

Pipe with Welded Connectors

API RECOMMENDED PRACTICE 5C6
THIRD EDITION, MAY 2018



AMERICAN PETROLEUM INSTITUTE

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Pipe with Welded Connectors

1 Scope

1.1 Purpose

This standard provides a practice for facility or field welding of connectors to pipe. The technical content contains guidance and requirements for welding procedure qualification, welder performance qualification, materials, testing, production welding, and inspection.

1.2 Coverage

This standard covers the weld fabrication of connectors and handling attachments, such as lift eyes and landing pads, to pipe. This standard also includes practices used within industry and is intended to be analogous to [API 6A](#) PSL 1 with additional requirements specific to the equipment fabrication.

2 Normative References

The following referenced documents are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced standard applies (including any addenda/errata).

[API Specification 2B](#), *Structural Steel Pipe*

[API Specification 5L](#), *Line Pipe*

[API Specification 5L](#), *Line Pipe* (46th Edition)

[API Specification 6A](#), *Wellhead and Christmas Tree Equipment*

[API Standard 1104](#), *Welding of Pipelines and Related Facilities*

[API Standard 20H](#), *Heat Treatment Services—Batch Type for Equipment Used in the Petroleum and Natural Gas Industry*

Aerospace Material Specification 2750, *Pyrometry*

ASME Boiler and Pressure Vessel Code, Section V, *Nondestructive Examination*

ASME Boiler and Pressure Vessel Code, Section VIII, Division I, *Rules for Construction of Pressure Vessels*

ASME Boiler and Pressure Vessel Code, Section IX, *Welding and Brazing Qualifications*

[ASTM A370](#), *Standard Methods and Definitions for Mechanical Testing of Steel Products*

[ASTM E10](#), *Standard Test Method for Brinell Hardness of Metallic Materials*

[ASTM E18](#), *Standard Test Methods for Rockwell Hardness of Metallic Materials*

[ASTM E23](#), *Standard Test Methods for Notched Bar Impact Testing of Metallic Materials*

[ASTM E92](#), *Standard Test Methods for Vickers Hardness and Knoop Hardness of Metallic Materials*

NACE MR0175/ISO 15156, *Petroleum and natural gas industries—Materials for use in H₂S-containing environments in oil and gas production*

ISO 6892-1, *Metallic materials – Tensile testing – Part 1: Method of test at room temperature*

3 Terms and Definitions

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

3.1

axial alignment

Alignment to within specified tolerances of the connector centerline, to the centerline of the connector at the opposite end of the pipe.

NOTE See Section 8 for additional information on alignment.

3.2

base metal

Metal to be welded or cut.

3.3

base metal grouping

System used to describe comparable base metal characteristics, such as chemical composition, weldability, thermal processing, and mechanical properties.

3.4

calibration

Comparison and adjustment of instruments to a standard of known accuracy.

3.5

carbon equivalent

Equation where variables are defined by base metal composition.

NOTE The result can be used as information to help assess the base metal weldability.

3.6

casing

Steel pipe used in oil wells to seal off fluids from the wellbore and to prevent the walls of the hole from sloughing or caving.

3.7

connector

Forging, machined to a geometry to function as a mechanical connection welded to pipe (casing).

3.8

connector parallelism

A measure of the connector face or plane with respect to the connector face at the opposite end of the pipe.

3.9

Charpy V-notch

Impact testing in accordance with [ASTM A370](#).

3.10**discontinuity**

An interruption of the typical structure of a weldment, such as lack of homogeneity in the mechanical, metallurgical, or physical characteristics.

NOTE A discontinuity is not necessarily a defect.

3.11**drift mandrel**

A precision dimensioned cylinder sized to pass through or be inserted into the ends of pipe to locate obstructions or to assure compliance with appropriate specifications.

NOTE Other drift configurations may be approved by the purchaser.

3.12**fabricator**

The company responsible for welding.

3.13**grinding**

Removing material from a pipe surface or weld by abrading, e.g. using a grinding wheel.

3.14**hardness test**

A measure of the hardness of a metal, as determined by pressing a hard steel ball or diamond penetrant into a smooth surface under standard conditions.

NOTE Results can be expressed in terms of Rockwell hardness number (HRB or HRC) or Brinell hardness number (BHN); refer to [ASTM E10](#) and [ASTM E18](#) for added information.

3.15**heat affected zone****HAZ**

Base metal zone adjacent to a weld that has had a metallurgical change induced by welding.

3.16**manufacturer**

The company that manufactures the connector.

3.17**magnetic particle examination**

A nondestructive test method utilizing magnetic flux leakage fields and suitable indicating materials to disclose surface and near-surface discontinuity indications.

3.18**nondestructive exam****NDE**

Inspection to detect internal, surface, and concealed defects or flaws in materials using techniques that do not damage or destroy the items being tested.

3.19**pipe**

Plain end pipe (casing) to which connectors are to be welded.