

**NATURAL GAS
PART 192**

**GAS PIPELINE TRANSMISSION
OPERATION AND MAINTENANCE
MANUAL**

Subpart E

Welding of Steel in Pipelines

§ 192.221 **Scope**

- (a) This subpart prescribes minimum requirements for welding steel materials in pipelines.
- (b) This subpart does not apply to welding that occurs during the manufacture of steel pipe or steel pipeline components.

§ 192.225 **Welding - General**

- (a) Welding must be performed by a qualified welder in accordance with welding approved procedures qualified to produce welds meeting the requirements of this subpart. The quality of the test welds used to qualify the procedures shall be determined by destructive testing.

Approved: _____ Date: _____
Manager, Safety, Health, and Environmental

Approved: _____ Date: _____
Environmental Manager

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ESI RESPONSE TO § 192.225

Welder Qualifications: All welding operations on ESI gas transmission pipelines will be completed by welders who have been qualified in accordance with API 1104 “Welding or Pipelines and Related Facilities”, section 3 - Qualification of Welders or ASME Section IX, Welding Qualifications.

Test Weld Quality: Quality of test welds will be determined with reference to the requirements in API Standard 1104, section 2 - Qualification of Welding Procedures for Welds Containing Filler-Metal Additives or ASME Standard V, “Nondestructive Examinations”. Reference ESI’s “Gas Transmission Pipelines Plant Engineering Specification” section 6.0 Welding.

Welding Procedures: Welding Procedures for use in construction or maintenance welding on ESI gas pipelines will be completed in accordance with API 1104, section 2 or ASME section IX. Welding Procedures will be recorded on an equivalent form to Figure 1. Sample Procedure Specification Form as required in paragraph 2.2, API 1104. Similar WPS (Weld Procedure Specifications) and PQR (Procedure Qualification Records) forms are suggested in ASME Section IX. Reference ESI’s “Gas Transmission Pipelines Plant Engineering Specification” section 6.0 Welding.

§ 192.227 Qualification of Welders

- (a) Except as provided in paragraph (b) of this section, each welder must be qualified in accordance with section 3 of API Standard 1104 or section IX of the ASME Boiler and Pressure Vessel Code. However, a welder qualified under an earlier edition than listed in appendix A may weld but may not requalify under that earlier edition.

ESI RESPONSE TO § 192.227

All welding operations on ESI gas transmission pipelines will be completed by welders who have been qualified in accordance with API 1104 “Welding or Pipelines and Related Facilities”, section 3 - Qualification of Welders or ASME section IX, Welding Qualifications.

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Quality of test welds will be determined with reference to the requirements in API Standard 1104, section 2 - Qualification of Welding Procedures for Welds Containing Filler-Metal Additives or ASME Standard V, "Nondestructive Examinations". Quality of test welds will be determined with reference to the requirements in API 1104, section 2 - Qualification of Welding Procedures for Welds Containing Filler-Metal Additives. Reference ESI's "Gas Transmission Pipelines Plant Engineering Specification" section 6.0 Welding.

- (b) A welder may qualify to perform welding on pipe to be operated at a pressure that produces a hoop stress of less than 20% of SMYS by performing an acceptable test weld, for the process to be used, under the test set forth in section I of appendix C of this part. A welder who makes welded service line connections to mains must also perform an acceptable test weld under section II of appendix C to this part as part of the qualifying test. After initial qualification, a welder may not perform welding unless:

ESI RESPONSE TO § 192.227

ESI will utilize only DOT qualified welders to perform welding activities on DOT pipe lines.

