 100	10 000	7 550	8 500	9 450	8 800	9 800	10 800	8 800	10 300	11 800
	40.00	0.395	4 950	5 500	6 050	5 780	6 400	7 020	6 510	7 230	7 950	7 700	8 450	9 170	8 840	9 600	10 360	8 900	10 500	12 100
		10.03	6 700	7 500	8 300	7 850	8 700	9 550	8 800	9 800	10 800	10 500	12 300	14 100	9 300	10 300	11 300	12 100	14 200	16 300
	43.50	0.435	6 120	6 800	7 480	7 400	8 200	9 000	8 840	9 800	10 800	9 800	11 550	13 300	7 470	8 300	9 130	11 400	13 400	15 400
		11.05	8 300	9 200	10 100	10 000	11 800	13 600	9 300	10 300	11 300	13 300	15 700	18 100	10 200	11 300	12 400	15 400	18 100	20 800
	47.00	0.472	6 320	7 020	7 720	8 650	9 500	10 350	8 840	9 800	10 800	11 700	13 750	15 800	7 470	8 300	9 130	13 500	15 900	18 300
		11.99	8 500	9 500	10 500	11 600	13 700	15 800	9 300	10 300	11 300	15 750	18 600	21 450	10 200	11 300	12 400	18 300	21 600	24 900
	53.50	0.545	6 510	7 230	7 950	11 050	13 000	14 950	7 470	8 300	9 130	15 400	18 100	20 800	7 850	8 700	9 570	17 850	21 000	24 150
		13.84	8 800	9 800	10 800	15 000	17 700	20 400	10 200	11 300	12 400	20 750	24 500	28 250	10 600	11 800	13 000	24 200	28 400	32 600
	58.40	0.585	7 150	7 950	8 750	12 600	14 850	17 100	7 830	8 700	9 570	17 650	21 000	24 150	8 150	9 050	9 950	18 450	21 700	24 950
		15.11	9 700	10 800	11 900	17 100	20 100	23 100	10 600	11 800	13 000	24 200	28 400	32 600	11 100	12 300	13 500	25 050	29 400	33 750
	59.40	0.609	6 840	7 600	8 380	10 450	12 300	14 150	8 450	9 400	10 350	14 150	16 650	19 150	8 750	9 750	10 750	16 300	19 150	22 000
		15.47	9 300	10 300	11 300	14 150	16 700	19 250	11 400	12 700	14 000	19 150	22 600	26 050	11 900	13 200	14 500	22 100	26 000	29 900
	61.10	0.625	7 150	7 950	8 750	10 750	12 650	14 550	8 750	9 750	10 750	14 750	17 350	19 950	9 150	10 150	11 150	17 200	20 250	23 300
		15.88	9 700	10 800	11 900	14 650	17 200	19 750	11 900	13 200	14 500	19 900	23 500	27 100	12 300	13 700	15 100	23 300	27 500	31 700
	64.90	0.672	7 830	8 700	9 570	12 300	14 450	16 600	9 150	10 150	11 150	16 900	19 900	22 900	9 450	10 500	11 550	18 450	21 700	24 950
		17.07	10 600	11 800	13 000	16 600	19 600	22 600	12 300	13 700	15 100	22 650	27 000	31 050	12 800	14 200	15 600	25 050	29 400	33 750
	70.30	0.734	8 150	9 050	9 950	14 450	17 000	19 550	9 450	10 500	11 550	16 900	21 700	24 950	9 850	10 850	11 850	18 450	21 700	24 950
		18.64	11 100	12 300	13 500	19 550	23 000	26 450	12 800	14 200	15 600	25 050	29 400	33 750	13 200	14 700	16 200	25 050	29 400	33 750
	71.80	0.750	8 150	9 050	9 950	14 750	17 350	19 950	9 850	10 850	11 850	18 450	21 700	24 950	10 100	11 200	12 300	18 450	21 700	24 950
		19.05	11 100	12 300	13 500	19 900	23 500	27 100	13 200	14 700	16 200	25 050	29 400	33 750	13 700	15 200	16 700	25 050	29 400	33 750

DINO VAM®

DINO VAM® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	105-110-115 ksi						120-125-130 ksi						135-140 ksi								
			MIL Slide		Field & Accessories		MIL Slide		Field & Accessories		MIL Slide		Field & Accessories		MIL Slide		Field & Accessories						
			min.	opt.	max.	ft.lb N.m	min.	opt.	max.	ft.lb N.m	min.	opt.	max.	ft.lb N.m	min.	opt.	max.	ft.lb N.m					
7"	20.00	0.272	5.800	6.440	7.080	5.010	5.570	6.130	5.270	5.860	6.450	5.400	6.000	6.600	5.660	6.280	6.920	5.800	6.440	7.080			
			7.830	8.700	9.570	6.840	7.600	8.360	7.110	7.900	8.690	7.290	8.100	8.910	7.650	8.500	9.350	7.830	8.700	9.570			
			6.180	6.870	7.560	6.120	6.800	7.480	6.710	7.450	8.200	6.710	7.450	8.200	7.180	7.960	8.760	7.180	7.960	8.760			
			8.05	8.790	9.300	10.230	8.280	9.200	10.120	9.080	10.100	11.110	9.080	10.100	11.110	9.720	10.800	11.880	9.720	10.800	11.880		
			0.362	7.370	7.810	8.960	8.270	9.190	10.110	7.090	7.880	8.670	11.900	13.200	14.500	15.400	18.100	20.800	12.800	14.200	15.600		
			9.19	9.540	10.600	11.660	11.250	12.500	13.750	9.630	10.700	11.770	12.240	13.600	14.960	10.170	11.300	12.430	13.230	14.700	16.170		
			0.408	7.810	8.680	9.560	11.390	12.680	13.930	7.810	8.680	9.560	12.660	13.980	15.360	7.810	8.680	9.560	13.540	15.040	16.540		
			10.36	10.620	11.800	12.960	15.480	17.200	18.920	10.620	11.800	12.960	17.010	18.900	20.790	10.620	11.800	12.960	18.360	20.400	22.440		
			7 5/8"	28.40	0.328	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
			193.67	8.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
9 5/8"	36.00	0.352	7.470	8.300	9.130	7.050	8.300	9.550	8.450	9.400	10.350	8.000	9.400	10.800	9.150	10.150	11.150	8.650	10.150	11.650			
			10.200	11.300	12.400	9.650	11.300	12.950	11.400	12.700	14.000	10.750	12.700	14.650	12.300	13.700	15.100	11.600	13.700	15.800			
			0.395	7.830	8.700	9.570	10.150	11.980	13.750	8.750	9.750	10.750	11.400	13.400	15.400	9.450	10.500	11.550	12.300	14.450	16.600		
			10.03	10.600	11.800	13.000	13.600	16.200	18.600	11.900	13.200	14.500	15.400	18.100	20.800	12.800	14.200	15.600	16.600	19.600	22.600		
			0.435	8.150	9.050	9.950	12.900	15.200	17.500	9.150	10.150	11.150	14.750	17.350	19.950	9.850	10.850	11.850	16.000	18.800	21.600		
			11.05	11.100	12.300	13.500	17.460	20.600	23.750	12.300	13.700	15.100	19.900	23.500	27.100	13.200	14.700	16.200	21.600	25.500	29.400		
			0.472	8.150	9.050	9.950	15.700	18.450	21.200	9.150	10.150	11.150	17.600	20.500	23.700	9.850	10.850	11.850	18.450	21.700	24.950		
			11.99	11.100	12.300	13.500	21.250	25.000	28.750	12.300	13.700	15.100	23.700	27.900	32.100	13.200	14.700	16.200	25.050	29.400	33.750		
			53.50	58.50	0.545	8.750	9.750	10.750	18.450	21.700	24.950	9.450	10.500	11.550	18.450	21.700	24.950	10.100	11.200	12.300	18.450	21.700	24.950
			13.94	11.900	13.200	14.500	25.050	29.400	33.750	12.800	14.200	15.600	25.050	29.400	33.750	13.700	15.200	16.700	25.050	29.400	33.750		
0.585	9.150	10.150	11.150	18.450	21.700	24.950	9.850	10.850	11.850	18.450	21.700	24.950	10.450	11.550	12.650	18.450	21.700	24.950					
15.11	12.300	13.700	15.100	25.050	29.400	33.750	13.200	14.700	16.200	25.050	29.400	33.750	14.100	15.700	17.300	25.050	29.400	33.750					
9 7/8"	59.40	0.609	9.150	10.150	11.150	18.450	21.700	24.950	9.450	10.500	11.550	18.450	21.700	24.950	10.100	11.200	12.300	18.450	21.700	24.950			
			15.47	12.300	13.700	15.100	25.050	29.400	33.750	12.800	14.200	15.600	25.050	29.400	33.750	13.700	15.200	16.700	25.050	29.400	33.750		
			0.625	9.450	10.500	11.550	18.450	21.700	24.950	9.850	10.850	11.850	18.450	21.700	24.950	10.450	11.550	12.650	18.450	21.700	24.950		
			15.98	12.800	14.200	15.600	25.050	29.400	33.750	13.200	14.700	16.200	25.050	29.400	33.750	14.100	15.700	17.300	25.050	29.400	33.750		
			0.672	9.850	10.850	11.850	18.450	21.700	24.950	10.100	11.200	12.300	18.450	21.700	24.950	10.850	11.950	13.050	18.450	21.700	24.950		
			17.07	13.200	14.700	16.200	25.050	29.400	33.750	13.700	15.200	16.700	25.050	29.400	33.750	14.600	16.200	17.800	25.050	29.400	33.750		
			0.734	10.100	11.200	12.300	18.450	21.700	24.950	10.450	11.550	12.650	18.450	21.700	24.950	11.100	12.300	13.500	18.450	21.700	24.950		
			18.64	13.700	15.200	16.700	25.050	29.400	33.750	14.100	15.700	17.300	25.050	29.400	33.750	15.000	16.700	18.400	25.050	29.400	33.750		
			0.750	10.450	11.550	12.650	18.450	21.700	24.950	10.850	11.950	13.050	18.450	21.700	24.950	11.450	12.650	13.850	18.450	21.700	24.950		
			19.05	14.100	15.700	17.300	25.050	29.400	33.750	14.600	16.200	17.800	25.050	29.400	33.750	15.500	17.200	18.900	25.050	29.400	33.750		

DINO VAM® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	145-150-155 ksi																		
			IML Side					Field & Accessories													
			min.	opt.	max.	min.	opt.	max.	min.	opt.	max.										
	lb/ft	in	ft.lb <i>N.m</i>																		
7" 177.80	20.00	0.272	5 980	6 650	7 320	5 080	5 640	6 200													
		6.91	8 100	9 000	9 900	6 840	7 600	8 360													
	23.00	0.317	6 320	7 020	7 720	6 250	6 940	7 630													
		8.05	8 550	9 500	10 450	8 480	9 400	10 340													
	26.00	0.362	7 940	8 820	9 700	10 410	11 570	12 730													
		9.19	10 800	12 000	13 200	14 130	15 700	17 270													
	29.00	0.408	8 200	9 110	10 020	14 560	16 200	17 820													
		10.36	11 160	12 400	13 640	19 500	22 000	24 200													
	7 5/8" 193.67	26.40	0.328	--	--	--	--	--	--												
		8.33	--	--	--	--	--	--	--												
9 5/8" 244.48	36.00	0.352	9 850	10 850	11 850	9 500	11 200	12 900													
		8.94	13 200	14 700	16 200	12 950	15 200	17 450													
	40.00	0.395	10 100	11 200	12 300	13 500	15 900	18 300													
		10.03	13 700	15 200	16 700	18 300	21 600	24 900													
	43.50	0.435	10 450	11 550	12 650	17 200	20 250	23 300													
		11.05	14 100	15 700	17 300	23 300	27 500	31 700													
	47.00	0.472	10 450	11 550	12 650	18 450	21 700	24 950													
		11.99	14 100	15 700	17 300	25 050	29 400	33 750													
	53.50	0.545	10 850	11 950	13 050	18 450	21 700	24 950													
		13.84	14 600	16 200	17 800	25 050	29 400	33 750													
58.40	58.40	0.595	11 100	12 300	13 500	18 450	21 700	24 950													
		15.11	15 000	16 700	18 400	25 050	29 400	33 750													
	59.40	0.609	10 850	11 950	13 050	18 450	21 700	24 950													
		15.47	14 600	16 200	17 800	25 050	29 400	33 750													
	61.10	0.625	11 100	12 300	13 500	18 450	21 700	24 950													
		15.88	15 000	16 700	18 400	25 050	29 400	33 750													
	64.90	0.672	11 450	12 650	13 850	18 450	21 700	24 950													
		17.07	15 500	17 200	18 900	25 050	29 400	33 750													
	70.30	0.734	11 700	13 000	14 300	18 450	21 700	24 950													
		18.64	15 900	17 700	19 500	25 050	29 400	33 750													
71.80	0.750	12 100	13 400	14 700	18 450	21 700	24 950														
	19.05	16 300	18 100	19 900	25 050	29 400	33 750														

