

# Enterprise API 1104 Welding Procedure Specifications Selection Tool

## STD.8001

---

### Scope

This standard outlines the process required to make use of the Company Server-Based WPS Selection Tool Application that utilizes project specific details to identify an acceptable Company API 1104 welding procedure specification (WPSs), and provides the welding procedure selection tool server location. In the event that the project does not wish to utilize the server-based welding procedure selection tool they may contact the Welding Department ([WPS@eprod.com](mailto:WPS@eprod.com)) for support on identifying the appropriate project welding procedure specification.

The welding procedures listed within the Server-Based WPS Selection Tool have been qualified for most construction and maintenance welding of Company pipelines and pipeline facilities, as defined by the Code of Federal Regulations, Title 49, Parts 192 and 195. The procedures cover both construction and maintenance welding for ASME B31.4 and B31.8 pipelines and facilities.

The procedure selection tool provides direction for establishing welding procedure specifications for a project specific scope-of-work for non-in-service applications.

This standard does not cover welding procedure specifications (WPSs) outside of API 1104 (e.g. ASME BPVC Section IX, AWS D1.1, etc.). The review process for such procedures is found in Company STD. 8007.

---

**TABLE OF CONTENTS**

<b>1.0</b>	<b>REFERENCES .....</b>	<b>3</b>
1.1.	Code of Federal Regulations (CFR) .....	3
1.2.	American Petroleum Institute (API) .....	3
1.3.	American Society of Mechanical Engineers (ASME) .....	3
1.4.	American Welding Society (AWS).....	3
1.5.	National Association of Corrosion Engineers (NACE) .....	3
1.6.	Company Standards .....	3
<b>2.0</b>	<b>TERMS AND DEFINITIONS.....</b>	<b>3</b>
<b>3.0</b>	<b>ENGINEERING METHODOLOGY .....</b>	<b>4</b>
<b>4.0</b>	<b>WPS SELECTION TOOL PROCEDURE .....</b>	<b>5</b>
4.1.	FIELD REQUIREMENTS .....	7
4.2.	RESTRICTIONS .....	7
4.3.	WPS SELECTION TOOL APPLICATION (SERVER-BASED) .....	7
<b>5.0</b>	<b>OUTPUT SCENARIOS OF WPS SELECTION TOOL .....</b>	<b>7</b>
<b>Appendix A</b>	<b>WPS Selection Tool Application .....</b>	<b>9</b>
<b>Attachment</b>	<b>Revision Log.....</b>	<b>10</b>

## 1.0 REFERENCES

The following is a list of regulations, standards, and codes referenced in this Standard. Unless otherwise specified, the latest approved edition of each reference shall apply.

### 1.1. Code of Federal Regulations (CFR)

49 CFR 192	Transportation of Natural Gas and Other Gases by Pipeline
49 CFR 195	Transportation of Hazardous Liquids by Pipeline

### 1.2. American Petroleum Institute (API)

API Standard 1104	Welding of Pipelines and Related Facilities, 20th Edition, November 2005, errata/addendum (July 2007) and errata 2 (2008)
-------------------	---

### 1.3. American Society of Mechanical Engineers (ASME)

ASME B31.3	Process Piping
ASME B31.4-2019	Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids
ASME B31.8-2018	Gas Transmission and Distribution Piping Systems
ASME BPVC.VIII	ASME Boiler and Pressure Vessel Code, Section VIII, Division 2: Alternative Rules
ASME BPVC.IX	ASME Boiler and Pressure Vessel Code, Section IX: Welding and Brazing Qualifications

### 1.4. American Welding Society (AWS)

AWS D1.1/D1.1M	Structural Welding Code - Steel
----------------	---------------------------------

### 1.5. National Association of Corrosion Engineers (NACE)

NACE MR0175 / ISO 15156-1	International Standard - Petroleum and Natural Gas Industries—Materials for use in H <sub>2</sub> S-Containing Environments in Oil and Gas Production—Part 1: General Principles for Selection of Cracking-Resistant Materials
---------------------------	--

### 1.6. Company Standards

STD.8004	In-Service Welding Pre-Assessment, Evaluation, and Approval
STD.8007	Welding Procedure and Qualification Documentation Review Process for Code Compliance

## 2.0 TERMS AND DEFINITIONS

**API** – American Petroleum Institute

**App** – Appendix

**ASME** – American Society of Mechanical Engineers

**AWS** – American Welding Society

**Company** – Enterprise (if used in connection with a contract or other agreement, the actual Enterprise entity will be the specific Enterprise entity referenced in the contract).

