

NSMAXTM-GRC Connection Field Inspection Procedure

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CONTENTS

1. Introduction and Scope	2
2. Preparation	2
3. Connection Identification	3
4. Pre-inspection Works	3
5. BOX (Coupling Inspection)	4
5.1 Internal Surface (Area A, B, C, D and F1/F2)	4
5.2 Thread area (Area A)	4
5.3 Groove (Area B)	4
5.4 Torque Shoulder (Area C)	4
5.5 Internal Bore (Area D)	5
5.6 Outside Surface including coupling surface (Area E)	5
5.7 Chamfer (Area F1 and F2)	5
6. PIN Inspection	6
6.1 External Surface (Area A, B, C and D)	6
6.2 Perfect Thread Area (Area A)	6
6.3 Imperfect Thread Area (Area B)	6
6.4 Burrs in Imperfect Tread Area and Chamfer (Area B and C)	6
6.5 Shoulder (Area D)	7
7. Ovality (Mashed) Deformation	7
8. Post-inspection Works	7
9. Example of special coating defects	8
10. Summary of field connection inspection	9
11. Appendix: Drift-size and Connection Dimensions Table of NSMAX™-GRC	11

1. Introduction and Scope

This document outlines the field inspection procedure for NSMAX™ -GRC semi-premium connections. It provides standardized criteria and methods for inspecting connections both new and in-service connections, whether at rig sites or in storage yards, as well as for evaluating and repairing connections in service when required, ensuring connection integrity and performance. The procedure covers visual inspection of both PIN and BOX components, including preparation, cleaning, defect evaluation, and post-inspection handling.

3 different versions of NSMAX™ connection have been developed. These are:

- NSMAX™ -GR "GR" stands for "Good Running"
- NSMAX™ -GRC "GRC" stands for "Good Running Coated" for enhanced gas sealability
- NSMAX™ -GR-PS "GR-PS" stands for "Good Running Positioning Shoulder" where the coupling has no J area, and the field end pin shoulders against the mill end pin.

NSMAX™ -GR and NSMAX™ -GRC are interchangeable, while NSMAX™ -GR-PS is not. Specifics concerning NSMAX™ -GRC design are detailed in Para 3. Connection identification.