DINO VAM® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	55-65 ksi						75-80-85 ksi						90-95-100 ksi																				
			Mill Side			Field & Accessories			Mill Side			Field & Accessories			Mill Side			Field & Accessories																	
			min.	opt.	max.	ft.lb N/m	min.	opt.	max.	min.	opt.	max.	ft.lb N/m	min.	opt.	max.	min.	opt.	max.	ft.lb N/m	min.	opt.	max.												
9 3/4" 247.65	59.20	0.595	6.840	7.600	8.360	10.750	12.650	14.550	7.470	8.300	9.130	14.750	17.350	19.950	8.150	9.050	9.950	17.200	20.250	23.300	8.150	9.050	9.950	17.200	20.250	23.300									
			9.300	10.300	11.300	14.650	17.200	19.750	10.200	11.300	12.400	19.900	23.500	27.100	11.100	12.300	13.500	23.300	27.500	31.700	8.450	9.400	10.350	18.150	21.350	24.650	8.450	9.400	10.350	18.150	21.350	24.650			
9 7/8" 250.83	62.80	0.625	7.470	8.300	9.130	11.700	13.750	15.800	8.750	9.750	10.750	17.700	20.400	23.250	9.150	10.150	11.150	18.700	21.500	24.500	9.150	10.150	11.150	18.700	21.500	24.500	9.150	10.150	11.150	18.450	21.700	24.850			
			10.200	11.300	12.400	15.750	18.600	21.450	11.900	13.200	14.500	21.250	25.000	28.750	12.300	13.700	15.100	25.050	29.000	33.750	12.300	13.700	15.100	25.050	29.000	33.750	12.300	13.700	15.100	25.050	29.000	33.750			
66.40	0.661	0.780	8.780	8.700	9.570	12.900	15.200	17.600	9.150	10.150	11.150	17.500	20.600	23.700	9.450	10.500	11.550	17.500	20.600	23.700	9.450	10.500	11.550	17.500	20.600	23.700	9.450	10.500	11.550	18.450	21.700	24.850			
			16.79	10.600	11.800	13.000	17.450	20.600	23.750	12.300	13.700	15.100	23.700	27.900	32.100	12.800	14.200	15.600	25.050	29.400	33.750	12.800	14.200	15.600	25.050	29.400	33.750	12.800	14.200	15.600	25.050	29.400	33.750		
67.50	0.678	0.780	8.780	8.700	9.570	13.200	15.550	17.900	9.450	10.500	11.550	17.900	21.100	24.250	9.450	10.500	11.550	18.450	21.700	24.850	9.450	10.500	11.550	18.450	21.700	24.850	9.450	10.500	11.550	18.450	21.700	24.850			
			17.22	10.600	11.800	13.000	17.950	21.100	24.250	12.800	14.200	15.600	25.050	29.400	33.750	13.200	14.700	16.200	25.050	29.400	33.750	13.200	14.700	16.200	25.050	29.400	33.750	13.200	14.700	16.200	25.050	29.400	33.750		
68.90	0.700	0.780	8.780	8.700	9.570	14.150	16.650	19.150	9.450	10.500	11.550	18.450	21.700	24.850	9.450	10.500	11.550	18.450	21.700	24.850	9.450	10.500	11.550	18.450	21.700	24.850	9.450	10.500	11.550	18.450	21.700	24.850			
			17.78	10.600	11.800	13.000	19.150	22.600	26.050	12.800	14.200	15.600	25.050	29.400	33.750	13.200	14.700	16.200	25.050	29.400	33.750	13.200	14.700	16.200	25.050	29.400	33.750	13.200	14.700	16.200	25.050	29.400	33.750		
70.50	0.720	0.780	8.780	8.700	9.570	14.750	17.350	19.950	9.850	10.950	11.950	18.450	21.700	24.850	9.850	10.950	11.950	18.450	21.700	24.850	9.850	10.950	11.950	18.450	21.700	24.850	9.850	10.950	11.950	18.450	21.700	24.850			
			18.29	10.600	11.800	13.000	19.900	23.500	27.100	13.200	14.700	16.200	25.050	29.400	33.750	13.700	15.200	16.700	25.050	29.400	33.750	13.700	15.200	16.700	25.050	29.400	33.750	13.700	15.200	16.700	25.050	29.400	33.750		
10 3/4" 273.05	40.50	0.350	5.860	6.510	7.160	4.610	5.420	6.230	7.470	8.300	9.130	6.080	7.160	8.230	8.450	9.400	10.350	6.760	7.850	8.940	6.080	7.160	8.230	6.760	7.850	8.940	6.080	7.160	8.230	6.760	7.850	8.940			
			8.89	7.960	8.800	9.700	6.350	7.400	8.450	10.200	11.300	12.400	8.200	9.700	11.200	11.400	12.700	14.000	9.150	10.800	12.450	8.200	9.700	11.200	9.150	10.800	12.450	8.200	9.700	11.200	9.150	10.800	12.450		
45.50	0.400	0.450	6.510	7.230	7.950	7.050	8.300	9.550	8.150	9.050	9.950	9.200	10.850	12.500	8.150	9.150	10.150	10.750	12.650	14.550	8.150	9.150	10.150	10.750	12.650	14.550	8.150	9.150	10.150	10.750	12.650	14.550			
			10.15	8.800	9.800	10.800	9.650	11.300	12.950	11.100	12.300	13.500	12.450	14.700	16.950	12.300	13.700	15.100	14.650	17.200	19.750	12.300	13.700	15.100	14.650	17.200	19.750	12.300	13.700	15.100	14.650	17.200	19.750		
51.00	0.450	0.495	7.150	7.950	8.750	9.200	10.850	12.500	8.450	9.400	10.350	12.300	14.450	16.600	8.450	9.500	10.500	11.550	14.450	17.000	19.550	8.450	9.500	10.500	11.550	14.450	17.000	19.550	8.450	9.500	10.500	11.550	14.450	17.000	19.550
			11.43	9.700	10.800	11.900	12.450	14.700	16.950	11.400	12.700	14.000	16.600	19.600	22.600	12.800	14.200	15.600	19.550	23.000	26.450	12.800	14.200	15.600	19.550	23.000	26.450	12.800	14.200	15.600	19.550	23.000	26.450		
55.50	0.495	0.545	7.830	8.700	9.570	11.050	13.000	14.950	9.150	10.150	11.150	15.050	17.700	20.400	9.150	10.150	11.150	15.050	17.700	20.400	9.150	10.150	11.150	15.050	17.700	20.400	9.150	10.150	11.150	15.050	17.700	20.400			
			12.57	10.600	11.800	13.000	15.000	17.700	20.400	12.300	13.700	15.100	20.400	24.000	27.600	13.200	14.700	16.200	20.400	24.000	27.600	13.200	14.700	16.200	20.400	24.000	27.600	13.200	14.700	16.200	20.400	24.000	27.600		
60.70	0.545	0.595	8.450	9.400	10.350	13.200	15.550	17.900	9.850	10.950	11.950	18.450	21.700	24.850	9.850	10.950	11.950	18.450	21.700	24.850	9.850	10.950	11.950	18.450	21.700	24.850	9.850	10.950	11.950	18.450	21.700	24.850			
			13.84	11.400	12.700	14.000	17.950	21.100	24.250	13.200	14.700	16.200	24.550	29.000	33.250	13.700	15.200	16.700	25.050	29.400	33.750	13.700	15.200	16.700	25.050	29.400	33.750	13.700	15.200	16.700	25.050	29.400	33.750		
65.70	0.595	0.645	8.750	9.750	10.750	15.400	18.100	20.800	10.100	11.200	12.300	18.450	21.700	24.850	10.100	11.200	12.300	18.450	21.700	24.850	10.100	11.200	12.300	18.450	21.700	24.850	10.100	11.200	12.300	18.450	21.700	24.850			
			15.11	11.900	13.200	14.500	20.750	24.500	28.250	13.700	15.200	16.700	29.050	34.000	37.300	14.100	15.700	17.300	25.050	29.400	33.750	14.100	15.700	17.300	25.050	29.400	33.750	14.100	15.700	17.300	25.050	29.400	33.750		
66.15	0.611	0.661	9.150	10.150	11.150	12.300	14.450	16.600	10.450	11.550	12.650	16.300	19.150	22.000	10.450	11.550	12.650	16.300	19.150	22.000	10.450	11.550	12.650	16.300	19.150	22.000	10.450	11.550	12.650	16.300	19.150	22.000			
			15.52	12.300	13.700	15.100	16.600	19.600	22.600	14.100	15.700	17.300	22.100	26.000	29.900	15.000	16.700	18.400	25.050	29.400	33.750	15.000	16.700	18.400	25.050	29.400	33.750	15.000	16.700	18.400	25.050	29.400	33.750		
73.20	0.672	0.720	9.450	10.500	11.550	14.750	17.350	19.950	11.100	12.300	13.500	18.450	21.700	24.850	11.100	12.300	13.500	18.450	21.700	24.850	11.100	12.300	13.500	18.450	21.700	24.850	11.100	12.300	13.500	18.450	21.700	24.850			
			17.07	12.800	14.200	15.600	19.900	23.500	27.100	15.000	16.700	18.400	25.050	29.400	33.750	15.900	17.700	19.500	25.050	29.400	33.750	15.900	17.700	19.500	25.050	29.400	33.750	15.900	17.700	19.500	25.050	29.400	33.750		

DINO VAM® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	105-110-115 ksi						120-125-130 ksi						135-140 ksi					
			Mill Side		Field & Accessories		Mill Side		Field & Accessories		Mill Side		Field & Accessories		Mill Side		Field & Accessories			
In mm	lb/ft	In mm	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
			ft.lb N/m						ft.lb N/m						ft.lb N/m					
9 3/4" 247.65	59.20	0.895	8.750	9.750	10.750	18.450	21.700	24.950	9.450	10.500	11.550	18.450	21.700	24.950	10.100	11.200	12.300	18.450	21.700	24.950
		15.11	11.900	13.200	14.500	25.050	29.400	33.750	12.800	14.200	15.600	25.050	29.400	33.750	13.700	15.200	16.700	25.050	29.400	33.750
60.20	0.609	0.915	10.150	11.150	18.450	21.700	24.950	9.850	10.850	11.850	18.450	21.700	24.950	10.450	11.550	12.650	18.450	21.700	24.950	
		15.47	12.300	13.700	15.100	25.050	29.400	33.750	13.200	14.700	16.200	25.050	29.400	33.750	14.100	15.700	17.300	25.050	29.400	33.750
62.80 250.83	0.625	0.945	10.500	11.550	18.450	21.700	24.950	10.200	11.200	12.300	18.450	21.700	24.950	10.850	11.950	13.050	18.450	21.700	24.950	
		15.88	12.800	14.200	15.600	25.050	29.400	33.750	13.700	15.200	16.700	25.050	29.400	33.750	14.600	16.200	17.800	25.050	29.400	33.750
66.40	0.981	0.985	10.850	11.850	18.450	21.700	24.950	10.450	11.550	12.650	18.450	21.700	24.950	11.000	12.300	13.500	18.450	21.700	24.950	
		16.79	13.200	14.700	16.200	25.050	29.400	33.750	14.100	15.700	17.300	25.050	29.400	33.750	15.000	16.700	18.400	25.050	29.400	33.750
67.50	0.678	10.100	11.200	12.300	18.450	21.700	24.950	10.850	11.950	13.050	18.450	21.700	24.950	11.450	12.650	13.850	18.450	21.700	24.950	
		17.22	13.700	15.200	16.700	25.050	29.400	33.750	14.600	16.200	17.800	25.050	29.400	33.750	15.500	17.200	18.900	25.050	29.400	33.750
68.90	0.700	10.100	11.200	12.300	18.450	21.700	24.950	10.850	11.950	13.050	18.450	21.700	24.950	11.450	12.650	13.850	18.450	21.700	24.950	
		17.78	13.700	15.200	16.700	25.050	29.400	33.750	14.600	16.200	17.800	25.050	29.400	33.750	15.500	17.200	18.900	25.050	29.400	33.750
70.50	0.720	10.450	11.550	12.650	18.450	21.700	24.950	11.100	12.300	13.500	18.450	21.700	24.950	11.700	13.000	14.300	18.450	21.700	24.950	
		18.29	14.100	15.700	17.300	25.050	29.400	33.750	15.000	16.700	18.400	25.050	29.400	33.750	15.900	17.700	19.500	25.050	29.400	33.750
10 3/4" 273.05	40.50	0.350	9.450	10.500	11.550	7.700	9.050	10.400	10.850	11.950	13.050	8.650	10.150	11.650	11.450	12.650	13.850	9.200	10.850	12.500
		8.89	12.800	14.200	15.600	10.500	12.300	14.100	14.600	16.200	17.800	11.600	13.700	15.800	15.500	17.200	18.900	12.450	14.700	16.950
46.50	0.400	0.950	10.850	11.850	12.000	14.100	16.200	11.100	12.300	13.500	13.500	15.900	18.300	11.700	13.000	14.300	14.750	17.350	19.950	
		10.16	13.200	14.700	16.200	16.250	19.100	21.950	15.000	16.700	18.400	18.300	21.600	24.900	15.900	17.700	19.500	19.900	23.500	27.100
51.00	0.450	10.100	11.200	12.300	16.300	19.150	22.000	11.450	12.650	13.850	16.300	19.150	22.000	11.450	12.650	13.850	16.300	19.150	22.000	
		11.43	13.700	15.200	16.700	22.100	26.000	29.900	15.500	17.200	18.900	25.050	29.400	33.750	16.300	18.100	19.900	25.050	29.400	33.750
55.50	0.495	10.450	11.550	12.650	18.450	21.700	24.950	11.700	13.000	14.300	18.450	21.700	24.950	12.450	13.750	15.050	18.450	21.700	24.950	
		12.57	14.100	15.700	17.300	25.050	29.400	33.750	15.900	17.700	19.500	25.050	29.400	33.750	16.700	18.600	20.500	25.050	29.400	33.750
60.70	0.545	11.100	12.300	13.500	18.450	21.700	24.950	12.100	13.400	14.700	18.450	21.700	24.950	12.700	14.100	15.500	18.450	21.700	24.950	
		13.84	15.000	16.700	18.400	25.050	29.400	33.750	16.300	18.100	19.900	25.050	29.400	33.750	17.200	19.100	21.000	25.050	29.400	33.750
65.70	0.595	11.700	13.000	14.300	18.450	21.700	24.950	12.450	13.750	15.050	18.450	21.700	24.950	13.000	14.450	15.900	18.450	21.700	24.950	
		15.11	15.900	17.700	19.500	25.050	29.400	33.750	16.700	18.600	20.500	25.050	29.400	33.750	17.600	19.600	21.600	25.050	29.400	33.750
66.15	0.611	11.450	12.650	13.850	18.450	21.700	24.950	12.450	13.750	15.050	18.450	21.700	24.950	13.000	14.450	15.900	18.450	21.700	24.950	
		15.52	15.500	17.200	18.900	25.050	29.400	33.750	16.700	18.600	20.500	25.050	29.400	33.750	17.600	19.600	21.600	25.050	29.400	33.750
73.20	0.672	12.100	13.400	14.700	18.450	21.700	24.950	12.700	14.100	15.500	18.450	21.700	24.950	13.350	14.850	16.350	18.450	21.700	24.950	
		17.07	16.300	18.100	19.900	25.050	29.400	33.750	17.200	19.100	21.000	25.050	29.400	33.750	18.100	20.100	22.100	25.050	29.400	33.750



DINO VAM® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	145-150-155 ksi				Field & Accessories				
			Mill Side		min.		opt.		max.		
In <i>mm</i>	lb/ft	In <i>mm</i>	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.
			ft.lb <i>N.m</i>								
9 3/4" 247.65	59.20	0.595	10 850	11 950	13 050	18 450	21 700	24 950	25 050	29 400	33 750
	60.20	0.609	11 100	12 300	13 500	18 450	21 700	24 950	25 050	29 400	33 750
			15.47	15 000	16 700	18 400	25 050	29 400	33 750		
9 7/8" 250.83	62.80	0.625	11 450	12 650	13 850	18 450	21 700	24 950	25 050	29 400	33 750
	66.40	0.661	11 700	13 000	14 300	18 450	21 700	24 950	25 050	29 400	33 750
	67.50	0.678	12 100	13 400	14 700	18 450	21 700	24 950	25 050	29 400	33 750
10 3/4" 273.05	68.90	0.700	12 100	13 400	14 700	18 450	21 700	24 950	25 050	29 400	33 750
	70.50	0.720	12 450	13 750	15 050	18 450	21 700	24 950	25 050	29 400	33 750
			17.22	16 300	18 100	19 900	25 050	29 400	33 750		
10 3/4" 273.05	40.50	0.350	12 100	13 400	14 700	9 800	11 550	13 300	13 300	15 700	18 100
	45.50	0.400	12 450	13 750	15 050	16 000	18 800	21 600	21 600	25 500	29 400
	51.00	0.450	12 700	14 100	15 500	18 450	21 700	24 950	25 050	29 400	33 750
10 3/4" 273.05	55.50	0.495	13 000	14 450	15 900	18 450	21 700	24 950	25 050	29 400	33 750
	60.70	0.545	13 350	14 850	16 350	18 450	21 700	24 950	25 050	29 400	33 750
	65.70	0.595	13 700	15 200	16 700	18 450	21 700	24 950	25 050	29 400	33 750
10 3/4" 273.05	66.15	0.611	13 700	15 200	16 700	18 450	21 700	24 950	25 050	29 400	33 750
	73.20	0.672	14 000	15 550	17 100	18 450	21 700	24 950	25 050	29 400	33 750
			17.07	19 000	21 100	23 200	25 050	29 400	33 750		

