API 1104 20TH VS. 21ST EDITION COMPARISON

AGENDA

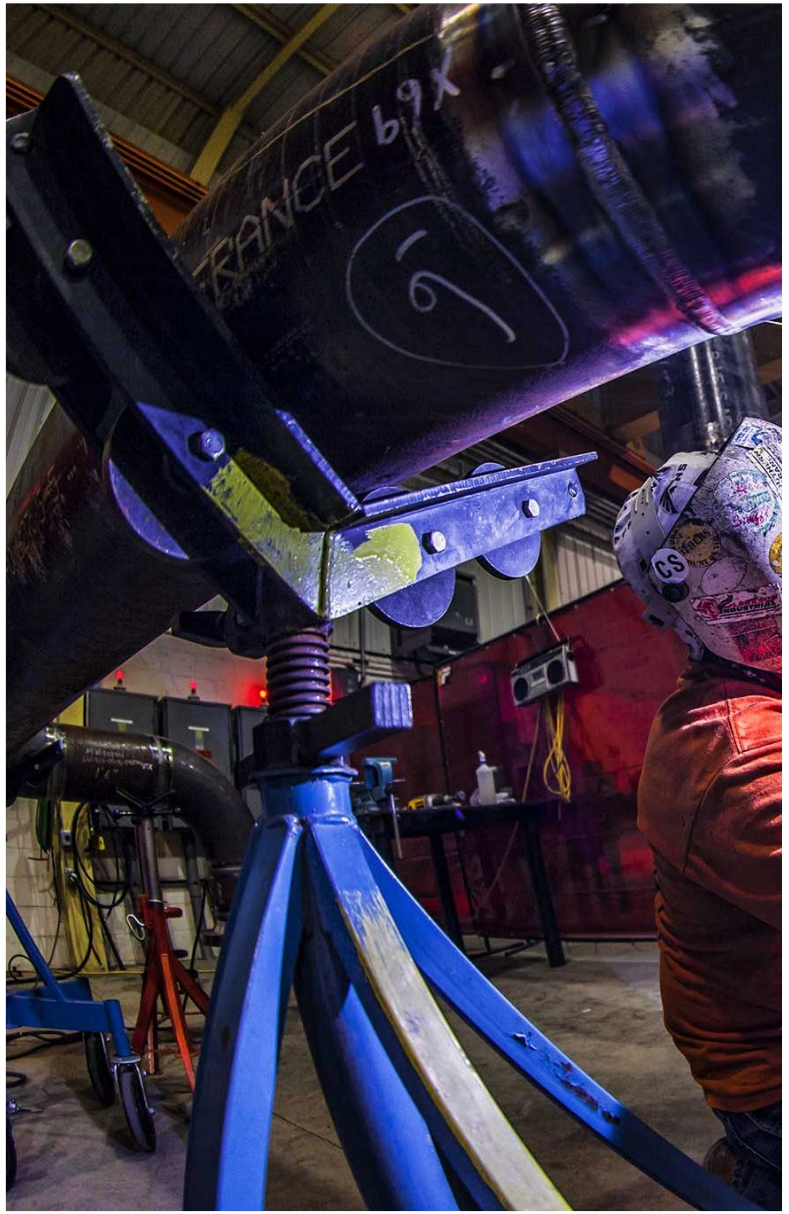
The Standard

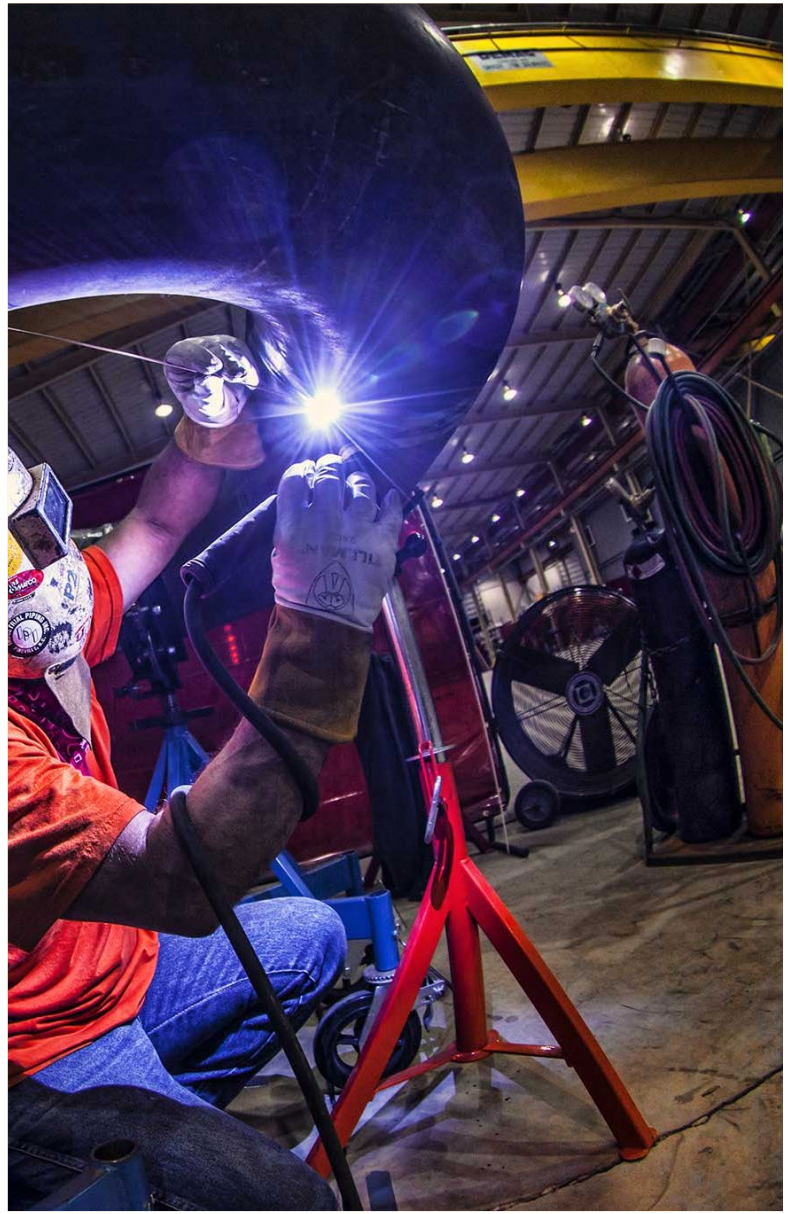
Stay of Enforcement

What you need to know

Implementation

Changes





API STANDARD 1104 21ST EDITION

- API 1104 21st edition has been incorporated by reference with an effective date of June 28, 2024.
- API Std 1104 is the primary standard for welding steel piping and for testing welds on steel pipelines. It covers the requirements for welding and nondestructive testing of pipeline welds. In the PSRs, this standard is used for qualifying welders, welding procedures, and welding operators, and interpreting the results of nondestructive tests.
- Replaces API Std 1104, "Welding of Pipelines and Related Facilities," 20th edition, October 2005
- Referenced in 49 CFR 192.225(a); 192.227(a); 192.229(b) and (c); 192.241(c); Section II of Appendix B in part 192; 195.214(a); 195.222(a) and (b); and 195.228(b).

API STANDARD 1104 21ST EDITION

Stay on Enforcement
6/20/24

- Due to the effective date, GPA and API requested a stay on enforcement to prevent regulatory disruptions during the 2024 construction season
- PHMSA agreed to the stay and allowed operators to use the previous procedures and standards from which they were based until Jan. 1, 2025

API STANDARD 1104 21ST EDITION

- What you need to know
  - As of June 28, 2024, operators must qualify new welding procedure specifications and welders to the 21st edition.
  - If you have a qualified welding procedure under API 1104 20th edition, you can continue to use that procedure if an essential variable has not changed.