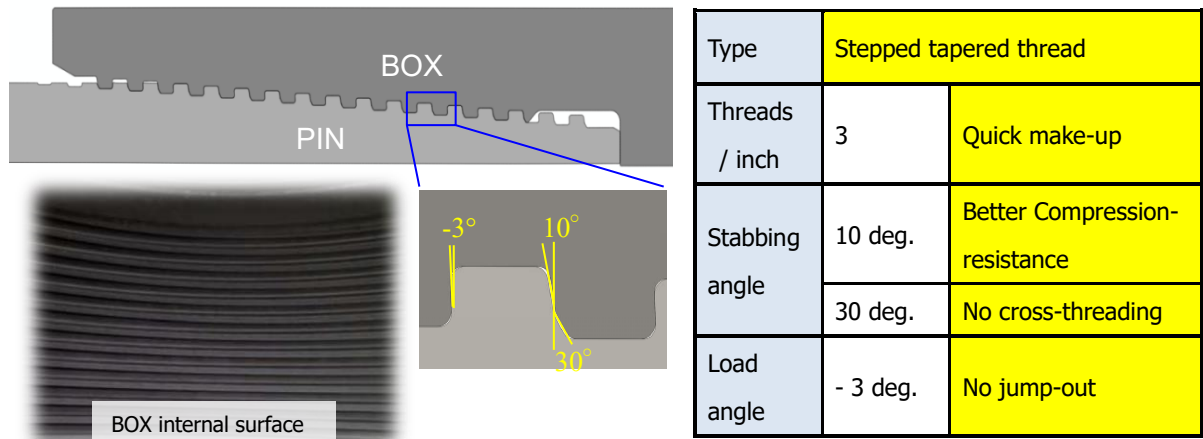
2. Preparation

- 2.1 Pipes are to be spaced out on racks with adequate distance to allow rolling 360° for removing protectors, cleaning PIN/BOX connections and for visual inspection.
- 2.2 Protector removal equipment, such as chain wrench, "T" type bar and/or strap wrench, should be available.
- 2.3 Cleaning equipment for PIN/BOX, such as steam cleaner, high pressure water, new nylon brushes, compressed air and rags should be provided. *In the case of BOX cleaning, steam cleaner and solvent shall not be used.*
- 2.4 Cleaning equipment for Pipe OD/ID: In case Pipe OD/ID has been contaminated, the same equipment listed in 2.3 above should be accessible.
- 2.5 It is recommended to perform inspection in dry conditions preferably in a covered facility.
- 2.6 Before inspection, "Pipe and Connection Identification", such as size, weight, grade, connection type and mill I.D., stencils shall be checked and recorded.
- 2.7 If "Drifting" is required, it should be performed before the pipe body high-pressure wash where applicable, and always before cleaning and connection inspection. This ensures that the drifting process does not contaminate or damage the connection surfaces.

3. Connection Identification

3.1 Prior to connection inspection, the following characteristics of NSMAX™-GRC should be verified for connection identification.

- Design features: 3 TPI, with Torque shoulder, and without metal-to-metal seal.
- Surface condition: Box is manganese phosphate coated, with special coating on internal surface, and pin is as machined.



3.2 If "Pipe and Coupling Stenciling" are unreadable, the pipe shall not be used.

4. Pre-inspection Works

4.1 Protector-removal and Damage Check

If damaged protectors are found, the identification number(s) of the pipe(s) shall be recorded.
→Connections for these pipes shall be thoroughly inspected to confirm that there is no damage on thread surface nor any severe deformation affecting the connection ovality (see Para 7).

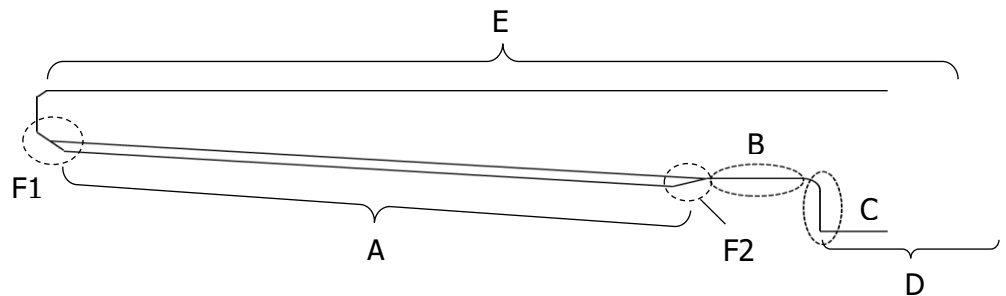
4.2 Connection Cleaning

Cleaning should be carried out carefully not to damage phosphating or thread surface. The entire thread surface shall be cleaned for visual inspection.

5. BOX (Coupling Inspection)

Area definition

- A: Thread Area
- B: Groove
- C: Torque Shoulder
- D; Internal Bore
- E: Outside Surface
- F1, F2: Chamfer



5.1 Internal Surface (Area A, B, C, D and F1/F2)

- Presence of the special coating shall be visually verified.
- If coating loss (e.g. due to abrasion or friction exposing the underlying phosphate layer) exceeds 25% of the threaded area (Area A), the coupling shall be rejected.
- If coating defects (e.g. pinholes or orange peel) exceed 15% of the threaded area (Area A), the coupling shall be rejected.
- Coating damage in Area B, D and F1/F2 is acceptable, as it does not affect connection performance.

5.2 Thread area (Area A)

- Rust: acceptable if removable with a Scotch-Brite pad.
- Corrosion, pitting/inclusion, galling, ding, and burrs: not allowed.

5.3 Groove (Area B)

- Rust: acceptable if removable with a Scotch-Brite pad.
- Corrosion, pitting/inclusion: not allowed.
- Light ding: acceptable after field repair.
- Tool mark by threading insert is allowed.