DINO VAM® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	55-65 ksi						75-80-85 ksi						90-95-100 ksi												
			Mill Side		Field & Accessories		Mill Side		Field & Accessories		Mill Side		Field & Accessories		Mill Side		Field & Accessories										
In mm	lb/ft	In mm	min.	max.	opt.	max.	min.	max.	opt.	max.	ft.lb N/m	min.	max.	opt.	max.	min.	max.	opt.	max.	ft.lb N/m	min.	max.	opt.	max.			
10 3/4* 273.05	76.10	0.709	9.850	10.850	11.850	16.300	19.150	22.000	11.450	12.650	13.850	18.450	21.700	24.950	12.100	13.400	14.700	18.450	21.700	24.950	12.100	13.400	14.700	18.450	21.700	24.950	
			13.200	14.700	16.200	22.100	26.000	29.900	15.500	17.200	18.900	25.050	29.400	33.750	16.300	18.100	19.900	25.050	29.400	33.750	16.300	18.100	19.900	25.050	29.400	33.750	
			18.01	10.100	11.200	12.300	17.200	20.250	23.300	11.700	13.000	14.300	19.450	21.700	24.950	12.450	13.750	15.050	18.450	21.700	24.950	12.450	13.750	15.050	18.450	21.700	24.950
11 3/4* 298.45	47.00	0.375	6.840	7.600	8.360	7.700	9.050	10.400	8.750	9.750	10.750	10.450	12.300	14.150	9.850	10.850	11.850	12.300	14.150	16.000	9.850	10.850	11.850	12.300	14.150	16.000	
			9.53	9.300	10.300	11.300	10.500	12.300	14.100	11.900	13.200	14.500	14.150	16.700	19.250	13.200	14.700	16.200	16.600	19.600	22.600	13.200	14.700	16.200	16.600	19.600	22.600
			11.05	9.700	10.800	11.900	14.650	17.200	19.750	12.300	13.700	15.100	20.400	24.000	27.600	14.100	15.700	17.300	23.700	27.900	32.100	14.100	15.700	17.300	23.700	27.900	32.100
60.00	0.489	0.489	7.830	8.700	9.570	9.500	11.200	12.900	9.850	10.850	11.850	12.900	14.700	16.200	13.200	14.700	16.200	17.450	19.400	21.350	13.200	14.700	16.200	17.450	19.400	21.350	
			12.42	10.600	11.800	13.000	12.950	15.200	17.450	15.000	16.700	18.400	25.050	29.400	33.750	15.000	16.700	18.400	25.050	29.400	33.750	15.000	16.700	18.400	25.050	29.400	
			13.56	12.300	13.700	15.100	16.250	19.100	21.950	14.100	15.700	17.300	22.100	26.000	29.900	15.000	16.700	18.400	25.050	29.400	33.750	15.000	16.700	18.400	25.050	29.400	
65.00	0.534	0.534	9.150	10.150	11.150	12.000	14.100	16.200	10.450	11.550	12.650	16.300	19.150	22.000	11.100	12.300	13.500	18.450	21.700	24.950	11.100	12.300	13.500	18.450	21.700	24.950	
			14.78	13.200	14.700	16.200	19.150	22.600	26.050	15.000	16.700	18.400	25.050	29.400	33.750	15.900	17.700	19.500	25.050	29.400	33.750	15.900	17.700	19.500	25.050	29.400	
			14.78	13.200	14.700	16.200	19.150	22.600	26.050	15.000	16.700	18.400	25.050	29.400	33.750	15.900	17.700	19.500	25.050	29.400	33.750	15.900	17.700	19.500	25.050	29.400	
71.80	0.582	0.582	9.850	10.850	11.850	14.150	16.650	19.150	11.100	12.300	13.500	18.450	21.700	24.950	11.700	13.000	14.300	18.450	21.700	24.950	11.700	13.000	14.300	18.450	21.700	24.950	
			14.78	13.200	14.700	16.200	19.150	22.600	26.050	15.000	16.700	18.400	25.050	29.400	33.750	15.900	17.700	19.500	25.050	29.400	33.750	15.900	17.700	19.500	25.050	29.400	
			14.78	13.200	14.700	16.200	19.150	22.600	26.050	15.000	16.700	18.400	25.050	29.400	33.750	15.900	17.700	19.500	25.050	29.400	33.750	15.900	17.700	19.500	25.050	29.400	
64.50	0.380	0.380	8.750	9.750	10.750	9.500	11.200	12.900	11.450	12.650	13.850	12.900	15.200	17.500	12.700	14.100	15.500	14.750	17.950	19.950	12.700	14.100	15.500	14.750	17.950	19.950	
			9.65	11.900	13.200	14.500	12.950	15.200	17.450	15.500	17.200	18.900	17.450	20.600	23.750	17.200	19.100	21.000	19.900	23.500	17.200	19.100	21.000	19.900	23.500		
			10.92	12.300	13.700	15.100	17.450	20.600	23.750	15.900	17.700	19.500	24.200	28.400	32.600	17.600	19.600	21.600	25.050	29.400	33.750	17.600	19.600	21.600	25.050	29.400	
61.00	0.430	0.430	9.150	10.150	11.150	12.900	15.200	17.500	11.700	13.000	14.300	17.850	21.000	24.150	13.000	14.450	15.900	18.450	21.700	24.950	13.000	14.450	15.900	18.450	21.700	24.950	
			10.92	12.300	13.700	15.100	17.450	20.600	23.750	15.900	17.700	19.500	24.200	28.400	32.600	17.600	19.600	21.600	25.050	29.400	33.750	17.600	19.600	21.600	25.050	29.400	
			12.19	12.800	14.200	15.600	21.600	25.500	29.400	16.300	18.100	19.900	25.050	29.400	33.750	18.100	20.100	22.100	25.050	29.400	33.750	18.100	20.100	22.100	25.050	29.400	
72.00	0.514	0.514	10.100	11.200	12.300	18.450	21.700	24.950	12.450	13.750	15.050	18.450	21.700	24.950	13.700	15.200	16.700	18.450	21.700	24.950	13.700	15.200	16.700	18.450	21.700	24.950	
			13.06	13.700	15.200	16.700	20.550	24.400	33.750	16.700	18.600	20.500	25.050	29.400	33.750	18.500	20.600	22.700	25.050	29.400	33.750	18.500	20.600	22.700	25.050	29.400	
			13.97	10.450	11.550	12.650	15.400	18.100	20.800	12.700	14.100	15.500	18.450	21.700	24.950	13.700	15.200	16.700	18.450	21.700	24.950	13.700	15.200	16.700	18.450	21.700	
60.70	0.580	0.580	11.700	13.000	14.300	17.500	20.600	23.700	13.000	14.450	15.900	18.450	21.700	24.950	14.000	15.550	17.100	18.450	21.700	24.950	14.000	15.550	17.100	18.450	21.700	24.950	
			14.73	15.900	17.700	19.500	23.700	27.900	17.600	19.600	21.600	25.050	29.400	33.750	19.000	21.100	23.200	25.050	29.400	33.750	19.000	21.100	23.200	25.050	29.400		
			15.44	12.100	13.400	14.700	18.450	21.700	24.950	13.350	14.850	16.350	18.450	21.700	24.950	14.300	15.900	17.500	18.450	21.700	24.950	14.300	15.900	17.500	18.450	21.700	
85.00	0.608	0.608	12.100	13.400	14.700	18.450	21.700	24.950	13.350	14.850	16.350	18.450	21.700	24.950	14.300	15.900	17.500	18.450	21.700	24.950	14.300	15.900	17.500	18.450	21.700	24.950	
			15.44	16.300	18.100	19.900	25.050	29.400	33.750	18.100	20.100	22.100	25.050	29.400	33.750	19.400	21.600	23.800	25.050	29.400	33.750	19.400	21.600	23.800	25.050	29.400	
			15.44	16.300	18.100	19.900	25.050	29.400	33.750	18.100	20.100	22.100	25.050	29.400	33.750	19.400	21.600	23.800	25.050	29.400	33.750	19.400	21.600	23.800	25.050	29.400	



DINO VAM® TORQUE VALUES

Size (OD)	Nominal Weight lb/ft	Wall Thickness in mm	105-110-115 ksi				120-125-130 ksi				135-140 ksi									
			Mill Side min.	Mill Side max.	Field & Accessories min.	Field & Accessories max.	Mill Side min.	Mill Side max.	Field & Accessories min.	Field & Accessories max.	Mill Side min.	Mill Side max.	Field & Accessories min.	Field & Accessories max.						
In mm			ft.lb N/m				ft.lb N/m				ft.lb N/m									
			optl.	min.	max.	optl.	min.	max.	optl.	min.	max.	optl.	min.	max.	optl.	min.	max.			
10 3/4" 273.05	76.10	0.709	12 700	14 100	15 500	18 450	21 700	24 950	13 000	14 450	15 900	18 450	21 700	24 950	13 700	15 200	16 700	18 450	21 700	24 950
		18.01	17 200	19 100	21 000	25 050	29 400	33 750	17 600	19 600	21 600	25 050	29 400	33 750	18 500	20 600	22 700	25 050	29 400	33 750
	79.20	0.734	13 000	14 450	15 900	18 450	21 700	24 950	13 700	15 200	16 700	18 450	21 700	24 950	14 000	15 550	17 100	18 450	21 700	24 950
		18.64	17 600	19 600	21 600	25 050	29 400	33 750	18 500	20 600	22 700	25 050	29 400	33 750	19 000	21 100	23 200	25 050	29 400	33 750
11 3/4" 298.45	47.00	0.375	11 100	12 300	13 500	14 150	16 650	19 150	12 450	13 750	15 050	15 700	18 450	21 200	13 350	14 850	16 350	17 200	20 250	23 300
		9.53	15 000	16 700	18 400	19 150	22 600	26 050	16 700	18 600	20 500	21 250	25 000	28 750	23 300	25 100	27 000	28 750	31 700	34 700
	54.00	0.435	11 700	13 000	14 300	18 450	21 700	24 950	13 000	14 450	15 900	18 450	21 700	24 950	14 000	15 550	17 100	18 450	21 700	24 950
		11.05	16 900	17 700	19 500	25 050	29 400	33 750	17 600	19 600	21 600	25 050	29 400	33 750	19 000	21 100	23 200	25 050	29 400	33 750
	60.00	0.489	11 700	13 000	14 300	16 900	19 900	22 900	13 000	14 450	15 900	18 450	21 700	24 950	14 000	15 550	17 100	18 450	21 700	24 950
		12.42	15 900	17 700	19 500	22 950	27 000	31 050	17 600	19 600	21 600	25 050	29 400	33 750	19 000	21 100	23 200	25 050	29 400	33 750
	65.00	0.534	12 450	13 750	15 050	18 450	21 700	24 950	13 350	14 850	16 350	18 450	21 700	24 950	14 300	15 900	17 500	18 450	21 700	24 950
		13.56	16 700	18 600	20 500	25 050	29 400	33 750	18 100	20 100	22 100	25 050	29 400	33 750	19 400	21 600	23 800	25 050	29 400	33 750
	71.00	0.582	13 000	14 450	15 900	18 450	21 700	24 950	13 700	15 200	16 700	18 450	21 700	24 950	14 600	16 250	17 900	18 450	21 700	24 950
		14.78	17 600	19 600	21 600	25 050	29 400	33 750	18 500	20 600	22 700	25 050	29 400	33 750	19 900	22 100	24 300	25 050	29 400	33 750
11 7/8" 301.63	71.80	0.582	12 450	13 750	15 050	18 450	21 700	24 950	13 700	15 200	16 700	18 450	21 700	24 950	14 600	16 250	17 900	18 450	21 700	24 950
		14.78	16 700	18 600	20 500	25 050	29 400	33 750	18 500	20 600	22 700	25 050	29 400	33 750	19 900	22 100	24 300	25 050	29 400	33 750
13 3/8" 339.73	54.50	0.380	14 300	15 900	17 500	16 900	19 900	22 900	16 300	18 100	19 900	18 450	21 700	24 950	17 600	19 550	21 500	18 450	21 700	24 950
		9.65	19 400	21 600	23 800	22 950	27 000	31 050	22 000	24 500	27 000	25 050	29 400	33 750	23 800	26 500	29 200	25 050	29 400	33 750
	61.00	0.430	15 000	16 650	18 300	18 450	21 700	24 950	16 600	18 450	20 300	18 450	21 700	24 950	17 900	19 900	21 900	18 450	21 700	24 950
		10.92	20 300	22 600	24 900	25 050	29 400	33 750	22 500	25 000	27 500	25 050	29 400	33 750	24 300	27 000	29 700	25 050	29 400	33 750
	66.00	0.480	15 300	17 000	18 700	18 450	21 700	24 950	16 900	18 800	20 700	18 450	21 700	24 950	18 200	20 250	22 300	18 450	21 700	24 950
		12.19	20 700	23 000	25 300	25 050	29 400	33 750	22 900	25 500	28 100	25 050	29 400	33 750	24 700	27 500	30 300	25 050	29 400	33 750
	72.00	0.514	15 600	17 350	19 100	18 450	21 700	24 950	17 250	19 150	21 050	18 450	21 700	24 950	18 550	20 600	22 650	18 450	21 700	24 950
		13.06	21 100	23 500	25 900	25 050	29 400	33 750	23 400	26 000	28 600	25 050	29 400	33 750	25 100	27 900	30 700	25 050	29 400	33 750
	77.00	0.550	15 600	17 350	19 100	18 450	21 700	24 950	16 900	18 800	20 700	18 450	21 700	24 950	18 200	20 250	22 300	18 450	21 700	24 950
		13.97	21 100	23 500	25 900	25 050	29 400	33 750	22 900	25 500	28 100	25 050	29 400	33 750	24 700	27 500	30 300	25 050	29 400	33 750
	80.70	0.580	15 950	17 700	19 450	18 450	21 700	24 950	17 250	19 150	21 050	18 450	21 700	24 950	18 550	20 600	22 650	18 450	21 700	24 950
		14.73	21 600	24 000	26 400	25 050	29 400	33 750	23 400	26 000	28 600	25 050	29 400	33 750	25 100	27 900	30 700	25 050	29 400	33 750
	85.00	0.608	16 300	18 100	19 900	18 450	21 700	24 950	17 600	19 550	21 500	18 450	21 700	24 950	18 900	21 000	23 100	18 450	21 700	24 950
		15.44	22 000	24 500	27 000	25 050	29 400	33 750	23 800	26 500	29 200	25 050	29 400	33 750	25 600	28 400	31 200	25 050	29 400	33 750

DINO VAM® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	145-150-155 ksi							
			Mill Side		Field & Accessories		Field & Accessories			
In <i>mm</i>	lb/ft	In <i>mm</i>	min.	opti.	max.	min.	opti.	max.		
			ft.lb <i>N.m</i>							
10 3/4" 273.05	76.10	0.709	14 300	16 900	17 500	18 450	21 700	24 950		
			19 400	21 600	23 800	25 050	29 400	33 750		
			14 600	16 250	17 900	18 450	21 700	24 950		
11 3/4" 298.45	47.00	0.375	14 300	16 900	17 500	18 450	21 700	24 950		
			19 400	21 600	23 800	25 050	29 400	33 750		
			15 000	16 650	18 300	18 450	21 700	24 950		
60.00	0.489	0.489	15 000	16 650	18 300	18 450	21 700	24 950		
			20 300	22 600	24 900	25 050	29 400	33 750		
			12 42	20 300	22 600	24 900	25 050	29 400	33 750	
65.00	0.534	0.534	15 300	17 000	18 700	18 450	21 700	24 950		
			20 700	23 000	25 300	25 050	29 400	33 750		
			14 78	21 100	23 500	25 900	25 050	29 400	33 750	
11 7/8" 301.63	71.00	0.582	15 600	17 350	19 100	18 450	21 700	24 950		
			21 100	23 500	25 900	25 050	29 400	33 750		
			14 78	21 100	23 500	25 900	25 050	29 400	33 750	
13 3/8" 339.73	85.00	0.608	15 600	17 350	19 100	18 450	21 700	24 950		
			21 100	23 500	25 900	25 050	29 400	33 750		
			14 78	21 100	23 500	25 900	25 050	29 400	33 750	
61.00	0.430	0.430	18 900	21 000	23 100	18 450	21 700	24 950		
			25 600	28 400	31 200	25 050	29 400	33 750		
			19 200	21 350	23 500	18 450	21 700	24 950		
68.00	0.480	0.480	26 000	28 900	31 800	25 050	29 400	33 750		
			12 19	26 500	29 400	32 300	25 050	29 400	33 750	
			13 06	26 500	29 400	32 300	25 050	29 400	33 750	
72.00	0.514	0.514	19 550	21 700	23 850	18 450	21 700	24 950		
			26 500	29 400	32 300	25 050	29 400	33 750		
			19 550	21 700	23 850	18 450	21 700	24 950		
77.00	0.550	0.550	26 500	29 400	32 300	25 050	29 400	33 750		
			13 97	26 500	29 400	32 300	25 050	29 400	33 750	
			19 550	21 700	23 850	18 450	21 700	24 950		
80.70	0.580	0.580	26 500	29 400	32 300	25 050	29 400	33 750		
			14 73	26 500	29 400	32 300	25 050	29 400	33 750	
			19 550	21 700	23 850	18 450	21 700	24 950		
85.00	0.608	0.608	26 500	29 400	32 300	25 050	29 400	33 750		
			15 44	26 500	29 400	32 300	25 050	29 400	33 750	
			19 550	21 700	23 850	18 450	21 700	24 950		



DINO VAM® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	55-65 ksi						75-80-85 ksi						90-95-100 ksi								
			Mill Side			Field & Accessories			Mill Side			Field & Accessories			Mill Side			Field & Accessories					
			min.	optl.	max.	ft.lb N/m	min.	optl.	max.	min.	optl.	max.	ft.lb N/m	min.	optl.	max.	min.	optl.	max.	ft.lb N/m	min.	optl.	max.
13 3/8"	86.00	0.825	12 450	13 750	15 050	18 450	21 700	24 950	13 700	15 200	16 700	18 450	21 700	24 950	18 450	21 700	24 950	14 900	16 250	17 900	18 450	21 700	24 950
			339.73	15.88	16 700	18 600	20 500	25 050	29 400	33 750	18 500	20 600	22 700	25 050	29 400	33 750	25 050	29 400	33 750	19 400	22 100	24 300	25 050	29 400	33 750
13 5/8"	88.20	0.925	12 450	13 750	15 050	18 450	21 700	24 950	13 700	15 200	16 700	18 450	21 700	24 950	18 450	21 700	24 950	14 300	15 900	17 500	18 450	21 700	24 950
			346.08	15.88	16 700	18 600	20 500	25 050	29 400	33 750	18 500	20 600	22 700	25 050	29 400	33 750	25 050	29 400	33 750	19 400	21 600	23 800	25 050	29 400	33 750
14"	82.50	0.862	13 700	15 200	16 700	18 800	18 250	18 700	15 600	17 950	19 100	18 150	21 350	24 550	18 150	21 350	24 550	16 300	18 100	19 900	18 450	21 700	24 950
			355.60	14.27	18 500	20 600	22 700	25 000	25 400	21 800	23 500	25 900	24 550	28 900	33 250	24 550	28 900	33 250	16 900	18 800	20 700	18 450	21 700	24 950
14"	86.00	0.800	14 300	15 900	17 500	16 600	19 650	22 600	16 300	18 100	19 900	18 450	21 700	24 950	18 450	21 700	24 950	16 900	18 800	20 700	18 450	21 700	24 950
				15.24	19 400	21 600	23 800	22 450	26 500	30 550	22 000	24 500	27 000	25 050	29 400	33 750	25 050	29 400	33 750	17 600	19 500	21 500	18 450	21 700	24 950
14"	93.00	0.950	15 000	16 650	18 300	18 450	21 700	24 950	16 900	18 800	20 700	18 450	21 700	24 950	18 450	21 700	24 950	17 600	19 550	21 500	18 450	21 700	24 950
				16.51	20 300	22 600	24 900	25 050	29 400	33 750	22 900	25 500	28 100	25 050	29 400	33 750	25 050	29 400	33 750	23 800	26 500	29 200	25 050	29 400	33 750
14"	94.80	0.956	15 600	17 350	19 100	18 450	21 700	24 950	17 600	19 550	21 500	18 450	21 700	24 950	18 450	21 700	24 950	18 200	20 250	22 300	18 450	21 700	24 950
				16.66	21 100	23 500	25 900	25 050	29 400	33 750	23 800	26 500	29 200	25 050	29 400	33 750	25 050	29 400	33 750	24 700	27 500	30 300	25 050	29 400	33 750
14"	99.00	0.988	16 300	18 100	19 900	18 450	21 700	24 950	18 200	20 250	22 300	18 450	21 700	24 950	18 450	21 700	24 950	18 900	21 000	23 100	18 450	21 700	24 950
				17.48	22 000	24 500	27 000	25 050	29 400	33 750	24 700	27 500	30 300	25 050	29 400	33 750	25 050	29 400	33 750	25 600	28 400	31 200	25 050	29 400	33 750
14"	100.00	0.700	16 800	18 450	20 300	18 450	21 700	24 950	18 900	21 000	23 100	18 450	21 700	24 950	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950
				17.78	22 500	25 000	27 500	25 050	29 400	33 750	25 600	28 400	31 200	25 050	29 400	33 750	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750
14"	106.00	0.750	16 900	18 800	20 700	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950
				19.05	22 900	25 500	28 100	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750
14"	114.00	0.800	16 900	18 800	20 700	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950
				20.32	22 900	25 500	28 100	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750
16"	85.00	0.375	12 450	13 750	15 050	10 750	12 650	14 550	15 600	17 350	19 100	14 450	17 000	19 550	14 450	17 000	19 550	17 600	19 550	21 500	16 800	19 550	22 500
			406.40	9.53	16 700	18 600	20 500	14 650	17 200	19 750	21 100	23 500	25 900	19 550	23 000	26 450	19 550	23 000	26 450	23 800	26 500	29 200	22 450	26 500	30 550
16"	75.00	0.438	13 000	14 450	15 900	16 800	19 900	22 500	16 900	18 100	19 900	18 450	21 700	24 950	18 450	21 700	24 950	18 900	21 000	23 100	18 450	21 700	24 950
				11.13	17 600	19 600	21 600	22 450	26 500	30 550	22 000	24 500	27 000	25 050	29 400	33 750	24 700	27 500	30 300	25 050	29 400	31 200	25 050	29 400	33 750
16"	84.00	0.495	13 700	15 200	16 700	18 450	21 700	24 950	18 900	18 800	20 700	18 450	21 700	24 950	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950
				12.57	18 500	20 600	22 700	25 050	29 400	33 750	22 900	25 500	28 100	25 050	29 400	33 750	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750
16"	84.80	0.800	14 000	15 550	17 100	18 450	21 700	24 950	17 250	19 150	21 050	18 450	21 700	24 950	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950
				12.70	19 000	21 100	23 200	25 050	29 400	33 750	23 400	26 000	28 600	25 050	29 400	33 750	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750
16"	94.50	0.562	16 900	18 800	20 700	15 700	18 450	21 200	18 900	21 000	23 100	18 450	21 700	24 950	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950
				14.27	22 900	25 500	28 100	21 250	25 000	28 750	25 600	28 400	31 200	25 050	29 400	33 750	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750