**Company Project Manager** - An employee of Enterprise who has the overall responsibility for the project or a defined scope of work. For example, this can be someone in Capital Projects, Field Engineering, Asset Integrity, Maintenance or Operations.

**Company Authorized Representative** – Representative for company to visually inspect welds (i.e. inspector).

**Essential Variable** – A specified procedure variable (e.g. wall thickness, post weld heat treatment, direction of travel, base material, etc.) that if changed beyond a range qualified or specified on a welding procedure specification that would require requalification of the welding procedure specification.

**MDMT** – Minimum Design Metal Temperature

**NACE** – National Association of Corrosion Engineers

**NPS** – Nominal Pipe Size

**OD** – Outer Diameter

**SOW** – Scope of Work

**Sour Service** – When a hydrocarbon product has some threshold level of additional compound, etc. that creates a corrosive environment determined by design basis.

**WPS** – Welding Procedure Specification

**WT** – Wall Thickness

### 3.0 ENGINEERING METHODOLOGY

- (1) The server-based WPS Selection Tool will identify a potentially acceptable WPS(s) for a non-in-service project specific scope of work by cross-referencing the inputted project details to the essential variables associated with Company qualified WPSs. The Company Welding Department ([WPS@eprod.com](mailto:WPS@eprod.com)) shall offer further guidance upon request. Additionally, the project may contact the Welding Department ([WPS@eprod.com](mailto:WPS@eprod.com)) to identify the appropriate welding procedure specifications if the utilization of the server-based welding procedure selection tool is not wanted by the project. The WPS Selection Tool Application shall be accessed on the Company server (<http://engspecs.eprod.com/welding>) each time before utilization.
- (2) This process should be completed during the bid phase of a project to forecast any potential procedure concerns and/or qualifications requirements early in the project life cycle.
- (3) Prior to identifying an applicable WPS(s) for a project, the Company Project Manager shall perform the following tasks;
  - (a) Determine the prevailing construction code (e.g. ASME B31.4 or ASME B31.8). If the prevailing construction code is not B31.4 or B31.8 this selection tool cannot be utilized.
  - (b) Verify this procedure is being executed for a non-in-service welding application. This WPS Selection Tool shall not be utilized for in-service welding applications. See STD.8004 for in-service welding applications.
  - (c) Determine if the service environment is defined as “sour service”. Sour service conditions can be determined by the Company piping specification in conjunction with determining if the H<sub>2</sub>S volume(s) exceed the threshold limits established in NACE MR0175.
  - (d) Determine if the line will carry CO<sub>2</sub> with water or moisture as a component of the hydrocarbon product(s). Sources of CO<sub>2</sub> and water/moisture content within the product stream include but are not limited to product sample analysis, analysis of samples taken following pipeline pigging, and contractual limits on receipt of CO<sub>2</sub> and water/moisture as

well as the measures in place to monitor and limit the exceedance of these constituents in the pipeline.

- (e) Determine the minimum design metal temperature (MDMT) based on engineering design. See B31.4-2016 (401.2.3.7) or B31.8-2018 (805.2.2) for reference guidance.
- (f) Compile a list of all project material to be welded (i.e. material grades, WT, NPS)
- (g) Input all requested data into the Server-Based WPS Selection Tool Application.
- (h) Verify all information in steps (a) through (f) above is accurate and correct after performing step g.
- (i) Provide the completed WPS Selection Tool Printout to all of the appropriate project personnel which may include, but is not limited to the Company Project Manager, Chief Inspector(when applicable), Company Authorized Representative(s), and welding contractor.
- (j) Ensure the Company Authorized Representative(s) verifies, prior to the execution of a weld, that the material combinations (i.e. material grade, wall thickness, and pipe diameter) and the welding joint indicated in the WPS Selection Tool are the combinations to be welded in the field.