  - If you change an essential variable in your welding procedure, then it must meet the requirements of the 21st edition

API STANDARD 1104 21ST EDITION

- What you need to know
  - A welder qualified under the 20th edition can continue to weld until they renew their qualification.
  - If you were creating a welding procedure and it was already under development under the 20th edition prior to June 28, 2024, you can complete and continue to use that procedure if an essential variable has not been changed.
  - If the welding procedure development started after June 28, 2024, then the procedure must meet the 21st addition of API 1104

- Why did the IBR exclude Note 2 in Section 5.4.2.2?
  - This was to ensure testing is based on the higher strength rating of the multigrade pipe. When utilizing multigrade pipe, the tensile strength test shall be based on the higher grade; not on a lower grade which could have been chosen by the company under the provisions of Note 2.

5.4.2.2 Base Material

A change in base material constitutes an essential variable. When welding materials of two separate material groups, the procedure for the higher strength group shall be used. For the purposes of this standard, all materials shall be grouped as follows.

a) SMYS less than or equal to that of the material specified as API 5L Grade X42;

b) SMYS greater than that of the material specified as API 5L Grade X42 but less than that of the material specified as API 5L Grade X65;

c) for materials with a SMYS greater than or equal to that of the material specified as API 5L Grade X65, each grade shall receive a separate qualification test.