DINO VAM® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	105-110-115 ksi						120-125-130 ksi						135-140 ksi					
			Mill Side		Field & Accessories		Mill Side		Field & Accessories		Mill Side		Field & Accessories		Mill Side		Field & Accessories			
In	lb/ft	In	min.	max.	opt.	max.	min.	max.	opt.	max.	min.	max.	opt.	max.	min.	max.	opt.	max.		
mm		mm	ft.lb						ft.lb						ft.lb					
			N/m						N/m						N/m					
13 3/8"	86.00	15.88	16 600	18 450	20 300	21 700	24 950	17 900	19 900	21 900	23 850	18 450	21 700	24 950	19 200	21 350	23 500	18 450	21 700	24 950
	339.73		22 500	25 000	27 500	29 400	33 750	24 300	27 000	29 700	32 300	25 050	29 400	33 750	26 000	28 900	31 800	25 050	29 400	33 750
13 5/8"	88.20	15.88	19 300	18 450	21 700	24 950	18 200	20 250	22 300	24 300	25 050	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950
	355.60		22 000	24 100	27 000	29 400	33 750	24 700	27 500	30 300	32 300	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750
14"	82.50	14.27	17 600	19 550	21 500	24 950	19 550	21 700	23 850	25 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	
			23 800	26 500	29 200	33 750	26 500	29 400	32 300	35 000	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	
93.00	0.856	15.24	24 700	27 500	30 300	33 750	26 500	29 400	32 300	35 000	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	
			18 900	21 000	23 100	25 050	28 400	31 200	34 750	37 500	25 050	29 400	33 750	37 500	26 500	29 400	32 300	25 050	29 400	33 750
94.80	0.888	16.51	25 600	28 400	31 200	34 750	26 500	29 400	32 300	35 000	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	
			19 550	21 700	23 850	25 850	19 550	21 700	23 850	25 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	
99.00	0.938	16.66	26 500	29 400	32 300	35 000	26 500	29 400	32 300	35 000	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	
			19 550	21 700	23 850	25 850	19 550	21 700	23 850	25 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	
100.00	0.700	17.48	26 500	29 400	32 300	35 000	26 500	29 400	32 300	35 000	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	
			19 550	21 700	23 850	25 850	18 450	21 700	23 850	25 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	
106.00	0.750	17.78	26 500	29 400	32 300	35 000	26 500	29 400	32 300	35 000	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	
			19 550	21 700	23 850	25 850	18 450	21 700	23 850	25 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	
114.00	0.800	19.05	26 500	29 400	32 300	35 000	26 500	29 400	32 300	35 000	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	
			19 550	21 700	23 850	25 850	18 450	21 700	23 850	25 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	
16"	65.00	0.375	26 500	29 400	32 300	35 000	26 500	29 400	32 300	35 000	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	
	406.40		19 550	21 700	23 850	25 850	18 450	21 700	23 850	25 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	
75.00	0.438	9.53	26 500	29 400	32 300	35 000	26 500	29 400	32 300	35 000	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	
			19 550	21 700	23 850	25 850	18 450	21 700	23 850	25 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	
84.00	0.495	11.13	26 500	29 400	32 300	35 000	26 500	29 400	32 300	35 000	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	
			19 550	21 700	23 850	25 850	18 450	21 700	23 850	25 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	
84.80	0.500	12.57	26 500	29 400	32 300	35 000	26 500	29 400	32 300	35 000	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	
			19 550	21 700	23 850	25 850	18 450	21 700	23 850	25 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	
94.50	0.562	12.70	26 500	29 400	32 300	35 000	26 500	29 400	32 300	35 000	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	
			19 550	21 700	23 850	25 850	18 450	21 700	23 850	25 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	
		14.27	26 500	29 400	32 300	35 000	26 500	29 400	32 300	35 000	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	



DINO VAM® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	145-150-155 ksi				Field & Accessories					
			Mill Side		min.		opt.		max.			
In mm	lb/ft	In mm	min.	opt.	max.	min.	opt.	max.	min.	opt.	max.	
			ft.lb N.m									
13 3/8" 339.73	88.00	0.625	19 550	21 700	23 850	18 450	21 700	24 950				
			26 500	29 400	32 300	25 050	29 400	33 750				
			15.88	26 500	29 400	32 300	25 050	29 400	33 750			
14" 355.60	82.50	0.562	19 550	21 700	23 850	18 450	21 700	24 950				
			26 500	29 400	32 300	25 050	29 400	33 750				
			14.27	26 500	29 400	32 300	25 050	29 400	33 750			
13 5/8" 346.08	86.00	0.600	19 550	21 700	23 850	18 450	21 700	24 950				
			26 500	29 400	32 300	25 050	29 400	33 750				
			15.24	26 500	29 400	32 300	25 050	29 400	33 750			
14"	83.00	0.650	19 550	21 700	23 850	18 450	21 700	24 950				
			26 500	29 400	32 300	25 050	29 400	33 750				
			16.51	26 500	29 400	32 300	25 050	29 400	33 750			
13 5/8"	94.80	0.656	19 550	21 700	23 850	18 450	21 700	24 950				
			26 500	29 400	32 300	25 050	29 400	33 750				
			16.66	26 500	29 400	32 300	25 050	29 400	33 750			
14"	99.00	0.688	19 550	21 700	23 850	18 450	21 700	24 950				
			26 500	29 400	32 300	25 050	29 400	33 750				
			17.48	26 500	29 400	32 300	25 050	29 400	33 750			
13 5/8"	100.00	0.700	19 550	21 700	23 850	18 450	21 700	24 950				
			26 500	29 400	32 300	25 050	29 400	33 750				
			17.78	26 500	29 400	32 300	25 050	29 400	33 750			
14"	106.00	0.750	19 550	21 700	23 850	18 450	21 700	24 950				
			26 500	29 400	32 300	25 050	29 400	33 750				
			19.05	26 500	29 400	32 300	25 050	29 400	33 750			
16"	114.00	0.800	19 550	21 700	23 850	18 450	21 700	24 950				
			26 500	29 400	32 300	25 050	29 400	33 750				
			20.32	26 500	29 400	32 300	25 050	29 400	33 750			
16" 406.40	65.00	0.375	19 550	21 700	23 850	18 450	21 700	24 950				
			26 500	29 400	32 300	25 050	29 400	33 750				
			9.53	26 500	29 400	32 300	25 050	29 400	33 750			
16"	75.00	0.438	19 550	21 700	23 850	18 450	21 700	24 950				
			26 500	29 400	32 300	25 050	29 400	33 750				
			11.13	26 500	29 400	32 300	25 050	29 400	33 750			
16"	84.00	0.495	19 550	21 700	23 850	18 450	21 700	24 950				
			26 500	29 400	32 300	25 050	29 400	33 750				
			12.57	26 500	29 400	32 300	25 050	29 400	33 750			
16"	84.80	0.500	19 550	21 700	23 850	18 450	21 700	24 950				
			26 500	29 400	32 300	25 050	29 400	33 750				
			12.70	26 500	29 400	32 300	25 050	29 400	33 750			
16"	94.50	0.562	19 550	21 700	23 850	18 450	21 700	24 950				
			26 500	29 400	32 300	25 050	29 400	33 750				
			14.27	26 500	29 400	32 300	25 050	29 400	33 750			

DINO VAM® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	55-65 ksi						75-80-85 ksi						90-95-100 ksi											
			Mill Side			Field & Accessories			Mill Side			Field & Accessories			Mill Side			Field & Accessories								
			min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.	min.	optl.	max.						
in <i>mm</i>	lb/ft	in <i>mm</i>	ft.lb <i>N.m</i>						ft.lb <i>N.m</i>						ft.lb <i>N.m</i>											
16" 406.40	97.00	0.575	19 550	21 700	23 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950
			26 500	29 400	32 300	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750
	104.00	0.625	17 600	19 550	21 500	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950
			23 800	26 500	29 200	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750
	108.00	0.656	18 900	21 000	23 100	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950
			25 600	28 400	31 200	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750
	128.00	0.781	19 550	21 700	23 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950
			26 500	29 400	32 300	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750

DINO VAM® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	105-110-115 ksi						120-125-130 ksi						135-140 ksi											
			Mill Side		Field & Accessories		Mill Side		Field & Accessories		Mill Side		Field & Accessories		Mill Side		Field & Accessories									
			min.	opti.	max.	min.	opti.	max.	min.	opti.	max.	min.	opti.	max.	min.	opti.	max.	min.	opti.	max.						
in <i>mm</i>	lb/ft	in <i>mm</i>	ft.lb <i>N.m</i>			ft.lb <i>N.m</i>			ft.lb <i>N.m</i>			ft.lb <i>N.m</i>			ft.lb <i>N.m</i>			ft.lb <i>N.m</i>								
16* 406.40	97.00	0.575	19 550	21 700	23 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950
		14.61	26 500	29 400	32 300	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750
	104.00	0.625	19 550	21 700	23 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950
106.00		0.656	19 550	21 700	23 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950
		16.66	26 500	29 400	32 300	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750
	128.00	0.781	19 550	21 700	23 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950	19 550	21 700	23 850	18 450	21 700	24 950
		19.84	26 500	29 400	32 300	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750	26 500	29 400	32 300	25 050	29 400	33 750

DINO VAM® TORQUE VALUES

Size (OD)	Nominal Weight	Wall Thickness	145-150-155 ksi					
			Mill Side		Field & Accessories			
In <i>mm</i>	lb/ft	In <i>mm</i>	min.	opt.	max.	min.	opt.	max.
			ft.lb <i>N.m</i>					
16" 406.40	97.00	0.575	19 550	21 700	23 850	18 450	21 700	24 950
			26 500	29 400	32 300	25 050	29 400	33 750
	104.00	0.625	19 550	21 700	23 850	18 450	21 700	24 950
			26 500	29 400	32 300	25 050	29 400	33 750
	108.00	0.656	19 550	21 700	23 850	18 450	21 700	24 950
			26 500	29 400	32 300	25 050	29 400	33 750
	128.00	0.781	19 550	21 700	23 850	18 450	21 700	24 950
			26 500	29 400	32 300	25 050	29 400	33 750
		19.84	26 500	29 400	32 300	25 050	29 400	33 750

3.17 VAM® LIFT



VAM® LIFT is a semi premium high torque integral connection for large OD pipe. A semi-flush integral connection which is ideal for surface casing and intermediate casing, it is the new solution to meet the most demanding offshore challenges for the Oil & Gas industry.

Applicable Range

Available size range

- 13 3/8", 13 5/8" and 16" OD

Available across the full range of steel grades

- Yield strength 80 ksi to 140 ksi

Applications

- Surface Casing
- Intermediate casing / liner
- Geothermal wells
- Reaming down hole
- Unconventional wells
- Drilling with casing / liner
- Extended reach wells
- Pipe rotation during cementation
- Ideal for deep and shallow offshore wells
- Ideal for slim-hole well designs

Performance

- Extreme torque capacity
- Resistance to collapse and internal pressure 100% of pipe body yield strength
- Up to 74% efficiency under tension, with 100% CYS compression rating.
- Bending up to 20°/30m (12°/100ft) tested under combined loads
- Qualified as per ISO 13679:2002 CAL I

Benefits

- Easy to run
- Computerized Make-up torque control
- Recommended for rotating liner thanks to high torque capacity
- Ideal for slim-hole well designs due to high clearance (connection max OD only 3% over pipe OD).

VAM® LIFT TECHNICAL DATA

Size (OD) inch	Nominal Weight lb./ft.	Wall Thickness inch.	API Drift Diameter inch.	Connection OD inch.	Efficiency %	Make-up Loss inch.	Pipe Body Section sq. in.	CCS sq. in.	Connection Yield Strength (1000 lb.)				
									80 ksi	95 ksi	110 ksi	125 ksi	140 ksi
13 3/8"	68.00	0.480	12.259	13.521	69.1%	6.050	19.445	13.429	1.075	1.276	1.478	1.680	1.881
13 5/8"	72.00	0.514	12.191	13.727	66.8%	4.811	20.768	13.865	1.110	1.318	1.526	1.734	1.943
16"	84.00	0.495	14.823	16.211	69.8%	5.389	24.112	16.823	1.346	1.599	1.851	2.104	2.356
	109.00	0.656	14.501	16.419	74.1%	5.846	31.622	23.422	1.875	2.226	2.577	2.929	3.280

Size (OD) inch	Nominal Weight lb./ft.	Internal Yield Pressure (psi) - API 5C3				External Pressure Resistance (psi) - API 5C3							
		80 ksi	95 ksi	110 ksi	125 ksi	140 ksi	80 ksi	95 ksi	110 ksi	125 ksi	140 ksi		
13 3/8"	68.00	5.024	5.966	6.908	7.850	8.793	2.270	2.340	2.340	2.340*	-	-	-
13 5/8"	72.00	5.380	6.389	7.398	8.407	9.415	2.670	2.830	2.880	2.880	2.880*	2.880*	2.880*
16"	84.00	4.331	5.143	5.955	6.768	7.580	3.980	4.260	4.570	4.800	4.930*	4.930*	4.930*
	109.00	5.740	6.816	7.893	8.969	10.045	3.080	3.320	3.470	3.520	3.520	3.520	3.520

* Liquid MIYP Qualified

VAM® LIFT TORQUE TABLE

Size (OD)	Nominal Weight	Wall Thickness	All grades		
			min.	opti.	max.
in	lb/ft	in	ft.lbs.		
mm		mm	N.m.		
13 3/8	68.00	0.480	70 000	-	-
339.73		12.19	94 900	-	-
	72.00	0.514	70 000	-	-
		13.06	94 900	-	-
13 5/8	88.20	0.625	70 000	-	-
346.08		15.88	94 900	-	-
16	84.00	0.495	70 000	-	-
406.40		12.57	94 900	-	-
	109.00	0.656	70 000	-	-
		16.66	94 900	-	-

3.18 VAM TOP[®] FE

Applicable Range



- Available in sizes from 6⁵/₈" to 14", wall thicknesses ranging from 0.317" to 0.725" (special applications available up to 16")
- Standard, alternative and special drifts
- High strength steels up to 125ksi including Vallourec sour service grades

Applications

Suitable for high fatigue applications

- Drilling Risers
- Inner Production Riser Completion/Workover/Landing string

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VAM[®] Risers are the most experienced and successful Threaded and Coupled riser connections in the world. They have been developed and run over the last twenty years.

VAM TOP[®] FE is a threaded and coupled riser connector featuring high fatigue resistance (SAF ≤ 2.0 vs. DNVB1 curve). It is the "Fatigue Enhanced" version of the widely used and field proven VAM TOP[®] connection.