§ 192.229 Limitations on Welders

- (a) No welder whose qualification is based on nondestructive testing may weld compressor station pipe and components.
- (b) No welder may weld with a particular welding process unless, within the preceding 6 calendar months, he has engaged in welding with that process.
- (c) A welder qualified under § 192.227(a)--
 - (1) May not weld on a pipe to be operated at a pressure that produces a hoop stress of 20 percent or more of SMYS unless within the preceding 6 calendar months has had one weld tested and found acceptable under section 3 or 6 of API Standard 1104, or ASME Section IX except that a

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welder qualified under an earlier edition previously listed in appendix A of this part may weld but may not requalify under that earlier edition; and

- (2) May not weld on pipe to be operated at a pressure that produces a hoop stress of less than 20 percent of SMYS unless the welder is tested in accordance with paragraph (c)(1) of this section or requalifies under paragraph (d)(1) or (d)(2) of this section.
- (d) A welder qualified under § 192.227(b) may not weld unless--
 - (1) Within the preceding 15 calendar months, but at least once each calendar year, the welder has requalified under § 192.227(b); or
 - (2) Within the preceding 7 1/2 calendar months, but at least twice each calendar year, the welder has had--
 - (i) A production weld cut out, tested, and found acceptable in accordance with the qualifying test; or
 - (ii) For welders who work only on service lines 2 inches or smaller in diameter, two sample welds tested and found acceptable in accordance with the test in section III of Appendix C of this part.

ESI RESPONSE TO § 192.229

Welders on compressor station pipe and components must be qualified by the mechanical testing methods in Section 2, API 1104 or section IX ASME BPV Code.

In accordance with paragraph 3.2.2 “SCOPE”, API 1104 and the requirements in ASME IX, welders must requalify in welding process if any essential variable is changed in the welding procedure specification.

To qualify to perform welding, the welder must have been tested within the last 6 months or had a production weld pass within 6 months not to exceed 7-1/2 months.

The test welds are completed in the “bG” position and are destructively tested by one or more of the following methods: guide bend, tensile, or toughness test.

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ESI's Contract Bid Packages will contain the API 1104 and/or ASME Section IX procedures and qualifications. Vista will only use contract welders who have been qualified to the requirements of API 1104 or ASME section IX.

§ 192.231 Protection from Weather

The welding operation must be protected from weather conditions that would impair the quality of the completed weld.

ESI RESPONSE TO § 192.231

Welding on ESI's DOT regulated pipelines will not be initiated nor continued if the following weather conditions occur during welding operations:

- (1) Steady wind speed of 20 mph without adequate shelter.
- (2) Steady wind speed of 20 mph or more with gusts greater than 40 mph.
- (3) Condensation including rain, fog, hail, without adequate shelter.
- (4) Relative humidity is 95% or higher.

§ 192.233 Miter Joints.

- (a) A miter joint on steel pipe to be operated at a pressure that produces a hoop stress of 30% or more of SMYS may not deflect the pipe more than 3E.
- (b) A miter joint on steel pipe to be operated at a pressure that produces a hoop stress of less than 30%, but more than 10% of SMYS may not deflect the pipe more than 12-1/2E and must be a distance equal to one pipe diameter or more away from any other miter joint, as measured from the crotch of each joint.
- (c) A miter joint on steel pipe to be operated at a pressure that produces a hoop stress of 10% or less of SMYS may not deflect the pipe more than 90E.

ESI RESPONSE TO § 192.233

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Miter joints will not be installed in ESI DOT Regulated Pipelines.

§ 192.235 Preparation for Welding

Before beginning any welding, the welding surfaces must be clean and free of any material that may be detrimental to the weld, and the pipe or component must be aligned to provide the most favorable condition for depositing the root bead. This alignment must be preserved while the root bead is being deposited.

ESI RESPONSE TO § 192.235

Reference ESI “Gas Transmission Pipelines Plant Engineering Specifications” section 6.0 Welding.

Internal or external lineup clamps are required to assure the high-low for any section of the girth weld does not exceed 3/32”.

§ 192.241 Inspection and Test of Welds

- (a) Visual inspection of welding must be conducted to insure that:
 - (1) The welding is performed in accordance with the welding procedure; and
 - (2) The weld is acceptable under paragraph (c) of this section.