**Note:** The selection tool process is completed on a per project basis to minimize reservation of which Company WPSs are required for the project SOW and to ensure all potentially acceptable WPSs have been identified for field personnel.

## 4.0 WPS SELECTION TOOL PROCEDURE

- (1) The Company has qualified several WPSs, which were specifically designed to be applicable to most construction and maintenance welding on Company pipeline projects. The Server-Based WPS Selection Tool Application utilizes project specific details to identify a potentially acceptable Company qualified WPS. The WPS Selection Tool Application shall be accessed on the Company server (<http://engspecs.eprod.com/welding>) each time before utilization.
- (2) Where a potentially acceptable Company qualified WPS is identified by the Selection Tool, the Company Project Manager shall review the inputted project specific details for accuracy to ensure the identified WPS(s) can be applied to the project.
- (3) Upon completion of this review process for accuracy the identified WPS(s) is considered acceptable. In the event where no Company qualified WPS(s) is acceptable for the entered project specific details, the WPS Selection Tool generates an output indicating the Company Welding Department should be contacted for technical assistance.
- (4) The Company Project Manager, or their designee shall gather and enter or select the following project specific details into the WPS Selection Tool for each weld configuration to be executed in the field:
  - (a) Prevailing design/construction code – A drop-down list for selection of either ASME B31.4 or ASME B31.8 is provided. For any other prevailing design/construction code this WPS Selection Tool is not applicable.
  - (b) If the line is to carry CO<sub>2</sub> with water/moisture as part of the product composition – A selection button of “yes” or “no” is provided.
  - (c) Company piping specification – Utilizing text input from 4.0(4)(a) the application will allow selection of only the Company piping specifications associated with the selected construction code.
  - (d) Material specification and grade of both pipe/fitting components to be welded – A drop down list of common pipe material specification and grades are provided.

- Yield strength is auto populated based on the specified minimum yield strength of the material selected.
- (e) Wall thickness of both pipe/fitting components to be welded (i.e. WT (in.)) - A drop down list of common pipe/fitting wall thicknesses is provided.
- (f) Pipe/fitting diameter of both pipe/fitting components to be welded (i.e. NPS (in.)), which is based on nominal OD – A drop down list of common pipe/fitting diameters is provided.
- (g) If the line is designed for sour service – “Sour” will be indicated based on auto-formatting if piping specification is designated as sour service. Reference: 3.0(3)(c) above for further clarification.
- (h) Line pipe MDMT – Input pipeline MDMT. A project specific MDMT based on design requirements must be established or verified based on previous design requirements.
- (i) Required welding joint – A drop down list of common field welding joints is provided.
  - See link “STD.8001: JOINT TYPES” in application for guidance document for selection the appropriate welding joint

**Note:** In order for the WPS Selection Tool to identify the potentially acceptable WPS for each weld, each combination of project specific details must be entered separately within the WPS Selection Tool. In other words, a separate entry of project specific details must be entered within the WPS Selection Tool whenever one or more of the project specific details (company piping specification, material grade, wall thickness, pipe diameter, weld joint type, MDMT, sour service requirements, CO<sub>2</sub> product) change. Upon completion of this review process for accuracy the identified WPS(s) is considered acceptable.