VAM TOP[®] FE features a premium gas tight internal metal-to-metal seal identical to the famous premium casing/tubing connection VAM TOP[®] from which it was designed. Fatigue enhancements include a bending swoosh to provide more flexibility in bending, a smooth thread shape, and increased coupling OD versus VAM TOP[®].

VAM TOP[®] FE has been the standard for riser applications for the last decade with over 1,000,000ft run throughout the world.

Performances

- ISO13679 qualified
- High number of Make & Breaks, up to 25 on select sizes
- High Fatigue resistance, SAF \leq 2.0 vs. DNV B1 curve.

Benefits

- High fatigue performance makes it ideal for riser environments.
- Fatigue performance demonstrated with more than 100 full scale connections tested on a resonant fatigue frame.
- Compatible with VAM TOP[®] for easy crossover. (VAM TOP[®] FE box to VAM TOP[®] pin).

Running Requirements

- The use of a slip type elevator, with low marking grip inserts, is mandatory for Hanging and Lifting the entire string.
- For lifting one pipe, a single joint elevator can be used provided its design prevents any damage to the coupling and is accurately dimensioned with a close fit for contact with the load bearing face during lifting operations.
- Lifting plugs can also be used though not recommended.

In case you want to run VAM TOP[®] FE as down hole casing after repeatable usage as a riser or for further assistance contact your local field service centre at the address at the back of this book or contact [Mr. Help](#) through the www.vamservices.com website.

VAM[®] Risers represent the specialized thread and pipe grades developed by Vallourec over the last twenty years for the unique fatigue environment experienced by top tensioned risers in the offshore oil and gas industry.

They represent two full product lines —the VAM TOP[®] FE and VAM[®] TTR— as well as seven tailor made products matching the full scope of the market needs. These fully developed products have extensive field running experience in the high pressure drilling, dry tree production, and completion/workover and intervention riser applications.

Other VAM[®] Riser connections are listed in the following application guide:

Application		Connection
Drilling Surface BOP		VAM TOP [®] FE
		VAM [®] DR HW
Production	Outer	VAM [®] TTR
	Inner	VAM TOP [®] FE
	Tubing	VAM TOP [®] FE
Workover, Landing, Completion		VAM [®] TTR
		VAM TOP [®] FE

Compatibility

Cases exist, where there is a need to assemble VAM TOP[®] and VAM TOP[®] FE threads, for example hydraulic test plugs (in the mill or in the field) or possibly accessories.

		VAM TOP [®] FE	
		Pin	Box
VAM TOP [®]	Pin	n/a	Compatible
	Box	NOT compatible	n/a

Compatibility chart between VAM TOP[®] and VAM TOP[®] FE connections

Dope quantities

Thread compound quantities for make-up are the same for VAM TOP[®] FE as for VAM TOP[®].

The recommended thread compound for standard VAM TOP[®] FE products is TOTAL TIFORA PG (non metallic thread compound).

The recommended quantity of thread compound shall be spread equally on pin and box end with care taken to ensure even coating across all mating parts.

The minimum thread compound quantities are indicated in the table below. Care shall be taken to keep the quantity as close as possible to this minimum to avoid contamination of the string.

Size	Minimum Quantity (ml)	Size	Minimum Quantity (ml)	Size	Minimum Quantity (ml)
7"	25	9 5/8"	41	13 3/8"	67
7 5/8"	27	9 7/8"	43	13 5/8"	68
7 3/4"	28	10 3/4"	46	14"	70
8"	31	11 3/4"	59		
8 5/8"	37	11 7/8"	60		

BOL PTC and standard API thread compound can be considered as acceptable though less preferred alternatives to TOTAL TIFORA PG. In all cases, it is recommended that the acceptability of the thread compound should be checked with the end user.

An Isolated Product is created when there is a specific need from an end user which cannot be met within the standard product line. For isolated products special drawings are issued to licensees. The naming convention for isolated products is to add the suffix 'NX' to the product name where 'N' is a sequential letter for each design. This complete name is marked on the product by the manufacturer. For VAM TOP[®] FE, isolated products are to be considered as not compatible with the standard product line and also not compatible between each other.

Compatibility may however take place on a case to case basis.

VAM TOP ® FE TECHNICAL DATA

Size (OD)	Nominal Weight	Wall Thickness		Drift Diameter	Coupling (OD)	Coupling ID (reg)	Make Up Loss	Coupling Length	Pipe Body Section	VAM TOP ® FE								
		in	mm							Regular Yield Strength (1000 lb)			External Pressure (psi)					
In	lb/ft	in	mm	in	in	in	in	in	sq.in	80	95	110	125	80	95	110	125	
6 5/8 169.28	36.70	0.562	14.27	5.376	7.705	5.669	4.427	11.693	10.705	856	1017	1178	1338	12.420	12.450	17.080	19.410	
	23.00	0.317	8.05	6.250	7.603	6.325	4.776	11.535	6.655	532	632	732	832	3.630	4.140	4.440	4.650	
	177.80	26.00	0.362	9.19	6.151	7.693	6.325	4.776	11.535	7.549	604	717	830	944	5.410	5.890	6.230	6.450
	32.00	0.408	10.36	6.059	7.784	6.325	4.776	4.776	11.535	8.449	676	803	929	1.056	7.030	7.840	8.530	9.110
	29.00	0.453	11.51	6.000	7.871	6.242	4.776	4.776	11.535	9.317	745	885	1.025	1.165	8.600	9.740	10.780	11.710
	35.00	0.488	12.65	5.879	7.953	6.161	4.776	4.776	11.575	10.172	814	966	1.119	1.272	10.180	11.650	13.030	14.310
	38.00	0.540	13.72	5.795	8.032	6.087	4.776	4.776	11.654	10.959	877	1.041	1.205	1.370	11.390	13.430	15.130	16.740
41.00	0.590	14.99	5.695	8.119	5.996	4.776	4.776	11.693	11.881	950	1.129	1.307	1.485	12.350	14.660	16.980	19.300	
42.70	0.625	15.88	5.625	8.182	5.933	4.776	4.776	11.772	12.517	1.001	1.189	1.377	1.565	13.010	15.450	17.890	20.330	
7 3/8 193.68	26.40	0.328	8.33	6.844	8.249	6.919	4.868	11.732	7.519	602	714	827	940	3.400	3.710	3.920	4.050	
	23.70	0.375	9.53	6.750	8.347	6.919	4.868	11.732	8.541	683	811	940	1.088	4.790	5.130	5.350	5.670	
	33.70	0.430	10.92	6.640	8.453	6.919	4.868	11.732	9.720	778	923	1.069	1.215	6.560	7.280	7.870	8.340	
	35.80	0.465	11.81	6.570	8.524	6.856	4.868	11.732	10.460	837	994	1.151	1.308	7.690	8.640	9.480	10.200	
	38.00	0.500	12.70	6.500	8.587	6.793	4.868	11.732	11.192	915	1.083	1.231	1.389	8.820	10.000	11.080	12.060	
	42.80	0.562	14.27	6.376	8.705	6.683	4.868	11.732	12.470	988	1.185	1.372	1.559	1.810	10.810	12.410	13.930	15.350
	45.30	0.595	15.11	6.310	8.764	6.622	4.868	11.732	13.141	1.051	1.248	1.446	1.643	11.510	13.670	15.440	17.100	
47.10	0.625	15.88	6.250	8.815	6.567	4.868	11.772	13.744	1.100	1.306	1.512	1.718	12.040	14.300	16.590	18.700		
7 3/4 196.65	46.10	0.595	15.11	6.500	8.880	6.750	4.915	11.850	13.374	1.070	1.271	1.471	1.672	11.340	13.320	15.000	16.590	
	32.00	0.375	9.53	7.125	8.721	7.194	4.915	11.850	8.983	719	853	988	1.123	4.220	4.450	4.800	5.060	
8 5/8 219.08	36.00	0.400	10.16	7.700	9.406	7.960	5.604	13.189	10.336	827	962	1.137	1.292	4.100	4.350	4.690	4.930	
	40.00	0.450	11.43	7.625	9.508	7.890	5.604	13.189	11.557	925	1.098	1.271	1.445	5.020	6.020	6.990	6.630	
	44.00	0.500	12.70	7.500	9.607	7.799	5.604	13.189	12.763	1.021	1.212	1.404	1.595	6.950	7.740	8.420	8.980	
	49.00	0.557	14.15	7.396	9.717	7.697	5.604	13.189	14.116	1.129	1.341	1.553	1.765	8.570	9.700	10.730	11.660	
	52.00	0.595	15.11	7.310	9.798	7.630	5.604	13.189	15.010	1.201	1.426	1.651	1.876	9.650	11.010	12.280	13.440	
	40.00	0.395	10.03	8.750	10.406	8.988	5.589	5.589	13.189	11.454	916	1.088	1.260	1.432	3.090	3.330	3.470	3.530
	43.50	0.435	11.05	8.625	10.488	8.925	5.589	5.589	13.189	12.559	1.005	1.193	1.381	1.570	3.810	4.130	4.420	4.620

VAM TOP ® FE TECHNICAL DATA

Size (OD)	Nominal Weight	Wall Thickness		Minimum Internal Yield Pressure (psi)					Make-up Torque (ft.lb)				
		in	mm	80	95	110	125	80	95	110	125		
6 5/8 169.28	36.70	0.562	14.27	11 880	14 100	16 330	18 560	18 960	21 010	23 040	25 130		
7	23.00	0.317	8.05	6 340	7 530	8 720	9 910	10 200	11 200	12 180	13 200		
<i>177.80</i>	26.00	0.362	9.19	7 240	8 600	9 960	11 310	10 870	11 870	12 860	13 880		
	29.00	0.408	10.36	8 160	9 690	11 220	12 750	11 380	12 380	13 370	14 390		
	32.00	0.453	11.51	9 060	10 760	12 460	14 160	14 200	15 560	16 900	18 290		
	35.00	0.498	12.65	9 960	11 830	13 700	15 560	16 740	18 450	20 130	21 880		
	38.00	0.540	13.72	10 800	12 830	14 850	16 880	19 090	21 110	23 120	25 190		
	41.00	0.580	14.99	11 600	14 010	16 230	18 440	21 870	24 280	26 680	29 140		
	42.70	0.625	15.88	12 500	14 840	17 190	19 530	24 050	26 730	29 390	32 130		
7 5/8	26.40	0.328	8.33	6 020	7 150	8 280	9 410	12 320	13 660	15 050	16 450		
<i>193.68</i>	29.70	0.375	9.53	6 880	8 180	9 470	10 760	13 050	14 420	15 780	17 190		
	33.70	0.430	10.92	7 900	9 380	10 860	12 340	13 880	15 250	16 620	18 020		
	36.80	0.485	11.81	8 540	10 140	11 740	13 340	16 160	17 860	19 540	21 280		
	39.00	0.500	12.70	9 180	10 900	12 620	14 340	18 420	20 440	22 450	24 530		
	42.80	0.562	14.27	10 320	12 250	14 190	16 120	22 340	24 940	27 520	30 170		
	45.30	0.595	15.11	10 920	12 970	15 020	17 070	24 490	27 400	30 290	33 260		
	47.10	0.625	15.88	11 480	13 630	15 780	17 930	26 570	29 770	32 930	36 190		
7 3/4 196.65	46.10	0.595	15.11	10 750	12 760	14 780	16 790	24 950	27 900	30 820	33 820		
8 203.2	32.00	0.375	9.53	6 563	7 793	9 023	10 254	16 690	18 650	20 600	22 600		
8 5/8 219.08	36.00	0.400	10.16	6 490	7 710	8 930	10 140	13 290	14 280	15 260	16 280		
	40.00	0.450	11.43	7 300	8 670	10 040	11 410	17 510	19 100	20 670	22 300		
	44.00	0.500	12.70	8 120	9 640	11 160	12 680	21 740	23 940	26 110	28 350		
	49.00	0.557	14.15	9 040	10 740	12 430	14 130	26 520	29 380	32 240	35 170		
	52.00	0.595	15.11	9 660	11 470	13 280	15 090	29 630	32 940	36 240	39 630		
9 5/8 244.48	40.00	0.395	10.03	5 750	6 820	7 900	8 980	12 820	13 780	14 740	15 720		
	43.50	0.435	11.05	6 330	7 510	8 700	9 890	16 790	18 340	19 890	21 480		

Running Requirements:

- The use of a slip type elevator, with low marking grip inserts, is mandatory for Hanging and Lifting the entire string.
- For lifting one pipe, a single joint elevator can be used provided its design prevents any damage to the coupling and is accurately dimensioned with a close fit for contact with the load bearing face during lifting operations.
- Lifting plugs can also be used though not recommended. In case you want to run VAM TOP ® FE as down hole casing after repeatable usage as a riser or for further assistance contact your local field service centre at the address at the back of this book or contact Mr. Help through the www.vamservices.com

VAM TOP ® FE TECHNICAL DATA

Size (OD)	Nominal Weight	Wall Thickness		Drift Diameter	Coupling (OD)	Coupling ID (reg)	Coupling Make Up Loss	Coupling Length	Pipe Body Section	VAM TOP ® FE					External Pressure (psi)				
		in	mm							80	95	110	125	80	95	110	125		
9 5/8 244.48	47.00	0.472	11.99	8.625	S	10.563	8.858	13.189	13.572	1.086	1.289	1.493	1.697	4.750	5.090	5.300	5.630		
	53.50	0.545	13.84	8.500	A	10.709	8.726	13.189	15.546	1.244	1.477	1.710	1.943	6.620	7.340	7.950	8.440		
	58.40	0.595	15.11	8.375	A	10.803	8.638	13.189	16.879	1.350	1.604	1.857	2.110	7.890	8.890	9.770	10.540		
	62.80	0.625	15.88	8.500	S	11.110	8.835	13.110	18.162	1.453	1.725	1.998	2.270	8.260	9.320	10.280	11.140		
9 7/8 250.83	65.30	0.650	16.51	8.419		11.166	8.789	13.150	18.838	1.507	1.790	2.072	2.355	8.890	10.070	11.170	12.160		
	66.40	0.661	16.79	8.387		11.189	8.770	13.189	19.134	1.531	1.818	2.105	2.392	9.150	10.400	11.560	12.610		
	66.90	0.668	16.97	8.383		11.201	8.758	13.189	19.322	1.546	1.836	2.125	2.415	9.320	10.610	11.810	12.900		
	67.50	0.678	17.22	8.363		11.221	8.740	13.189	19.590	1.567	1.861	2.155	2.449	9.570	10.920	12.160	13.310		
10 3/4 273.05	68.00	0.694	17.63	8.331		11.248	8.711	13.228	20.017	1.601	1.902	2.202	2.502	9.970	11.400	12.730	13.980		
	68.90	0.700	17.78	8.319		11.260	8.701	13.228	20.177	1.614	1.917	2.219	2.522	10.120	11.580	12.940	14.210		
	70.50	0.720	18.29	8.279		11.296	8.663	13.288	20.708	1.657	1.967	2.278	2.589	10.620	12.180	13.660	15.030		
	72.00	0.725	18.42	8.269		11.308	8.656	13.288	20.841	1.667	1.980	2.293	2.605	10.740	12.330	13.830	15.230		
11 3/4 298.45	45.50	0.400	10.16	9.874	S	11.544	10.122	13.268	13.006	1.040	1.236	1.431	1.626	2.470	2.590	2.610	2.610		
	51.00	0.450	11.43	9.694		11.650	10.031	13.268	14.561	1.165	1.383	1.602	1.820	3.220	3.480	3.660	3.740		
	55.50	0.495	12.57	9.625	A	11.741	9.951	13.288	15.947	1.276	1.515	1.754	1.983	4.020	4.290	4.610	4.850		
	60.70	0.545	13.84	9.504		11.843	9.882	13.268	17.473	1.398	1.660	1.922	2.184	5.160	5.580	5.980	6.070		
11 7/8 307.63	65.70	0.595	15.11	9.500	S	11.941	9.772	13.268	18.982	1.519	1.803	2.088	2.373	6.300	6.970	7.500	7.920		
	71.10	0.650	16.51	9.294		12.048	9.671	13.268	20.625	1.650	1.959	2.269	2.578	7.560	8.480	9.290	9.990		
	73.20	0.672	16.91	9.250		12.091	9.632	13.268	21.276	1.702	2.021	2.340	2.680	8.070	9.090	10.010	10.820		
	54.00	0.435	11.05	10.724		11.067	11.067	13.425	15.463	1.237	1.469	1.701	1.933	2.440	2.550	2.570	2.570		
13 3/8 339.73	60.00	0.430	10.92	10.625	A	12.733	10.970	13.425	17.300	1.384	1.644	1.903	2.163	3.180	3.440	3.610	3.680		
	65.00	0.534	13.56	10.625	A	12.827	10.890	13.425	18.816	1.505	1.788	2.070	2.352	3.870	4.170	4.460	4.680		
	71.00	0.582	14.78	10.430		12.922	10.803	13.425	20.420	1.634	1.940	2.246	2.553	4.880	5.240	5.470	5.760		
	67.80	0.550	13.97	10.619		12.985	10.986	13.425	19.568	1.565	1.859	2.152	2.446	4.090	4.340	4.670	4.920		
13 3/8 339.73	71.80	0.592	14.78	10.625	S	13.048	10.929	13.425	20.648	1.652	1.962	2.271	2.581	4.750	5.080	5.260	5.630		
	61.00	0.430	10.92	12.359		12.715	12.715	13.425	17.487	1.399	1.661	1.924	2.188	1.670	1.670	1.670	1.670		
	68.00	0.480	12.19	12.259		14.351	12.624	13.368	19.445	1.556	1.847	2.139	2.431	2.260	2.330	2.330	2.330		
	72.00	0.514	13.06	12.250	A	14.422	12.563	13.368	20.768	1.661	1.973	2.284	2.596	2.670	2.820	2.880	2.880		
	77.00	0.550	13.97	12.119		14.497	12.498	13.368	22.160	1.773	2.105	2.438	2.770	3.100	3.340	3.490	3.550		