5.4 Torque Shoulder (Area C)

- Rust: acceptable if removable with a Scotch-Brite pad.
- Corrosion, pitting/inclusion: not allowed.
- Light ding: acceptable after field repair.

5.5 Internal Bore (Area D)

- Rust: acceptable.
- Corrosion, pitting/inclusion: not allowed.
- For reference: The step at the Coupling central register is controlled to be ≤ 0.2 mm during manufacturing. No measurement is required during yard inspection.

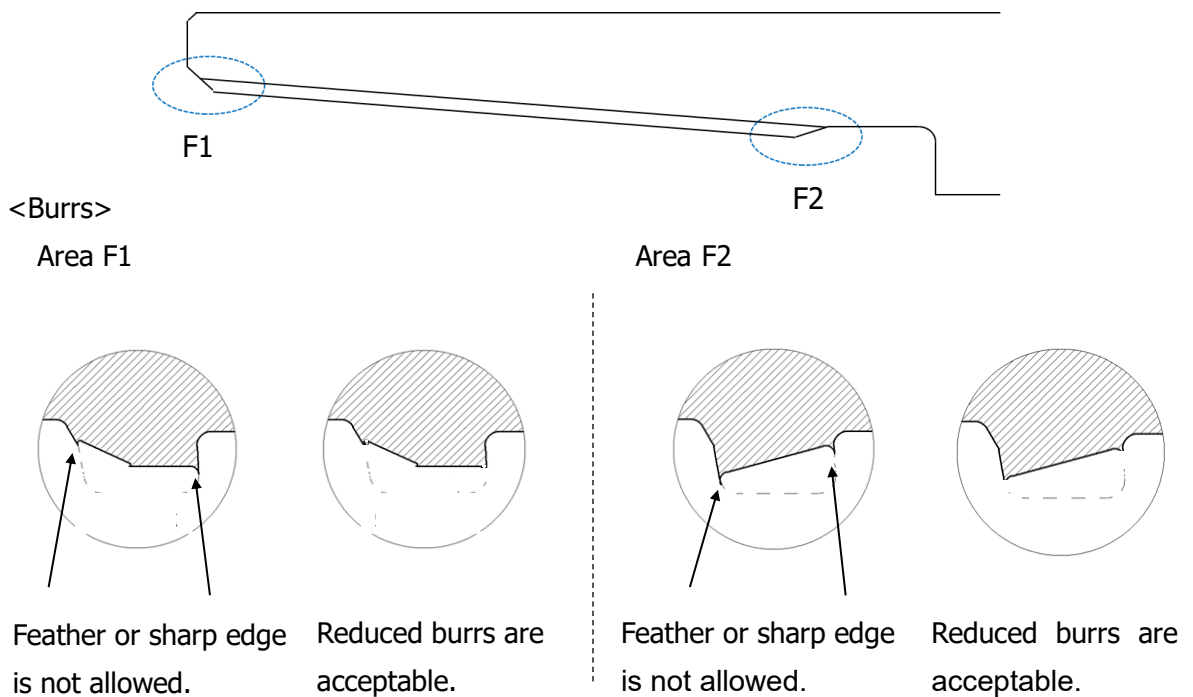


5.6 Outside Surface including coupling surface and face (Area E)

- Rust: acceptable.
- Corrosion: not allowed.
- Pitting/ding: not allowed, except round-bottom type with depth < 1.0 mm, acceptable.

5.7 Chamfer (Area F1 and F2)

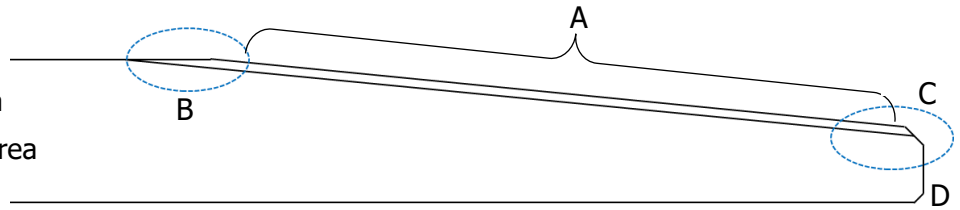
- Rust: acceptable if removable with a Scotch-Brite pad.
- Corrosion, pitting/inclusion: not allowed.
- Ding: acceptable after field repair.
- Feather/sharp burrs: not allowed. Reduced burrs: acceptable.



