

GENERAL SPECIFICATION

PIPELINES - RISERS

GS EP PLR 207

**CRA Clad or Lined Steel Pipe manufacturing
for pipeline applications**

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1. Scope

This specification defines the Company general requirements for the manufacture of clad and lined pipes for onshore and offshore applications.

This specification excludes pipe produced by weld overlay.

This specification shall be used in conjunction with a project particular Specification (PPS) to be made for the purpose of detailing the additional tests and requirements or the possible modifications to the present specification, based on the special design conditions of the pipeline project.

2. Normative references

2.1 External Documents

If conflicts arise between this specification and [API SPEC 5LD / DNVGL-ST-F101](#) (or referenced documents) then the most stringent requirements shall be applied.

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and addendums, is the latest revision published at the effective date of this document.

Reference	Title
API SPEC 5L	Line Pipe
API SPEC 5LC	CRA Line Pipe
API SPEC 5LD	CRA Clad or Lined Steel Pipe
ASME BPVC 2019 section V	ASME Boiler and Pressure Vessel Code (BPVC), Section V- Non destructive Examination
ASTM A262	Standard Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels
ASTM A263	Standard Specification for Stainless Chromium Steel-Clad Plate
ASTM A264	Standard Specification for Stainless Chromium-Nickel Steel-Clad Plate
ASTM A265	Standard Specification for Nickel and Nickel-Base Alloy-Clad Steel Plate
ASTM A370	Standard Test Methods and Definitions for Mechanical Testing of Steel Products

Reference	Title
ASTM A380	Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems
ASTM A923	Standard Test Method for Detecting Detrimental Intermetallic Phase in Duplex Austenitic/Ferritic Stainless Steels
ASTM B499	Standard Test Method for Measurement of Coating Thicknesses by the Magnetic Method: Nonmagnetic Coatings on Magnetic Basis Metals
ASTM E92	Standard Test Methods for Vickers Hardness and Knoop Hardness of Metallic Materials
ASTM G28	Standard Test Methods for Detecting Susceptibility to Intergranular Corrosion in Wrought, Nickel-Rich, Chromium-Bearing Alloys
ASTM G48	Standard Test Methods for Pitting and Crevice Corrosion Resistance of Stainless Steels and Related Alloys by Use of Ferric Chloride Solution
AWS A 5.9	Welding Consumables - Wire Electrodes, Strip Electrodes, Wires, and Rods for Arc Welding of Stainless and Heat Resisting Steels – Classification
DNVGL-ST-F101	Submarine Pipeline Systems
DNVGL-RP-F112	Duplex stainless steel - design against hydrogen induced stress cracking
EN 10204	Metallic products - Types of inspection documents
ISO 14175	Welding consumables - Gases and gas mixtures for fusion welding and allied processes
ISO 15156 (All parts)	Petroleum and natural gas industries - Materials for use in H ₂ S containing environments in oil and gas production - All parts
ISO 2178	Non-magnetic coatings on magnetic substrates - Measurement of coating thickness - Magnetic method
ISO 8501 (All parts)	Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness - All parts

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Reference	Title
ISO 8502-9	Preparation of steel substrates before application of paints and related products. Tests for the assessment of surface cleanliness - Part 9: Field method for the conductometric determination of water-soluble salts
ISO 9001	Quality management systems - Requirements
ISO/TS 29001	Petroleum, petrochemical and natural gas industries – Sector-specific quality management systems – Requirements for product and service supply organisations
ISO 17025	General requirements for the competence of testing and calibration laboratories

2.2 Total General Specifications

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and addendum, is the latest revision published.

Reference	Title
GS EP PLR 205	Carbon steel, pipe manufacturing for pipeline applications according to API SPEC 5L and DNVGL-ST-F101

3. Definitions and Abbreviations

3.1 Definitions

For the purpose of this document, the following terms and definitions apply.

Clad Pipe	Clad pipe is a bimetallic pipe composed of an internal CRA layer which is metallurgically bonded to the backing steel. The cladding shall be bonded by hot rolling.
Lined pipe	Lined pipe consists of a carbon steel pipe meeting the requirements of API SPEC 5L , PSL 2 with an internal CRA liner. The CRA liner is mechanically expanded against the backing steel.