VAM TOP ® FE TECHNICAL DATA

Size (OD)	Nominal Wall Thickness	Minimum Internal Yield Pressure (psi)						Make-up Torque (ft.lbs)					
		lb/ft	in	mm	80	95	110	125	80	95	110	125	
9 5/8 244.48	0.472	11.99	6.870	8.150	9.440	10.730	20.480	22.580	24.680	26.830			
	0.530	13.84	7.930	9.410	10.900	12.390	27.780	30.990	34.160	37.450			
	0.584	15.11	8.650	10.280	11.900	13.520	32.690	36.640	40.560	44.590			
9 7/8 250.83	0.625	15.88	8.860	10.520	12.180	13.840	37.630	42.710	47.550	50.000			
	0.650	16.51	9.220	10.940	12.670	14.400	40.410	45.680	50.000	50.000			
	0.661	16.79	9.370	11.130	12.890	14.640	41.540	46.990	50.000	50.000			
10 3/4 273.05	0.668	16.97	9.470	11.250	13.020	14.800	42.220	47.780	50.000	50.000			
	0.678	17.22	9.610	11.410	13.220	15.020	43.230	48.940	50.000	50.000			
	0.694	17.63	9.840	11.680	13.530	15.370	44.900	50.000	50.000	50.000			
11 3/4 298.45	0.700	17.78	9.920	11.780	13.650	15.510	45.450	50.000	50.000	50.000			
	0.720	18.29	10.210	12.120	14.040	15.950	47.560	50.000	50.000	50.000			
	0.725	18.42	10.280	12.210	14.130	16.060	48.030	50.000	50.000	50.000			
11 7/8 307.63	0.400	10.16	5.210	6.190	7.160	8.140	15.130	16.510	17.880	19.300			
	0.450	11.43	5.860	6.960	8.060	9.160	21.120	23.430	25.730	28.100			
	0.495	12.57	6.450	7.660	8.860	10.070	26.510	29.670	32.800	36.040			
13 3/8 339.73	0.545	13.84	7.100	8.430	9.760	11.090	32.480	36.570	40.620	44.820			
	0.595	15.11	7.750	9.200	10.650	12.110	38.520	43.570	48.580	50.000			
	0.650	16.51	8.470	10.050	11.640	13.230	45.210	50.000	50.000	50.000			
13 3/8 339.73	0.672	16.51	8.750	10.390	12.030	13.670	47.850	50.000	50.000	50.000			
	0.435	11.05	5.180	6.150	7.130	8.100	20.090	22.220	24.340	26.520			
	0.489	12.42	5.830	6.920	8.010	9.100	27.570	30.900	34.210	37.610			
11 7/8 307.63	0.534	13.56	6.360	7.560	8.750	9.940	33.890	38.220	42.550	47.000			
	0.582	14.78	6.930	8.230	9.530	10.840	40.660	46.090	50.000	50.000			
	0.550	13.97	6.480	7.700	8.920	10.130	36.100	40.810	45.500	50.000			
13 3/8 339.73	0.430	10.92	4.500	5.340	6.190	7.030	23.890	26.760	29.620	32.560			
	0.480	12.19	5.020	5.970	6.910	7.850	32.740	37.090	41.400	45.870			
	0.514	13.06	5.380	6.390	7.400	8.410	38.770	44.130	49.450	50.000			
0.550	13.97	5.760	6.840	7.920	9.000	45.210	50.000	50.000	50.000				

Running Requirements:

- The use of a slip type elevator, with low marking grip inserts, is mandatory for Hanging and Lifting the entire string.
- For lifting one pipe, a single joint elevator can be used provided its design prevents any damage to the coupling and is accurately dimensioned with a close fit for contact with the load bearing face during lifting operations.

• Lifting plugs can also be used though not recommended. In case you want to run VAM TOP ® FE as down hole casing after repeatable usage as a riser or for further assistance contact your local field service centre at the address at the back of this book or contact Mr. Help through the www.vamservices.com

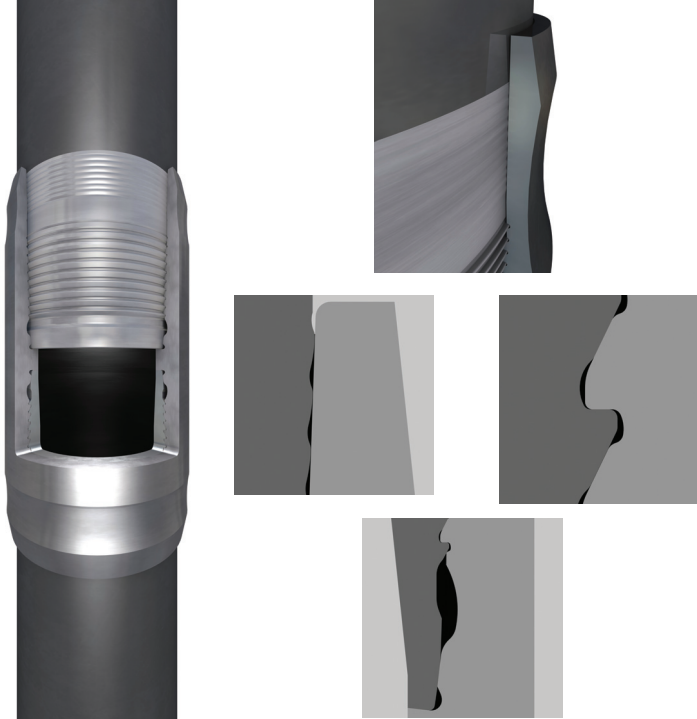
VAM TOP® FE TECHNICAL DATA

Size (OD)	Nominal Weight		Wall Thickness		Drift Diameter	Coupling (OD)	Coupling ID (reg)	Make Up Loss	Coupling Length	Pipe Body Section	VAM TOP® FE							
	lb/ft	in	mm	in							Regular Yield Strength (1000 lb)							
in	mm										80	95	110	125	80	95	110	125
13 3/8	80.70	0.590	14.73	12.059	14.560	12.443	5.698	13.398	23.314	1 865	2 215	2 565	2 914	3 460	3 770	4 000	4 140	
339.73	85.00	0.608	15.44	12.003	14.615	12.394	5.698	13.398	24.386	1 951	2 317	2 682	3 048	3 870	4 180	4 480	4 690	
	86.00	0.625	15.88	11.968	14.650	12.362	5.698	13.398	25.035	2 003	2 378	2 754	3 129	4 190	4 420	4 770	5 030	
13 5/8	88.20	0.625	15.88	12.250	14.902	12.614	5.698	13.398	25.525	2 042	2 425	2 808	3 191	3 980	4 260	4 570	4 800	
346.08	106.00	0.750	19.05	12.313	15.465	12.758	6.946	15.906	31.220	2 498	2 966	3 434	3 903	5 870	6 440	6 880	7 200	
355.6																		

3.19 VAM® TTR

Applicable Range

- Available in sizes from 7" to over 14"
- Heavy Wall (over 1" wall) with VAM® TTR HW
- High strength steels up to 125ksi including Vallourec Sour Services grades
- Standard, alternative and special drifts



Applications

- Suitable for very high fatigue applications
- Inner/ Outer Production risers
- High pressure Drilling risers
- Workover/ Completion riser

VAM® TTR is a threaded and coupled riser connector featuring a very high fatigue resistance ($SAF \leq 1.5$ vs DNV B1 curve). It was specifically designed as an outer production riser for years of reliable use in high fatigue environments.

VAM® TTR HW is the "Heavy Wall" version of the VAM TTR®. It maintains all the design features of the original, but with wall thickness able to withstand HP/HT environments (thickness over 1" with high strength Sour Service grades)

VAM® TTR features an external metal to metal seal to prevent seawater ingress and build-up of corrosion over design life. It also includes a fatigue compliant gas tight internal metal to metal seal derived from our premium casing and tubing connections. Additional Fatigue enhancements include stress reducing bending swoosh and special designed fatigue reducing threads

VAM® TTR has been successfully run in multiple projects over the last ten years. It is the industry standard for high fatigue applications.

Performances

- ISO13679 qualified
- High number of Make & Breaks, up to 25 on select sizes
- High Fatigue resistance, SAF \leq 1.5 vs DNV B1 curve

Benefits

- High fatigue performance makes it ideal for riser environments
- Internal metal-to-metal seal allows for gas-tightness
- External metal seals to avoid seawater ingress (avoids corrosion issues)

Running Requirements

- The use of a slip type elevator, with low marking grip inserts, is mandatory for Hanging and Lifting the entire string.
- For lifting one pipe, a single joint elevator can be used provided its design prevents any damage to the coupling and is accurately dimensioned with a close fit for contact with the load bearing face during lifting operations.
- Lifting plugs can also be used though not recommended.

Dope Quantities

The recommended thread compound for VAM® TTR and VAM® TTR HW is TOTAL TIFORA PG (a non-metallic thread compound).

The recommended thread compound repartition is ½ on Box end and ½ on the Pin end. Thread compound shall be applied evenly in order to get a uniform coating on all parts of the connection.

The recommended minimum and maximum thread compound quantities are indicated in the following table.

VAM® TTR THREAD COMPOUND QUANTITIES

Size (OD)	Nominal Weight	PIN		BOX	
		dope volume (cm3)		dope volume (cm3)	
in	lb/ft	Min	Max	Min	Max
8 5/8	43.40	16.5	22.0	16.5	22.0
9 5/8	40.00	27	33.0	27	33.0
9 5/8	53.50	27	40.5	27	40.5
10.715	62.60	26.5	33.0	26.5	33.0
10 3/4	71.10	27.5	49.5	27.5	49.5
10.951	76.50	31	35.5	31	35.5
12 3/4	65.10	30	52.0	30	52.0
13 3/8	68.00	35	47.5	35	47.5
13 3/8	72.00	32.5	57.5	32.5	57.5
14	93.00	30	47.5	30	47.5
14.34	87.90	33	47.5	33	47.5
14.58	106.70	35	50.5	35	50.5

Other sizes available upon request

VAM® TTR-HW THREAD COMPOUND QUANTITIES

Size (OD)	Nominal Weight	PIN		BOX	
		dope volume (cm3)		dope volume (cm3)	
in	lb/ft	Min	Max	Min	Max
7	56.00	17.55	23.1	17.55	23.1
9.982	119.70	23.35	54.6	23.35	54.6
10 3/4	100.28	21	35.5	21	35.5
11 3/4	126.50	24.5	64.5	24.5	64.5
16	162.20	46.7	79.7	46.7	79.7

Other sizes available upon request

VAM® TTR TECHNICAL DATA

Size (OD) inch mm	Nominal Weight lb./ft.	Wall		Drift Diameter inch.	Coupling OD inch.	Coupling ID inch.	Make-up Loss inch.	Coupling Length inch.	Efficiency %
		inch	mm						
8 5/8	43.40	0.500		7.500	9.298	7.802	6.894	14.788	82.0
9 5/8	40.00	0.395		8.679	10.331	8.730	6.245	13.491	77.0
9 5/8	53.50	0.545		8.500 S	10.406	8.728	7.547	16.094	83.0
10 7/15	62.60	0.570		9.500 S	11.507	9.780	8.071	17.142	84.0
10 3/4	71.10	0.650		9.294	11.665	9.672	8.777	18.554	86.0
10.951	76.50	0.688		9.500	11.913	9.806	9.167	19.333	87.0
12 3/4	65.10	0.492		11.610	13.483	11.970	7.832	16.665	82.0
13 3/8	68.00	0.480		12.259	14.095	12.621	7.843	16.685	81.0
13 3/8	72.00	0.514		12.250 S	14.138	12.560	8.197	17.394	83.0
14	93.00	0.650		12.513	14.937	12.947	9.236	20.472	86.0
14.34	87.90	0.590		13.000	15.187	13.395	9.339	19.679	85.0
14.58	106.70	0.710		13.000	15.577	13.421	9.736	20.472	87.0

Other sizes available upon request

VAM® TTR TORQUE TABLE

Size (OD) in	Nominal Weight lb/ft	Wall Thickness in mm	75 - 80 - 85 ksi			90 - 95 - 100 ksi			105 - 110 - 115 ksi			125 ksi		
			min.	opti. ft.lbs N.m	max.	min.	opti. ft.lbs N.m	max.	min.	opti. ft.lbs N.m	max.	min.	opti. ft.lbs N.m	max.
8 5/8	43.40	0.5 12.70	36 500 49 500	40 750 55 200	45 000 61 000	40 500 54 900	41 900 56 800	43 300 58 700	40 000 54 300	45 000 61 000	50 000 67 700			
9 5/8	40.00	0.395 10.03												
9 5/8	53.50	0.545 13.84	40 500 54 900	42 100 57 100	43 700 59 200									
10.715	62.60	0.57 14.48												
10 3/4	71.10	0.65 16.51	48 000 65 000	53 300 72 200	58 600 79 400									
10.951	76.50	0.688 17.47												
12 3/4	65.10	0.492 12.50	50 500 68 500	56 100 76 000	61 700 83 600									
13 3/8	68.00	0.480 12.19	43 600 59 100	48 400 65 600	53 200 72 100									
13 3/8	72.00	0.514 13.06												
14	93.00	0.650 16.51	53 200 72 100	59 100 80 100	65 000 88 100									
14.34	87.90	0.590 14.99	58 500 79 300	65 000 88 100	71 500 96 900									
14.58	106.70	0.710 18.03	63 000 85 400	70 000 94 900	77 000 104 400									

Other sizes available upon request



VAM® TTR-HW TECHNICAL DATA

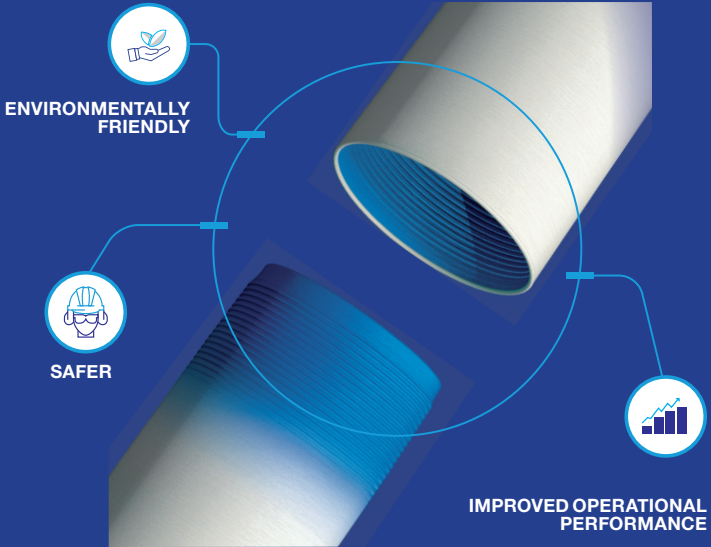
Size (OD) inch mm	Nominal Weight lb./ft.	Wall inch	Drift Diameter inch.	Coupling OD inch.	Coupling ID inch.	Make-up Loss inch.	Coupling Length inch.	Efficiency %
9.982	119.70	1.294	7.238	11.329	7.688	9.235	20.472	92.0
10 3/4	100.30	0.958	8.678	11.929	9.067	8.039	18.077	89.0
11 3/4	126.50	1.100	9.393	13.033	9.819	9.239	20.479	91.0
16	162.20	1.000	13.813	17.268	14.267	9.233	20.465	88.0

Other sizes available upon request

CLEANWELL®

The premium dope-free solution by VAM®

CLEANWELL® is a non-polluting coating applied in the mill to threaded connections replacing both storage and running compounds. Delivered "rig-ready", means reduced handling operations, both in the yard and on the rig. It ensures rapid and safe running in challenging operations, provides excellent sealability and improved protection against galling and corrosion. The result: lower operating costs.



+30%
NUMBERS OF JOINTS RUN PER HOUR⁽¹⁾

HANDS - FREE

COMPLIANT WITH OSPAR COMMISSION⁽²⁾



"Running CRA pipes with CLEANWELL® was fantastic compared to standard running compounds with not a single reject."

PETROBEL, Egypt.



⁽¹⁾ Observed during controlled tests compared to conventional running compound
⁽²⁾ Convention for the protection of the marine environment of the North-East Atlantic

3.20 CLEANWELL® technology: Dope-free solutions by VAM®

VAM® offers CLEANWELL® Technology which replaces the requirement for both storage and running thread compounds. CLEANWELL® Technology greatly improves safety and efficiency during pipe preparation and running, keeping your well completely clean with zero discharge to the environment and into the well (prevent bore contamination).