6. PIN Inspection

Area definition

- A: Perfect Thread Area
- B: Imperfect Thread Area
- C: Chamfer
- D: Shoulder including ID chamfer



6.1 External Surface (Area A, B, C and D)

- Rust: acceptable if removable with a Scotch-Brite pad.
- Corrosion, pitting/inclusion: not allowed.

6.2 Perfect Thread Area (Area A)

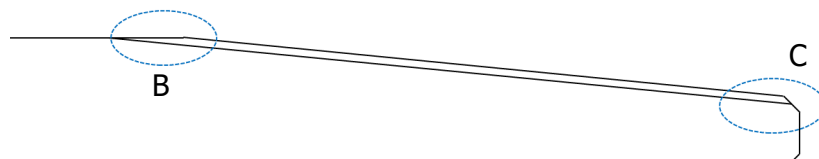
- Galling, Ding and Burrs: not allowed, except front 3 threads (25.4 mm) where field repair is acceptable if no heavy protrusion.
- Chatter that can be detected by a sharp tip or fingernail shall be rejected. On the other hand, chatter that is only visible but not detectable is acceptable.

6.3 Imperfect Thread Area (Area B)

- Light galling/ding: acceptable after field repair.
- Chatter that can be detected by a sharp tip or fingernail shall be rejected. On the other hand, chatter that is only visible but not detectable is acceptable.

6.4 Burrs in Imperfect Tread Area and Chamfer (Area B and C)

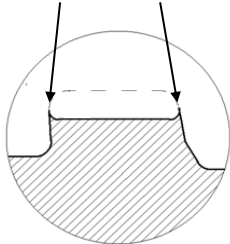
- Light galling/ding: acceptable after field repair.
- Burrs: feather/sharp not allowed; reduced acceptable.



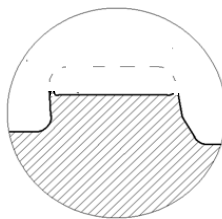
<Burrs>

Area B

Feather or sharp edge
is not allowed.

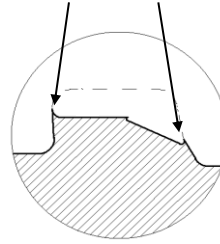


Reduced burrs
are acceptable.

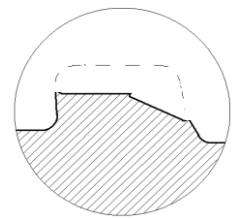


Area C

Feather or sharp edge
is not allowed.



Reduced burrs are
acceptable.



6.5 Shoulder (Area D)

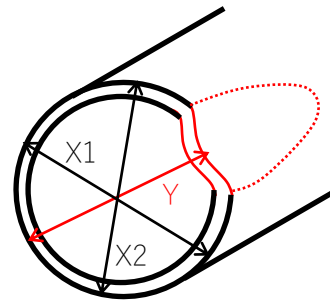
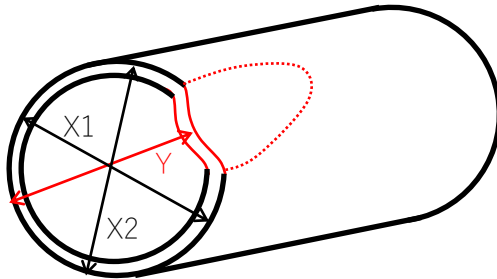
- Pitting and/or inclusion are all not allowed.
- Light damage such as ding accepted after field repair.

7. Ovality (Mashed) Deformation

Localized deformation affecting the ovality of the pin or box end, caused by handling or transportation damage, shall be rejected if it exceeds the rejection criteria specified below.