3.2 Abbreviations

AUT	Automatic Ultrasonic Testing
AWMT	All Weld Metal Welding
CRA	Corrosion resistant alloy

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CTOD	Crack Tip Opening Displacement
DBTT	Ductile Brittle Transition Curve
DPI	Dye Penetrant Inspection
ESW	ElectroSlag Welding
GMAW	Gas Metal Arc Welding
GTAW	Gas Tungsten Arc Welding
HAZ	Heat Affected Zone
ID	Inside Diameter
MPS	Manufacturing Procedure Specification
MPQT	Manufacturing Procedure Qualification Test
NDE	Non Destructive Testing
OD	Outside Diameter
PAW	Plasma Arc Welding
PPS	Project Particular Specification
PQR	Procedure Qualification Record
SAW	Submerged Arc Welding
SMTS	Specified Minimum Tensile Strength
SMYS	Specified Minimum Yield Strength
WPS	Welding Procedure Specification
WPQT	Welding Procedure Qualification Test
WT	Wall Thickness

4. Introduction

4.1 General

Carbon steel Pipe (backing steel) shall be manufactured in accordance with [GS EP PLR 205](#). Quality, Inspection (e.g. section 5.5), Technical Queries / NCR (e.g. section 5.6), Testing, dimensional, workmanship and NDE requirements from [GS EP PLR 205](#) (including selected Annexes and Appendices) remain applicable for the semi and finished clad or lined pipes.

Applicable standard for the manufacture of Clad/Lined Pipe are [API SPEC 5LD](#) and [DNVGL-ST-F101](#).

All requirements of [API SPEC 5LD](#) and [DNVGL-ST-F101](#) are applicable where this specification does not state overriding requirements.

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4.2 Grade

CRA shall be selected by Corrosion specialists, depending on project particular condition (type of effluent, preservation...), among the following list:

- Austenitic stainless steel UNS 31603, UNS N031703
- 22% duplex stainless steel UNS S31803*
- 25% superduplex stainless steel UNS S32750 / 32760 *
- Nickel based alloys: alloy 825 (UNS N08825) and alloy 625 (UNS N06625).

The thickness of the CRA layer shall be specified in the PPS and shall be as a minimum 3.0 mm.

*Duplex CRA is applicable to Lined pipes only.

5. Quality

Manufacturer(s) shall be previously audited and approved by Company.

Company can suspend the approval of a manufacturer due to a negative feedback concerning quality, delivery time, missing documentation or HSE issues.

All sub-suppliers (e.g. raw material supply, NDT, etc.) shall be clearly identified at the bid stage and be approved by Company.

The Manufacturer and its sub-suppliers shall operate a Quality Assurance system in accordance with [ISO 9001](#) or [ISO/TS 29001](#), approved by a Company recognized authority. Laboratory used for testing shall be certified according to [ISO 17025](#).

The Quality Manual shall be submitted prior the start of work. It shall be demonstrated that a continuous improvement program is in place.

Responsibility for quality control shall rest with the Manufacturer aided by such staff as may be required. Company may perform or delegate second party inspection during the entire manufacturing.

The Manufacturer shall maintain quality records as documentary evidence of compliance with quality requirements.

Quality records shall be available to the Inspector for analysis and review.

6. Requirements for clad pipes

6.1 C-Mn plate manufacturing

C-Mn plates shall be manufactured as TMCP following all the requirements of [GS EP PLR 205](#).

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6.2 CRA plate manufacturing

CRA plates shall be manufactured according to [API SPEC 5LD](#).

6.3 Clad Plate manufacture

6.3.1 General requirements

Clad plate shall be manufactured as per [API SPEC 5LD](#) by hot rolling process.

The manufacturer shall issue an Inspection Certificate 3.2 in accordance with [EN 10204](#).

In addition to the applicable essential variables of [GS EP PLR 205](#) Annex B, the MPS for clad plates shall as a minimum contain:

- The essential variables from [API SPEC 5LD](#)
- No changes to CRA layer grade
- No change in the CRA WT of more than ± 1.5 mm
- No change in the separating agent used in the sandwich (name/trademark to be clearly identified).

All work shall be performed in clean areas and clean environment to avoid contamination and condensation.

C-Mn faces in contact with CRA and CRA plates shall be:

- Blast cleaned to a surface cleanliness of [ISO 8501-1](#) Sa 2
- Cleaned, dried and free from any dust or particles
- Free from any oxides.

Plates shall be cropped off at 150 mm from the edges at the end of the manufacturing process.

Clad plates delivery condition shall be TMCP.

They may be delivered as quenched and tempered, providing Manufacturer can evidence that tempering conditions do not affect cladding material mechanical and corrosion properties.

Clad mother plates for bends shall only be delivered in the quenched and tempered state (with the same restrictions than given above for tempering).

6.3.2 Clad plates MPQT

Testing shall be carried out at a frequency as described in Table 1.

Table 1 - Clad Plate MPQT

Test	MPQT
Chemical composition	2 tests - (MH1 MH2 location)
Hardness	2 tests - (MH1 MH2 location)
Micrographic and metallographic testing	1 test
Tensile	2 tests - (TT4 location)
	3 tests - (TT1, TT2 and TT3 locations)
Impact Test	2 sets of 3 tests - (KCV1 to KCV6 locations)
Shear strength	3 tests - (SST1, SST2 and SST3 locations)
Guided bend	6 tests - (GB1, GB2 and GB3 locations)
Corrosion tests	3 tests - (C1, C2 and C3 locations)

Sampling location and specimen direction shall be as per Figure 1.

Figure 1 - Sampling location and direction