As a result from more than 15 years of R&D and field record expertise, CLEANWELL® Technology evolved along the time, being the CLEANWELL® Product Line a successful continuous improvement case relied on customer feedback and established reliability (for more information about CLEANWELL® evolution, please contact your local VAM® representatives, VAM® Services or VAM® Field Service International).

VAM® is currently extending its offer on all types of VAM® premium threads products including integrals and high torque types, being the later one already available on latest CLEANWELL® version.

CLEANWELL®

CLEANWELL® has been released several years ago and its latest version is now available on VAM® 21 and VAM® HTTC product lines.

CLEANWELL® is composed of a metal plating applied on both pin and box, coated with a fully dry and non-sticky proprietary lubricant. The association of the metal plating and proprietary lubricant provides an extended corrosion resistance time of more than 3 years in storage. Reliable and consistent makeup of the VAM® connections is ensured, which contributes to the running performance of the product.

Note that the CLEANWELL® threads are supplied with standard-like Protectors.

CLEANWELL®

Performances:

VAM® premium connections supplied with CLEANWELL® technology guarantee multiple make-and-break capacity, structural integrity and gas sealability up to the highest standard API RP 5C5 2017 CAL IV.

Torques:

VAM® premium connections coated with CLEANWELL® technology feature a specific torque table which might differ from the torque of the same connection with running compounds. Please contact your VAM® representative for specific torque values of VAM® connections coated with CLEANWELL® technology.

Running specificities and Make-up with non-coated pipes:

Specific rules apply when running CLEANWELL® connections or when mixing a CLEANWELL® coated thread with a standard non coated part. Please contact your VAM® representative, who will be able to provide full guidance and applicable related documentation.

4 Additional Information

4.1 VAM® copy warning

Since granting the first VAM® license in the mid-1960s, we have believed that a strong, global licensee network is a key factor for offering top-of-the-range OCTG products. The combination of this network with our extensive design, testing and manufacturing experience, has allowed us to both meet and exceed the expectations of our worldwide customer base over the last 40 years.

Unfortunately, as a consequence of this continuing success, several manufacturers have copied VAM® designs and are competing directly against genuine VAM® products. The genuine VAM® product lines are exhaustively listed into our website www.vamservices.com

We would like to draw your attention to the significant risks of using such VAM® copies, especially when mixing them with genuine VAM® connections. Despite claims of interchangeability by copy manufacturers, we are aware that considerable problems have been experienced in the field.

No access to VAM® drawings and technical information

VAM® copy manufacturers do not have access to genuine drawings and technical information which are dispatched to our licensee network through a “controlled document” system and which are regularly updated to take into consideration the latest developments.

No access to VAM® gauges system

All VAM® manufacturers adhere to a very stringent system of gauge calibration which is under the exclusive control of VAM® Services.

In order to ensure compatibility of VAM® joints manufactured worldwide, these joints are inspected to VAM® gauging procedures specifying the use of specific setting blocks calibrated under the control of VAM® Services. As VAM® copy manufacturers do not have access to this sophisticated gauging system, it is impossible for them to manufacture copy threads and to claim that they are compatible with VAM® joints.

No technical assistance from VAM® Service Network

VAM® copies are not supported by the VAM® licensee workshop network. Neither will it be possible to obtain technical assistance, nor field service or trouble shooting support from our worldwide representatives of VAM® Field Service International.

Conclusion

Due to the differences in tolerances, make-up torque, gauging criteria and lack of access to VAM® approved quality control system, VAM® copies mixed with genuine VAM® joints may lead to failures such as: thread or seal galling, ineffective sealing, thread jump out, tensile failures at loads substantially lower than theoretical minimum, connection back off, ID restriction...

VAM® copies are not compatible or interchangeable with genuine VAM® joints. Only with VAM® can you manage operational risks efficiently. Please note that, when using those copies, Vallourec in no case can be held responsible for leakage, accidents or any other problem that may arise and damage your reputation.

Besides, taking into consideration the lifecycle cost of such products, though they might appear cheaper in the first instance, copies will be more expensive because of failure risks, repairs, cross-over, etc. May you require any further information or assistance, please do not hesitate to contact VAM® Services.

4.2 Blanking dimensions / CDS

Blanking dimensions are one page technical documents that provide the necessary information required by Original Equipment Manufacturers (OEM) to design and pre-machine parts to accept VAM® premium connections.

Connection Data Sheets (CDS) are one page technical documents that provide all the dimensions, strengths and performances of a given OCTG {pipe, grade and connection} mix.

You can find the Connection Data Sheets and the Blanking dimensions in our website www.vamservices.com.

4.3 VAM® Field Service International

For more than 20 years the "VAM® guys" have demonstrated the value of the services they provide to the VAM® customers throughout the world.

Our Service Specialists enjoy a strong track record of safety, reliability and independence within the drilling operations of the majors and independent companies. This is achieved through the supervision of connection make-up at the rig site, pipe inspection on the deck or at the yard, pre-assembly inspection, audits, training or trouble shooting.

Whether it's HP-HT well architecture, CRA materials, GRE-Glass reinforced Epoxy-Liners, 13 Cr completions, expandable tubulars, custom made accessories: our qualified teams contribute to Quality Control, Inspection or Quality Assurance bringing their unique VAM® connection expertise to the industry.

As drilling activity continues to expand, VAM® is following customers along their international development. Field Service centres are available in the main Oil bases in Scotland, Texas, Mexico, Canada, West Africa, Middle-East, Singapore and China to make sure well engineering or completion teams can call off when needed.

For premium value think VAM®, close to you, well run and well done.
For more information on VAM® Products and Service please visit - www.vamservices.com

VAM® Field Service International

Vallourec Oil and Gas Limited
4 Prospect Place
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Westhill, Aberdeenshire
Aberdeen, AB32 6SY - U.K.
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fax: +44 (0) 1224 279384
email: uk@vamfieldservice.com

VAM USA

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USA
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fax: +1 281 821 7760
email: usa@vamfieldservice.com

VAM® Far East PTE Ltd

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Goldhill Plaza #19-10/12
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phone: +65 6 736 23 72
fax: +65 6 235 11 26
email: singapore@vamfieldservice.com

VAM® Caspian

Baku Branch (VAM® Caspian)

27-18 Istiglaliyyat Street

Baku

Azerbaijan

phone: +994 (0) 124 925 179

fax: +994 (0) 124 925 134

mobile: +994 (0) 50 46 03 326

email: baku@vamfieldservice.com

VAM® DUBAI

World Trade Center

Level 14

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fax: +52 229 981 03 49

email: mexico@vamfieldservice.com

VAM Field Service Angola Lda

Rua Amilcar Cabral, N°211

Edificio IRCA Andar N°2

Luanda

Angola

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fax: +244 222 310 910

email: angola@vamfieldservice.com

VALLOUREC NIGERIA Ltd

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 Onne/Ikpokiri Oil & Gas Free Zone
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 phone: +44 1224 279380
 email: nigeria@vamfieldservice.com

VALLOUREC TUBOS do BRASIL S.A.

VAM® Field Service Brasil Center
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 Bairro Mar do Norte
 ZEN (Zona Especial de Negócios)
 Rua B - Rua do Sondador, S/nº Quadra K
 CEP 28.890-000 - Rio das Ostras - RJ
 phone: +55 22 2771-4417
 mobile: +55 22 8156-0709
 E-mail: brazil@vamfieldservice.com

VAM® CANADA

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 Calgary, Alberta
 Canada T2P 3C5
 phone: +1 403 233 0119
 fax: +1 403 266 2332
 email: canada@vamfieldservice.com

VAM® Field Service (Beijing) Co. Ltd

Room 1001-1002, 10th Floor
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 Chaoyang District
 Beijing 100016
 Peoples Republic of China
 phone: +86 10 6438 3145
 fax: +86 10 6438 6402
 email: china@vamfieldservice.com

4.4 VAM® Services

VAM® Services, a division of VALLOUREC OIL AND GAS FRANCE, gives our OCTG customers and Drilling customers access to a world-wide network of more than 190 accessories and repair shops licensed to cut threads of the VAM® product line. These shops are strategically located near all major oil and gas fields.

In coordination with the technical sales and marketing departments, VAM® Services manages this network by providing technical support, training, dispatch of documentation and gauges, and regular audits (at least once a year) to ensure that VAM® connections are manufactured at the same quality level around the world.

VALLOUREC OIL AND GAS FRANCE - VAM® Services

21, route de Leval

BP 20129

59620 Aulnoye-Aymeries

France

Phone : +33 3 27 69 66 15

Fax : +33 3 27 66 45 75

For any enquiry regarding VAM® connections please refer to our website www.vamservices.com the [Mr Help](#) area

4.5 VALLOUREC

4.5.1 Company profile

Vallourec is a world leader in premium tubular solutions for the energy markets and for demanding industrial applications such as oil & gas wells in harsh environments, new generation power plants, challenging architectural projects, and high-performance mechanical equipment. Vallourec's pioneering spirit and cutting edge R&D open new technological frontiers. With close to 19,000 dedicated and passionate employees in more than 20 countries, Vallourec works hand-in-hand with its customers to offer more than just tubes: Vallourec delivers innovative, safe, competitive and smart tubular solutions, to make every project possible.

Vallourec launched the first VAM® product, a premium, metal-to-metal connection offering superior sealing ability, in 1965. VAM® transformed the tubing and casing standards in oil & gas and has been adopted worldwide. Vallourec is constantly innovating to design solutions to meet the ever more complex needs of our customers. The VAM® family of connections covers the largest range of requirements for OCTG and is supported by a worldwide network of over 200 accessories and repair shops licensed to cut threads of the VAM® product line.

4.5.2 Contact

VALLOUREC OIL AND GAS FRANCE

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92 103 Boulogne Billancourt Cedex - France
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fax: +1 403 266 2332
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VALLOUREC OIL & GAS MEXICO

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fax: +52 229 981 03 49
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VAM® FAR EAST (Field Service)

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fax: +65 6 235 11 26
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VALLOUREC TUBOS do BRASIL (Field Service)

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Edifício Rio Sul Center - Botafogo
22290-160 Rio de Janeiro-RJ
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phone: +55 21 3873 8300
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VALLOUREC MIDDLE EAST FZE

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Phone: +971 4 815 0100
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phone : +234 1 463 7458
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fax: +47 51 54 50 11
contact@vallourec.com

web : <http://www.vallourec.com>

4.6 NIPPON STEEL CORPORATION

4.6.1 Company profile

For more than five decades, NIPPON STEEL has been serving the needs of the oil and gas industries. All the supply records for most of the severe drilling environments indicate that NIPPON STEEL is the leader in tubular technologies. Field development where it was impossible to drill yesterday becomes a reality with NIPPON STEEL tubular products today.

Customer satisfaction and reliability are the key words for our product development.

NIPPON STEEL product line covers almost all applications from carbon steel to Ni based alloy steel with advanced sealing mechanisms such as VAM® Premium connections. As a result of continuous R&D effort, NIPPON STEEL has the widest material grades range for Casing & Tubing but also able to offer fit-for-purpose solutions.

4.6.2 Contact

Head office

NIPPON STEEL CORPORATION
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Phone + 81 (3) 6867-4111
Fax + 81 (3) 6867-5607

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Germany
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Fax: 49-211-5961163

London

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Fax +44 (20) 7266-7488

Switzerland

S&L Consulting SA
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1752 VILLARS/GLANE
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NIPPON STEEL CORPORATION Dubai Office
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Fax +971 (4) 8865901

Overseas affiliate**Houston**

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Singapore

NIPPON STEEL SOUTHEAST ASIA PTE. LTD.
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Phone +65 (6) 223-67777

Fax +65 (6) 224-4207

web: <http://www.tubular.nipponsteel.com>

4.7 Vallourec Tube-Alloy

4.7.1 Company Profile

For more than 40 years, Vallourec Tube-Alloy has served the petroleum industry as a leading provider of tubular accessories, premium threading, well coordination, completion tubulars and thermal solutions (THERMOCASE®).

Our commitment is to provide the highest quality products and services for the best value with the newest technology with a global industrial and commercial footprint.

4.7.2 Contact

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USA

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Vallourec Asia Pacific Corp.
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Vallourec Oil & Gas (China) Co., Ltd.
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13; Quadra: L
Zona Especial de Negocios – Rio das Ostras / RJ
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Jebel Ali Free Zone
PO BOX 261108
Dubai, United Arab Emirates
Tel: 971 4 815 0191

4.8 Miscellaneous

4.8.1 Bibliography norms applicable for VAM® connections

API 5CT, 9th Ed. / ISO 11960, Steel pipes for use as casing or tubing in wells

API Spec 5B, Specification For Threading, Gauging And Thread Inspection Of Casing, Tubing And Line Pipe Threads

API RP 5B1, Gauging and inspection of casing, tubing and line pipe threads

ANSI-NACE MR0175/ISO 15156-2, Materials for use in H₂S-containing environments in oil and gas production - Part 2: Cracking-resistant carbon and low alloy steels, and the use of cast irons - (identical to ISO 15156-2)

API RP 5A3 / ISO 13678, Recommended Practice On Thread Compounds For Casing, Tubing And Line Pipe

API RP 5A5 / ISO 15463, Field inspection of new casing, tubing, and plain-end drill pipe

API RP 5C1 / ISO 10405, Recommended practice for care and use of casing and tubing

API Bull 5C2, Bulletin on performance properties of casing, tubing and drill pipe

API TR 5C3 / ISO TR 10400, Technical report On equations and Calculations For Casing, Tubing and Line Pipe used as casing and tubing; and performance properties tables for casing and tubing (plus Supplement 1)

API RP 5C5 / ISO 13679, Recommended practice on procedures for testing casing and tubing connections

API Std 5T1, Imperfection terminology

IADC/SPE 11396, B.A. Dale, M.C. Moyer, T.W. Sampson, A Test Program for the Evaluation of Oilfield Thread Protectors, IADC/SPE Drilling Conference, New Orleans, LA, 20-23 December 1983

4.8.2 Conversion Factor

As detailed on the following page.

Conversion Factors for U.S./British and Metric Units	
U.S./British Unit	S.I. Unit
Linear Measures	
1 inch (in)	= 25.4 mm
1 foot (ft) 1ft = 12 in	= 0.3048 m
1 Yard (yd) = 3 ft	= 0.9144 m
1 English Mile	= 1.6093 km
0.039370 in	= 1 millimeter (mm)
0.393701 in	= 1 centimeter (cm)
3.280840 ft = 1.093613 yd	= 1 meter (m)
0.6214 English Mile	= 1 kilometer (km)

Square Measures	
1 square inch (sq.in)	= 645.160 sq.mm
1 square inch (sq.in)	= 6.45160 sq.cm
1 square foot (sq.ft)	= 9.2903 sq.dm
1 square yard (sq.yd)	= 0.836127 sq.m
1 sq.ft = 144 sq.in	= 0.092903 sq.m
0.001550 sq.in	= 1 square millimeter (sq.mm)
0.155000 sq.in	= 1 square centimeter (sq.cm)
10.763910 sq.ft	= 1 square meter (sq.m)
1.195990 sq.yd	= 1 square meter (sq.m)

Volume	
1 cubic inch (cu.in)	= 16.387064 cu.cm
1 cubic foot (cu.ft)	= 28.316847 cu.dm
1 ft = 1728 cu.in	= 0.028317 cu.m
1 gallon (U.S.)	= 3.7854 cu.dm
1 gallon (U.K.)	= 4.546 cu.dm
1 barrel (U.S.)	= 158.987 cu.dm
0.061024 cu.in	= 1 cubic centimeter (cu.cm)
0.035315 cu.ft	= 1 cubic decimeter (cu.dm)
35.31467 cu.ft	= 1 cubic meter (cu.m)

Weights	
1 ounce (oz)	= 28.3495 g
1 pound (lb) = 16 ounces	= 0.45359237 kg
1 long ton (l ton) = 2240 lb	= 1016.04706 kg
1 short ton (sh ton) = 2000 lb	= 907.185 kg
0.035274 oz	= 1 gramm (g)
2.204622 lb	= 1 kilogramm (kg)
0.984206 l ton	= 1 metric ton (t) = 1000 kg
1.10231 sh ton	= 1 metric ton (t)

Conversion Factors for U.S./British and Metric Units	
U.S./British Unit	S.I. Unit
Weights per Length	
1 lb / ft	= 1.488164 kg / m
0.671969 lb / ft	= 1 kg / m
Force *	
1 pound-force (lbf)	= 4.448222 Newton (N)
0.224809 lbf	= 1 N
Pressure / Stress *	
1 pound - force per square inch (psi)	= 0.06895 bar
1 lbf / sq.in (psi) ~ 1 lb / sq.in	= 0.006895 N / sq.mm (MPa)
14.5038 lbf / sq.in	= 1 bar
145.038 lbf / sq.in	= 1 N / sq.mm (MPa)
Density	
1 lb / ft ³	= 0.016018 ka / dm ³
62.427952 lb / ft ³	= 1 ka / dm ³
Torque *	
1 foot pound - force ft.lbf ~ 1 ft.lb	= 1.3558 N.m
0.7376 ft.lbf	= 1 N.m
Flow Rate	
1 barrel per day	= 0.158987 m ³ / dav
1 cubic foot per minute (ft / min)	= 0.02831685 m ³ / min 40 776192 m ³ / dav
Temperature	
Conversion formula °F to °C	= 5 / 9 (°F - 32)
1 degree Fahrenheit (°F)	= 0.5556 °C
32 °F	= 0 °C
212 °F	= 100 °C

* Note: 1 pound-force (lbf) ~ 1 pound (lb)

4.9 Color code

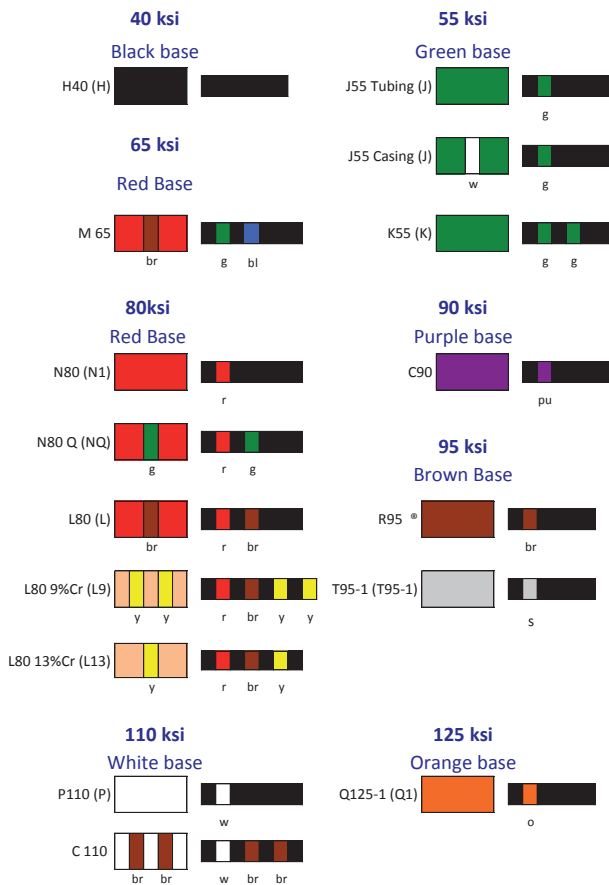
The following pages show the colour codes that identify the steel type. The colour code will either be painted on the coupling or in the case of pipe with integral connections it will be close to the box end. In some countries there are additional colour codes to identify the thread type and weight per foot. Please refer to the local colour code charts for these countries.