<BOX> Deformation amount $\leq 3.0\text{mm}$

<PIN> Deformation amount $\leq 3.0\text{mm}$



$$\text{Deformation amount} = (X1 + X2) / 2 - Y$$

X1, X2: OD of non-deformed area (at Pin-end / at Box-face)

Y: Min. OD of deformed area

8 Post-inspection Works

8.1 Connection and Protector Cleaning

- Cleaning and compressed air-drying the connection and protector thread surface to remove any contaminants.

8.2 Dope Application

- If the pipe will be run immediately, apply a thread compound (make-up dope) in accordance with the latest version of "NSMAX™ Compounds List (NSMAX_TM_CL_Rx)", available for download at: <https://www.tubular.nipponsteel.com/octg-connections/connection-list/nsmax-gr>



← Scan to access NSMAX™
Connection & Compounds List
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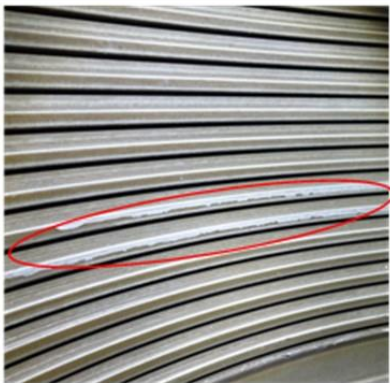

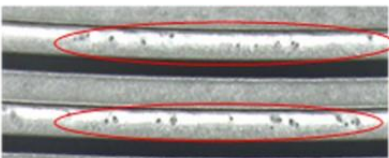
- If running is not immediate, apply a storage compound in accordance with the same list.

8.3 Protectors

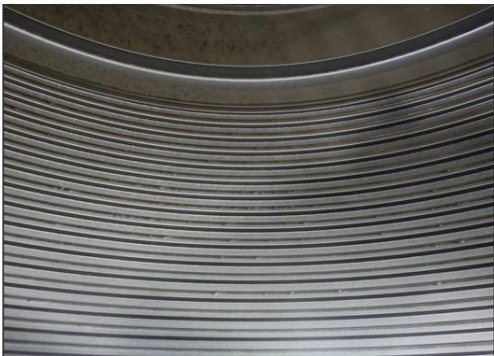


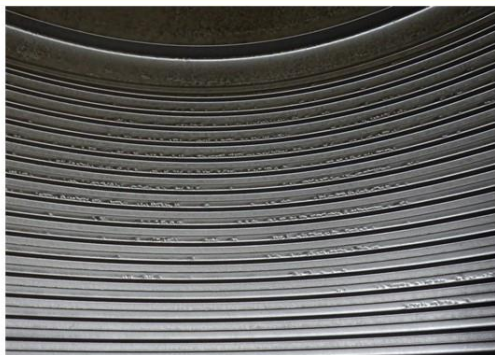
- Protectors shall be made up hand tight.

9. Example of special coating defects

Examples of coating loss and minor visual characteristics such as pinholes or orange peel

The example of coating loss	The example of orange peel	The example of pinhole
 <p>"Coating loss" is defined as the visible exposure of the substrate.</p>		

Reference samples for acceptable limits of minor visual characteristics

Acceptable Minor visual characteristics covered 5% of thread area	Acceptable Minor visual characteristics covered 10% of thread area
	
Acceptable Minor visual characteristics covered 15% of thread area	Not Acceptable Minor visual characteristics covered 20% of thread area
	

10. Summary of field connection inspection

Field Repairs: NSMAX™-GRC is designed with the threads providing sealability when engaged, consequently a leak path may be created when the perfect thread is damaged and deformed.

