

GP 18-07-01	Welding Procedures	August 2003
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Welding Procedures

GP 18-07-01

Scope

- 1) [R] This ExxonMobil Global Practice (GP) governs welding and welding qualifications.
- 2) [I] API RP 582, 1st Edition, March 2001, titled "Welding Guidelines for the Chemical, Oil, and Gas Industries," as amended by this GP, defines the minimum requirements and practices for welding and welding qualification. Unless otherwise noted, all the API paragraphs shall be considered mandatory.
- 3) [I] Only the paragraphs that are amended are listed in this GP. For convenience, the nature of the amendment is noted in the beginning of each paragraph as follows:
 - a) **Addition** Specifies paragraphs that do not appear in the API RP, and additions to the corresponding API paragraph.
 - b) **Exception** Specifies paragraphs that modify or completely replace the corresponding API paragraph.
- 4) [I] An asterisk (*) indicates that a decision by Purchaser is required or that additional information is furnished by Purchaser.

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1. Required References

* This Section lists Practices and Standards that are generically referenced and assumed to be a part of this document. Unless otherwise specified herein, use the latest edition.

1.1. Global Practices–ExxonMobil Engineering Practices

GP 03-18-01	Piping Fabrication Shop or Field
GP 18-10-01	Additional Requirements for Materials

1.2. API-American Petroleum Institute

API RP 582	Welding Guidelines for the Chemical, Oil, and Gas Industries
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2. Revisions to API RP 582

[I] All headings contained herein correspond to paragraph numbering within API RP 582 and reflect additions and exceptions to the recommended practice. All provisions not modified or deleted remain in force.

Revisions to Section 3: Definitions

3. Additions: Definitions

Back cladding	A localized weld overlay operation between two integrally clad or weld overlaid sections. This process is also known as "clad restoration."
Effective depth	The thickness of weld overlay or back cladding having the specified chemical composition.
Total depth	The total thickness of weld overlay or back cladding.
Weld overlay (surfacing)	A deposition of one or more layers of a dissimilar weld metal to the surface of a base material in an effort to improve the corrosion or wear resistance properties of the surface.

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Revisions to Section 4: General Welding Requirements

4.3. Addition: General

[R]Basis for rejection of WPS's shall be noncompliance with this practice, failure to meet applicable codes, or violation of industry practice.

4.4. Addition: General

[I] The Supplementary Essential Variables in ASME Section IX shall apply to all impact tested welding procedure specifications (even if impact testing is not a code requirement).

4.5. Addition: Base Metals

* [I] Base metals not listed in ASME Section IX QW/QB-422 but having equivalent chemical and mechanical properties as listed materials may be classified in a listed P-Number or S-Number and, where applicable, Group Number subject to the approval of the Owner's Engineer.

4.6. Addition: Documentation

[R] Each base metal within a given P-Number or Group Number having nominally different chemical or mechanical properties (as designated in QW-422 of ASME Section IX) requires:

- 1) A separate WPS. This requirement does not apply to different grades of P-No. 8, Groups 1 and 2, base metal provided the WPS specifies the filler metal required for each different base metal type.
- 2) Separate PQRs whenever a welding related operation satisfactory for one base metal is, in the opinion of the Owner's Engineer, unsatisfactory for another base metal within the same P or Group Number.

Revisions to Section 5: Welding Processes

5.1.i. Addition: Acceptable Welding Processes

[I] Electroslag Welding

5.2.a. Addition: Limitations of Fusion Welding Processes

[R] Single pass butt welding of pressure containing joints in ferritic steel exceeding 1/4 in. (6 mm) thickness is acceptable only when the joint receives a subsequent grain refining (austenitizing) heat treatment.

5.2.2.c. Addition: GMAW-S

[R] The root pass for any material thickness may be welded with this process.

5.2.2.d. Addition: GMAW-S

[R] Complete butt or fillet welds may be welded with this process provided the wall thickness of no member exceeds 1 in. (25 mm) and either of the following conditions is met:

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- Welding is done in any position except vertical-down and the current is not less than 170 A.
- Welding is done in the vertical-up position (3G) and the heat input is not less than 35000 Joules/in. (14000 Joules/cm). Heat input is defined as:

Equation 1: Heat Input

$$\frac{\text{amperage} \times \text{voltage} \times 60}{\text{travel speed (in. or cm per minute)}}$$

5.2.6.1 Addition: SAW

[R] Requalification is also required when the welding flux manufacturer is changed.

5.2.7. Addition: Gas Tungsten Arc Welding (GTAW)

- 1) [R] Manual GTAW (TIG) welding shall be used with the addition of filler metal and high frequency starting equipment or equal.
- 2) [R] For GTAW (TIG), the addition or deletion of consumable inserts for single welded butt joints (without backing devices) requires separate WPS(s) and PQR(s).

Revisions to Section 6: Welding Consumables

6.1.5. Addition: General

For electroslag welding, the AWS electrode-flux classification, and the flux manufacturer and trade name shall be specified in the PQR and WPS.

6.1.6. Addition: General

* [R] Unless specifically authorized by Purchaser, filler metals and consumables shall be used only for the primary material and process applications recommended in the AWS filler metal specification or by its manufacturer, e.g., filler metals designed for "single pass welding" shall not be used for multi-pass joints. SAW fluxes designated for non-PWHT applications shall not be used for PWHT applications.

6.1.7. Addition: General

[R] When joining similar metals, the deposited weld metal shall match the chemistry and the mechanical properties of the base metal as closely as possible.

* Whenever the minimum mechanical properties of the deposited weld metal fail to meet the minimum mechanical properties of the base metal, or whenever the nominal chemistry of the deposited weld metal differs from the nominal chemistry of the base metal, the Vendor's proposal to use such weld metal shall be submitted to Purchaser for approval by the Owner's Engineer.

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