Note that a black band around the centre of the coupling will identify it as having a special clearance option. Steel grades with 22% Chrome and above may be offered without any colour bands.

For steel grades with 9% and 13% Chrome, there is no base colour for the coupling (represented by the light coral colour).

Key, r= red, y = yellow, o = orange, s = silver, g = green, w = white, bl = blue, br = brown, pu = purple, pi = pink, dg = dark green.

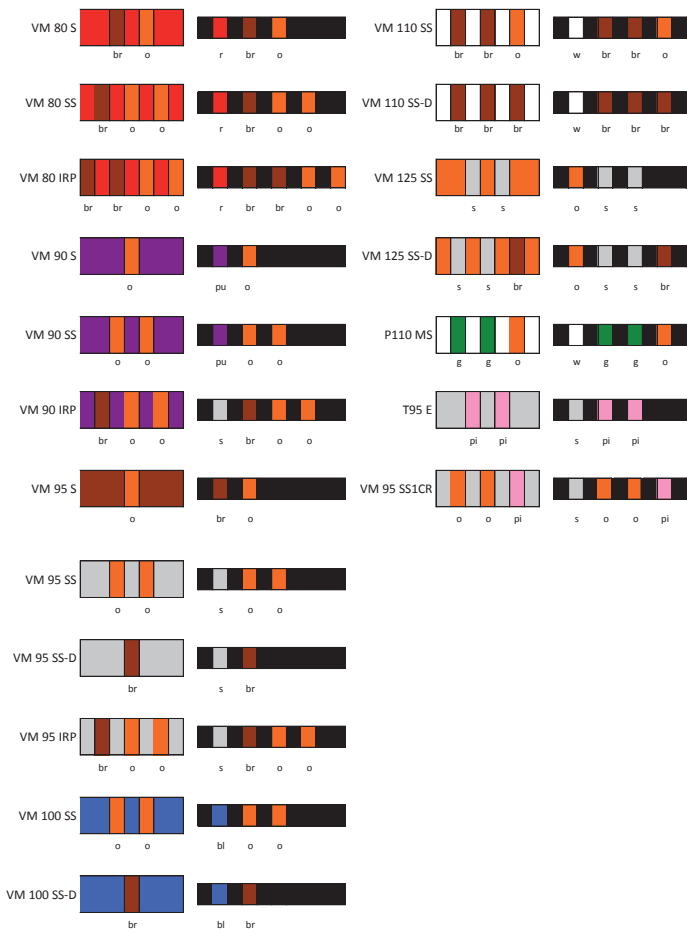
4.9.1 API



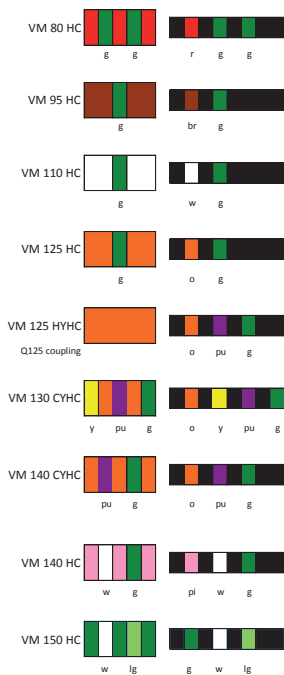
The letter in brackets after the grade is the API abbreviation for the grade. It is the letter that is stenciled on the pipe body.

4.9.2 Vallourec Proprietary Steel Grades

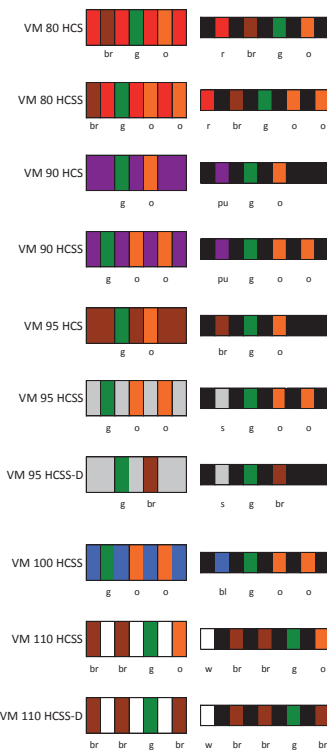
Sour Service



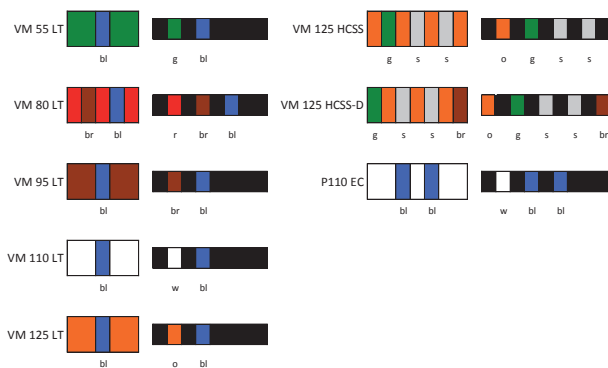
High Collapse



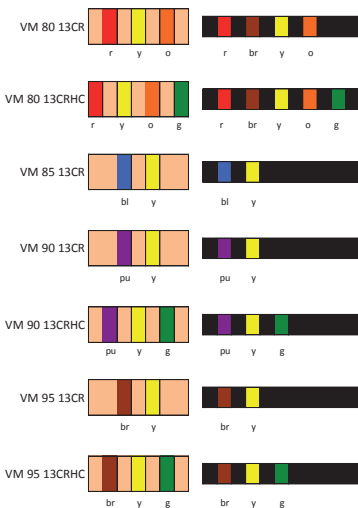
High Collapse and Sour Service



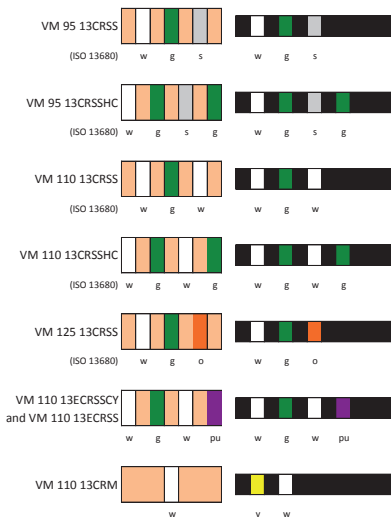
Low Temperature



Martensitic Stainless Steel 13%Cr

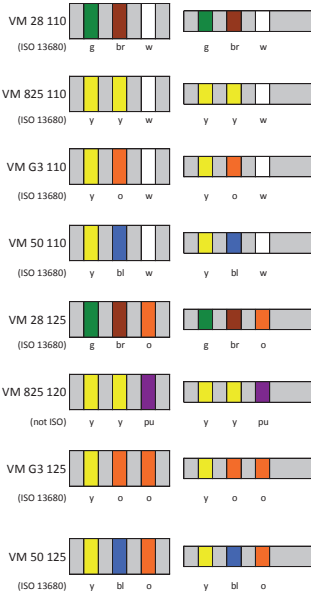
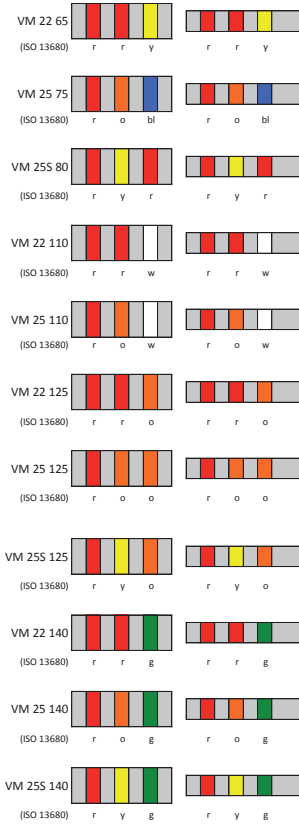


Martensitic Stainless Steel Super 13%Cr

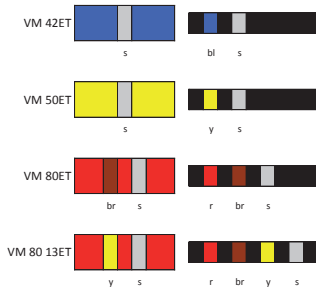


Duplex and Super Duplex Stainless Steel

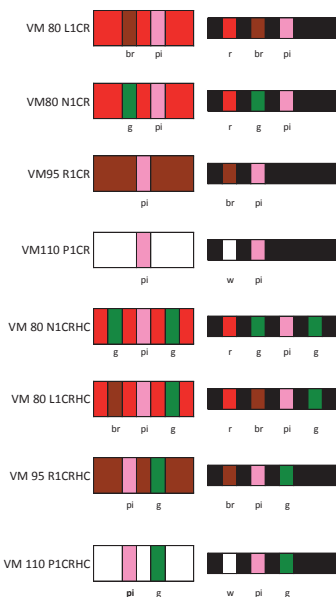
Super Austenetic and Nickel Based Alloy



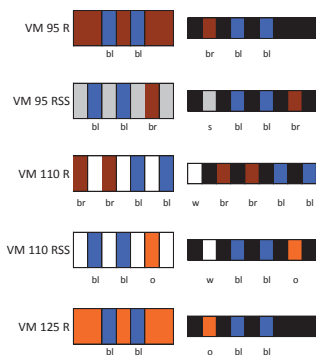
Expandable



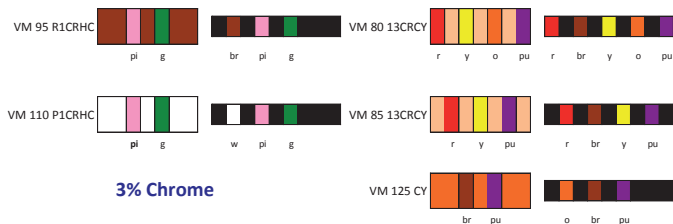
1% Chrome



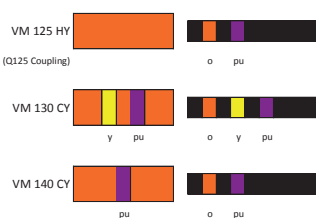
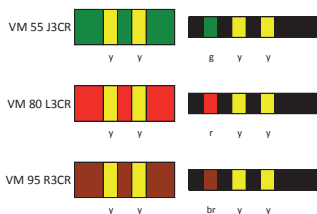
Riser



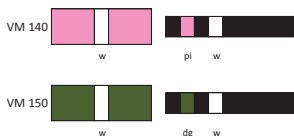
Restricted Yield



3% Chrome

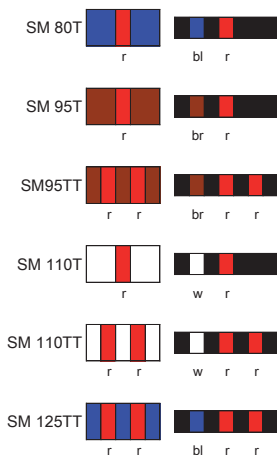


Deep Well

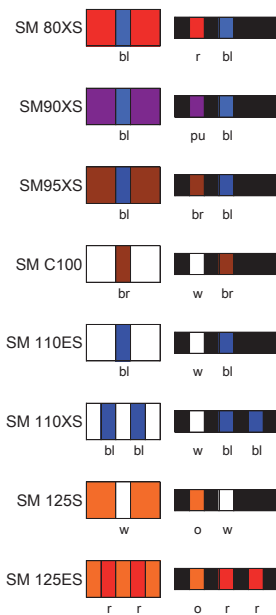


4.9.3 NIPPON STEEL Proprietary Steel Grades

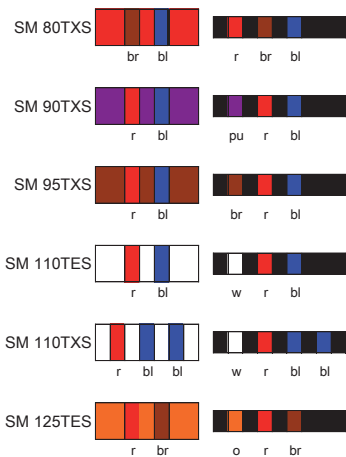
High Collapse



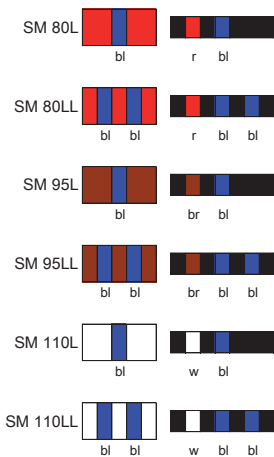
Sour Service



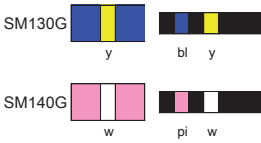
High Collapse and Sour Service



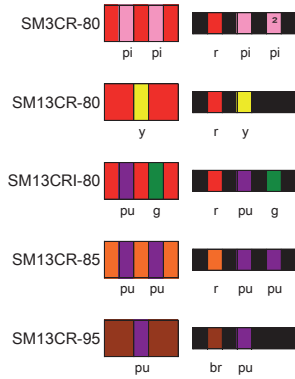
Low Temperature



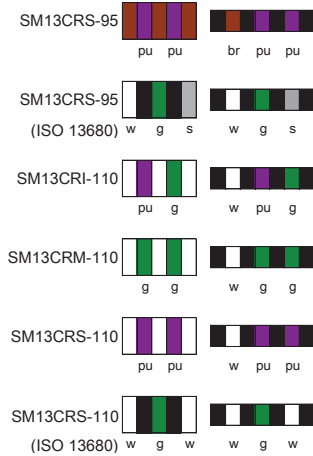
Deep Well



Martensitic Stainless Steel 13%Cr



Martensitic Stainless Steel Super 13%Cr



Duplex Stainless Steel

Austenitic Stainless Steel

SM22CR-110 (ISO 13680)		SM2535-110 (ISO 13680)	
	r r w w w		g o w w w
SM25CR-110 (ISO 13680)		SM2242-110 (ISO 13680)	
	r o w w w		y y w w w
SM22CR-125 (ISO 13680)		SM2550-110 (ISO 13680)	
	r r o w w		y g w w w
SM25CR-125 (ISO 13680)		SM2050-110 (ISO 13680)	
	r o o w w		y bl w w w
SM25CRW-125 (ISO 13680)		SMC276-110 (ISO 13680)	
	r y o w w		y br w w w
		SM2535-125 (ISO 13680)	
			g o o w w
		SM2242-125 (ISO 13680)	
			y y o w w
		SM2550-125 (ISO 13680)	
			y g o w w
		SM2050-125 (ISO 13680)	
			y bl o w w
		SMC276-125 (ISO 13680)	
			y br o w w

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