- (5) WPS Output – Automatically selects a potentially acceptable WPS based upon the project specific details entered. Typical auto-populated responses includes the potentially acceptable WPS number or the statement “Welding Dept.”.
- (6) The Company Project Manager shall review all of the entered project specific details to verify the details are accurate and entered properly. The Company Project Manager does not have the authority to delegate this review and verification to a Company Authorized Representative or any other individual.
- (7) If the review performed in Step 4.0(6) has determined that the inputted information does not accurately describe and/or does not fully include all of the projects potential welding combinations, the Company Project Manager shall correct all inaccurate information and proceed back to Step 4.0(6).
- (8) If the review performed in Step 4.0(6) has determined that the inputted information does not accurately describe and/or does not fully include all of the projects potential welding combinations, and the Company Project Manager is unable to correct all inaccurate information because the requirements for the project specific details (company piping specification, material grade, wall thickness, pipe diameter, weld joint type, MDMT range) are outside the limits identified in the WPS Selection Tool, the Company Project Manager shall contact the Company Welding Department.
- (9) If the auto-populated WPS equals “Welding Dept.” (refer to Step 4.0.(5)),
  - (a) The WPS Selection Tool was unable to identify a potentially acceptable WPS for the inputted project specific details and the Company Project Manager shall contact the Company Welding Department.
- (10) If the review performed in Steps 4.0(6) has determined that the inputted information accurately describes and fully includes all of the projects potential welding combinations, but a WPS number is not auto-populated by the WPS Selection Tool and equals “Welding Dept.”, the Company Project Manager shall contact the Company Welding Department, as a procedure qualification may be required.

- (11) If the review performed in step 4.0(6) determines that the inputted information accurately describes and fully includes all of the project's potential welding combinations, the WPS number auto-populated by the WPS Selection Tool can be utilized as an acceptable Company qualified WPS and no further approval is required from the Company Welding Department.
- Note: If, after all of the requirements of Step 4.11 are met, a different WPS than indicated by the WPS Selection Tool is desired by the Company Project Manager, the Company Welding Department will need to be contacted to determine if an alternative WPS is available.
- (12) The Company Project Manager is responsible ensuring that a copy of the completed WPS Selection Tool, where utilized as part of this procedure to select an acceptable Company qualified WPS, is retained for the life of the subject pipeline asset.
- (13) The Company Project Manager is responsible for providing the completed WPS Selection Tool to all of the appropriate project personnel which may include, but is not limited to the Company Project Manager, Chief Inspector(when applicable), Company Authorized Representative(s), and welding contractor.
- (14) The Company Project Manager is responsible for obtaining and distributing all required WPSs identified in the WPS Selection Tool to all of the appropriate project personnel which may include, but is not limited to the Company Project Manager, Chief Inspector(when applicable), Company Authorized Representative(s), and welding contractor. WPSs can be obtained either from the Company Quality Assurance Department (i.e. Regional Manager of Inspection) or the Company Welding Department.
- (15) End procedure.

#### 4.1. FIELD REQUIREMENTS

The Company Project Manager is responsible for ensuring that the Company Authorized Representative(s) verifies, prior to the execution of a weld, that the material combinations (i.e. material grade, wall thickness, and pipe diameter) and the welding joint identified in the WPS Selection Tool are the combinations to be welded in the field.

#### 4.2. RESTRICTIONS

- (1) The WPS Selection Tool is NOT a substitute of the Pre-Approval Letter (PAL) for in-service applications, guidance for in-service welding is in Company STD.8004.
- (2) The WPS Selection Tool is NOT to be utilized for ASME B31.3, ASME BPVC Section VIII or AWS D1.1 applications.

#### 4.3. WPS SELECTION TOOL APPLICATION (SERVER-BASED)

The Selection Tool is embedded within this Standard in Appendix A.

### 5.0 OUTPUT SCENARIOS OF WPS SELECTION TOOL

- (1) Once the Company Project Manager inputs and verifies the required project details are accurate (Step 4.0(6)). The following three (3) scenarios are the potential outcomes that could occur utilizing this selection tool;
- (a) If the "WPS" Column in the Selection Tool auto-populates a WPS number, this means the indicated established Company WPS is potentially acceptable. No further approval is required from the Company Welding Department. Upon completion of the Company Project Managers review process outlined in Section 4.1 to determine the inputted data is accurate the identified WPS(s) is considered acceptable.
- (b) If the "WPS" Column in the Selection Tool auto-populates a response of "Welding Dept.", the WPS Selection Tool was unable to identify a potentially acceptable WPS for the



inputted project specific details and a procedure qualification may be required. Please contact the Company Welding Department for options and further direction to resolve this matter.