BOX	Rust	Corrosion	Pitting /Inclusion	Galling	Ding	Burr
A: Thread Area	Accept if it can be removed with Scotch- Brite pad	Reject	Reject	Reject	Reject	Reject
B: Groove	Accept if it can be removed with Scotch- Brite pad	Reject	Reject	N/A	Light accepted after field repair	N/A
C: Torque Shoulder	Accept if it can be removed with Scotch- Brite pad	Reject	Reject	N/A	Light accepted after field repair	N/A
D: Internal Bore	Light accepted	Reject	Reject	N/A	N/A	N/A
E: Outside Surface	Light accepted	Reject	Reject, except round-bottom depth < 1.0 mm acceptable	N/A	Reject, except round-bottom depth < 1.0 mm acceptable	N/A
F1, F2: Chamfer	Accept if it can be removed with Scotch- Brite pad	Reject	Reject	N/A	Light accepted after field repair	Reject feather /sharp burrs; Reduced burrs acceptable

Pin	Rust	Corrosion	Pitting /Inclusion	Galling	Ding	Burr
A: Perfect Thread Area	Accept if it can be removed with Scotch-Brite pad	Reject	Reject	Field repair on front 3 threads area (25.4mm) is acceptable(*) Otherwise Reject		
B: Imperfect Thread Area	Accept if it can be removed with Scotch-Brite pad	Reject	Reject	Light damage accepted after field repair		Reject feather /sharp burrs; Reduced burrs acceptable
C: Chamfer	Accept if it can be removed with Scotch-Brite pad	Reject	Reject	Light damage accepted after field repair		Reject feather /sharp burrs; Reduced burrs acceptable
D: Shoulder	Accept if it can be removed with Scotch-Brite pad	Reject	Reject	N/A	Light damage accepted after field repair	N/A

Note:

- **Rust:** A reddish-brown oxide film forms on the surface, but without any metal loss or pitting.
- **Corrosion:** A phenomenon in which metals in general deteriorate and lose material due to chemical or electrochemical reactions, resulting in actual metal loss.
- **Light damage:** Very minor dressing may be permitted at the inspector's discretion, limited to such minor imperfections, provided it can be completed within approximately two minutes per joint and does not alter the original profile.
- **Field repair on thread:** Field repair on front 3 threads area (25.4 mm) is acceptable if there are no heavy protrusions, since that area is a non-thread seal area; for other thread areas, please contact NSC representatives for instructions.
- **Ovality (Mashed Deformation):** Localized out-of-roundness at **PIN** or **BOX** ends caused by handling or transportation impact. Rejection applies if deformation exceeds 3.0 mm (see Para. 7).

11. Appendix: Drift-size and Connection Dimensions Table of NSMAX™-GRC

OD	Weight	Wall	drift	Connection Dimension				
				Group	Connection OD (nom)	Connection ID (nom)	Make-up Loss	Coupling Length
inch	lb/ft	inch	inch		inch	inch	inch	inch
Tolerance					+0.125 / -0.063	±0.020	±0.006	+0.236 / -0
18	94	0.500	16.812	2	18.937	17.000	5.549	12.280
	105	0.562	16.688		18.937	16.876	5.549	12.280
	117	0.625	16.562	3	19.055	16.750	6.252	13.685
	119	0.640	16.532		19.055	16.720	6.252	13.685
	128	0.688	16.500(*)		19.055	16.624	6.252	13.685
18 5/8	87.5	0.435	17.567	1	19.626	17.755	5.614	12.409
	94.5	0.468	17.501		19.626	17.689	5.614	12.409
	96.5	0.486	17.500(*)	2	19.626	17.653	5.549	12.280
	101	0.510	17.500(*)		19.626	17.605	5.549	12.280
	106	0.531	17.375		19.626	17.563	5.549	12.280
	109.4	0.563	17.311	3	19.626	17.499	5.549	12.280
	112	0.579	17.279		20.000	17.467	6.252	13.685
	115	0.594	17.249		20.000	17.437	6.252	13.685
	122	0.636	17.165		20.000	17.353	6.252	13.685
	136	0.693	17.051		20.000	17.239	6.252	13.685
20	94	0.438	18.936	1	21.000	19.124	5.661	12.504
	106.5	0.500	18.812	2	21.000	19.000	5.596	12.374
	117	0.563	18.686		21.000	18.874	5.596	12.374
	133	0.635	18.542	3	21.063	18.730	6.315	13.811
	144	0.693	18.500(*)		21.063	18.614	6.315	13.811

(*) Special drift

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