NOTE 1 The groupings specified in 5.4.2.2 do not imply that base materials or filler metals of different analyses within a group may be indiscriminately substituted for a material that was used in the qualification test without consideration of the compatibility of the base materials and filler metals from the standpoint of metallurgical and mechanical properties and requirements for preheat and PWHT.

NOTE 2 When base material with multiple grade markings is being used, the company designates, before using the material, the selected single grade to be used.

API STANDARD 1104 21ST EDITION CHANGES

Section	Description of 21st Edition Specific Changes
3	Expanded definitions section.
Figure 1 & Figure 2	Revised Welding Procedure and Coupon Test Report Forms
5.3.2.5	Specification of electrode with a G suffix requires the manufacturer and trade name be specified.
5.3.2.6	Electrical characteristics required for type and size of electrode, rod, or wire.
5.3.2.13	Removed temperature control methods and clarified preheat is measured at start of weld.
5.3.2.17	Added Method of Cooling After Welding (If forced cooling is to be used, the specification shall designate the type of cooling after welding, such as forced cooling with water, as well as the maximum metal temperature at which forced cooling is applied.)

API STANDARD 1104 21ST EDITION CHANGES

Section	Description of 21st Edition Specific Changes
5.4.2.2	Base Material – changed SMYS values to ranges of pipe grades.
5.4.2.6	Filler metal grouping expanded to include suffix designators. Filler metal compatibility statement added.
5.4.2.10	Change in gas flow rate greater than 20% of nominal becomes an essential variable.
5.6.2.1	Reduced section tensile test detailed.
5.6.2.3	Added 95% statement for SMTS as criteria for passing tensile test.
5.6.3.3 & 5.6.4.3	If one test fails, results of 2 additional test can be substituted for pipe greater than 12¾ Weld specimens shall not contain longitude weld.
5.6.4.2	Allowed alternate bend fixture with smaller radius can be used.

API STANDARD 1104 21ST EDITION CHANGES

Section	Description of 21st Edition Specific Changes
6.6.1	Ultrasonic testing added as a welder qualification method.
10	Substantial change. The 21st edition has an update and expansion of Section 10 which deals with weld repair. Section 10 sets forth a process for the development of weld repair procedures and repair welder qualification.
12.2	Procedure Qualification 20th edition held that nick break tests for procedure qualification were not required. 21st edition requires nick break testing if procedure includes manual or semi-automatic pass.
12.4.2.6	For G suffix welding electrodes manufacturer and trade name required.
12.4.2.18	Method of Cooling After Welding added - requires statement regarding air cooling or forced cooling and max metal temperature for application.
12.5.2.2	Materials – changed to utilize pipe grade as opposed to SMYS.

API STANDARD 1104 21ST EDITION CHANGES

Section	Description of 21st Edition Specific Changes
12.5.2.6	Electrode G suffix manufacturer and trade essential variable. Filler metal compatibility statement added.
12.5.2.13	A decrease in minimum preheat constitutes an essential variable.
12.5.2.14	PWHT – addition or change in PWHT constitutes an essential variable.
12.5.2.17	Method of Cooling After Welding – Increase in max weld temperature prior to forced cooling and a change in method that results in a higher rate of cooling constitutes an essential variable.
12.6.1	Welding operator qualification – 20th edition held that nick break tests for procedure qualification were not required. 21st edition requires nick break testing if procedure includes manual or semi-automatic pass.
12.6.2	Operator qualification now states welder qualified in fixed is also qualified to perform roll welding within essential variables qualified.
Annex A	Guidance material expanded.

API STANDARD 1104 21ST EDITION CHANGES

Section	Description of 21st Edition Specific Changes
A.3.1	General statement added – An appropriate quality control program shall be established to ensure welding is performed within the parameters of the qualified welding procedure.
A.3.2	Essential variables modified regarding pipe, chemistry as relates to Pcm, CE, C and filler materials composition.
A.3.3	Added section on Qualification of Multiple Pipe Sources.
A.3.4	Added section on retesting in the event of one failed coupon – 2 for 1.
A.5	Clarification changes made to explanations and examples.
Annex B	Guidance material expanded.
B.2.4.3	Added discussion on Weld Deposition Repairs.
B.3.1	Location identification becomes a limiting factor for welder qualification.

THANKS!

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