- (c) If the “WPS” Column in the Selection Tool auto-populates a WPS number, this means the indicated established Company WPS is potentially acceptable and becomes considered acceptable upon completion of the Company Project Managers review process outlined in Section 4.0. However, if a different WPS than indicated by the WPS Selection Tool is desired by the Company Project Manager, the Company Welding Department ([WPS@eprod.com](mailto:WPS@eprod.com)) will need to be contacted to determine if an alternative WPS is available. The identification of an alternative potentially acceptable WPS by the Company Welding Department shall occur on a case-by-case basis and shall only be applicable for the Project and AFE originally specified.



## Appendix A WPS Selection Tool Application

<http://engspecs.eprod.com/welding>

## Attachment Revision Log

Revision No. 1.0		Publish Date: 13 May 11
Location of Change	Type of Change	Reason for Change
Section 2	New section	Added to define numerical sequencing.
Section 3	Title	Added "Groupings".
Section 4, Columns 1 & 2	Text	Changed "EPCO #" to "WPS #", changed "Previous #" to "PQR #".
Section 4, Column 1	Text	Added rev #s for each procedure.
Section 4	WPS listing	Removed procedures/ added current procedures in new numbering system.
Revision No. 2.0		Publish Date: 17 Jun 11
Location of Change	Type of Change	Reason for Change
Section 4	Update	Updated the following information for WPS 11-11: revision number, PQR number, and procedure qualification date.
Revision No. 3.0		Publish Date: 10 Aug 11
Location of Change	Type of Change	Reason for Change
Section 4	Update	Updated revision numbers for group 15 WPS.
Revision No. 3.1		Publish Date: 08 Sep 11
Location of Change	Type of Change	Reason for Change
Section 1.2 and 1.3	Revision	Updated references.
Revision No. 4.0		Publish Date: 23 Nov 11
Location of Change	Type of Change	Reason for Change
Section 3	XX-XX-XX	Added text to define third set of numbers in numerical sequencing.
Table 3.3	Addition of table	Table added with definitions for numbers.
Section 4 hyperlinks, revisions	Text, hyperlink	All WPSs revised with hyperlinks to new revisions, update of revision numbers for WPSs.
Section 4 OD	OD > NPS 2"	As shown on WPS

Section 4 procedures	Procedure removals	WPSs 2-03, 5-13 rev 0, 6-01, 9-02, and 12-01 archived.
Section 4 procedures	Procedure additions	WPSs 2-11-01, 3-11-01, 5-11-01, 8-12-01, and 9-12-01 added.
<b>Revision No. 4.1</b>		<b>Publish Date: 15 Feb 12</b>
<b>Location of Change</b>	<b>Type of Change</b>	<b>Reason for Change</b>
Section 4	Addition of WPS 5-12	WPS added
Section 4	Revision of WPS 15-02	Revision of longitudinal electrical characteristics
<b>Revision No. 4.2</b>		<b>Publish Date: 18 Apr 12</b>
<b>Location of Change</b>	<b>Type of Change</b>	<b>Reason for Change</b>
Section 4	New revision	WPS 15-01 revised
Section 4	New revision	WPS 15-02 revised
Section 4	New revision	WPS 15-05 revised
Section 4	New revision	WPS 15-10 revised
<b>Revision No. 4.3</b>		<b>Publish Date: 05 Jun 12</b>
<b>Location of Change</b>	<b>Type of Change</b>	<b>Reason for Change</b>
Section 4	Addition	WPS 15-11 added
<b>Revision No. 4.4</b>		<b>Publish Date: 21 Feb 13</b>
<b>Location of Change</b>	<b>Type of Change</b>	<b>Reason for Change</b>
Section 4	New Revision	WPSs: 2-11, 5-11, 8-11, 11-11, 15-01, 15-02, 15-05, 15-10 and 15-11 revised
<b>Revision No. 5.0</b>		<b>Publish Date: 13 Jun 13</b>
<b>Location of Change</b>	<b>Type of Change</b>	<b>Reason for Change</b>
Section 4 Procedures	Procedure removals	WPSs: 1-11, 2-11, 5-11, 8-11, 11-11
Section 4 Procedures	Procedure additions	WPSs: 1-11-01, 2-11-02, 5-11-02, 8-11-01, 11-11-01
Section 3	"XX-XX-XX"	Re-defined numerical sequence
Section 3	Revised (4)	Re-defined numerical sequence

Table 3.3	Removal	New numerical sequence does not require Table 3.3
<b>Revision No. 6.0</b>		<b>Publish Date: 23 July 13</b>
<b>Location of Change</b>	<b>Type of Change</b>	<b>Reason for Change</b>
Section 4 Procedures	Procedure removals	WPSs: 2-11-01, 2-12, 3-02, 3-11-01, 4-11, 4-12, 5-02, 5-03, 5-11-01, 5-12, 5-13, 8-02, 8-12-01, 9-11, 9-12-01, 11-02, 12-02, 12-11, 15-01, 15-02, 15-05, 15-10, and 15-11 archived.
Section 4 Procedures	Procedure additions	WPSs: 2-12-01, 3-11-02, 4-11-01, 4-12-01, 5-12-01, 5-13-01, 8-12-02, 9-01-01, 9-12-02, 12-11-01, 15-12, 15-13, 15-14, 15-15 added.
<b>Revision No. 6.1</b>		<b>Publish Date: 13 Sep 13</b>
<b>Location of Change</b>	<b>Type of Change</b>	<b>Reason for Change</b>
Section 4 Procedures	Procedure removal	Archived WPS 3-11-02.
<b>Revision No. 6.2</b>		<b>Publish Date: 29 Aug 14</b>
<b>Location of Change</b>	<b>Type of Change</b>	<b>Reason for Change</b>
Section 1.2	Update	Updated reference
Section 4 Procedures	Procedure removals	WPSs: 15-12, 15-13, 15-14, and 15-15 archived.
Section 4 Procedures	Procedure additions	WPSs: 15-16, 15-17, 15-18, 15-19, 15-20, and 15-21 added.
<b>Revision No. 6.3</b>		<b>Publish Date: 29 Oct 15</b>
<b>Location of Change</b>	<b>Type of Change</b>	<b>Reason for Change</b>
Section 4 Procedures	Procedure removals	WPSs: 1-11-01, 2-11-02, 4-11-01, 5-11-02, 8-11-01, 11-11-01, and 12-11-01 archived.
Section 4 Procedures	Procedure additions	WPSs: 1-11-03, 2-11-03, 4-11-03, 5-11-03, 8-11-03, 11-11-03, and 12-11-03 added.
Section 4 Procedures	Procedure revisions	WPSs: 15-16, 15-17, 15-18, 15-19, 15-20, 15-21 updated; also updated liquid and gas pipeline flow rate ranges for these six WPSs.
<b>Revision No. 7.0</b>		<b>Publish Date: 28 Jun 16</b>
<b>Location of Change</b>	<b>Type of Change</b>	<b>Reason for Change</b>
Table 3.2	Addition	Added "Groove Weld with Backing and Fillet Welds" for XX-14
Section 4.0 Procedures	Procedure additions	WPSs: 2-14-01, 3-14-01, 5-14-01, 6-14-01, 8-14-01, and 9-14-01 added.

Section 4.0 Procedures	Procedure updates	In-service WPSs 15-16, 15-17, 15-18, 15-19, 15-20, and 15-21 updated.
Section 4.0 Procedures	Consolidation/deletion	Data in "Run Pipe" and "Branch" columns was the same or "N/A," so these two columns were consolidated into one for "Pipe Grade," "Diameter Range," and "WT Range." Duplicate data was deleted.
Appendix A	Addition	Added WPS Summary Matrix
<b>Revision No. 8.0</b>		<b>Publish Date: 03 Sep 20</b>
<b>Location of Change</b>	<b>Type of Change</b>	<b>Reason for Change</b>
Entire Document	Addition / Deletion / Revision	The entire document was revised.