ESI RESPONSE TO § 192.241

ESI will utilize API Standard 1104, section 6-Acceptance Standards for Nondestructive Testing and ASME BPV Code, section V as the governing specifications for inspection of Company Welding Operations. However, ESI does reserve the right to test to ASME B31.3 Standards. In each case, the particular circumstances of the project will determine which standard shall be used on DOT regulated Pipelines. For work to be performed inside ESI or Conoco Battery limits, the more stringent Standard of ASME B31.3 shall be used. Reference section 6.0 Welding in ESI’s “Gas Transmission Pipelines Plant Engineering Specification” DOT-006.

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- (b) The welds on a pipeline to be operated at a pressure that produces a hoop stress of 20% or more of SMYS must be nondestructively tested in accordance with § 192.243, except that welds that are visually inspected and approved by a qualified welding inspector need not be nondestructively tested if:
 - (1) The pipe has a nominal diameter of less than 6 inches; or
 - (2) The pipeline is to be operated at a pressure that produces a hoop stress of less than 40% of SMYS and the welds are so limited in number that nondestructive testing is impractical.
- (c) The acceptability of a weld that is nondestructively tested or visually inspected is determined according to the standards in section 6 of API Standard 1104. However, if a girth weld is unacceptable under those standards for a reason other than a crack, and if the Appendix to API Standard 1104 applies to the weld, the acceptability of the weld may be further determined under the Appendix.

§ 192.243 Nondestructive Testing

- (a) Non-destructive testing of welds must be performed by any process, other than trepanning, that will clearly indicate defects that may affect the integrity of the weld.

ESI RESPONSE TO § 192.243

Nondestructive testing of welds on ESI gas transmission pipelines will be performed by contractor or Company personnel who have been tested and certified to the requirements in SNT Recommended Practice No. TC-1A, “Nondestructive Examinations”.

Radiographic procedures shall meet the requirements in API 1104 or ASME B31.3 based on the standard to which the project is being constructed. Acceptability standards are given in both API 1104 and ASME B31.3. Each weld must meet the standards to which it is being constructed or must be removed and/or repaired when used on a DOT regulated pipeline. In each case, the particular circumstances of the project will determine which standard shall be used on DOT regulated Pipelines. For work to be performed inside ESI

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or Conoco Battery limits, the more stringent Standard of ASME B31.3 shall be used. Reference ESI "Gas Transmission Pipelines Engineering Plant Specification" section 6.6 Welding and Inspection Tests.

- (b) Nondestructive testing of welds must be performed:
 - (1) In accordance with written procedures; and
 - (2) By persons who have been trained and qualified in the established procedures and with the equipment employed in testing.
- (c) Procedures must be established for the proper interpretation of each nondestructive test of a weld to ensure the acceptability of the weld under § 192.241(c).

ESI RESPONSE TO § 192.243

Non-destructive examination procedure and acceptance criteria are in the ESI General Engineering Department NDT Standards. Contractor Procedures will be reviewed and approved by an SNT TC-1A Level III certified Inspector. Contract NDT III Procedures must be approved by the Contractor Company's Level III inspector.

- (d) When nondestructive testing is required under § 192.241(b), the following percentages of each day's field butt welds, selected at random by the operator, must be nondestructively tested over their entire circumference;
 - (1) In Class 1 locations, except offshore, at least 10%.
 - (2) In Class 2 locations, at least 15%.
 - (3) In Class 3 and Class 4 locations, at crossings of major or navigable rivers, offshore, and within railroad or public highway rights-of-way, including tunnels, bridges, and overhead road crossings, 100% unless impracticable, in which case at least 90%. Nondestructive testing must be impracticable for each girth weld not tested.

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ESI RESPONSE TO § 192.243

ESI DOT Regulated Pipelines are located in Class 3 areas. Reference ESI's Welding and NDT procedures in the Inspection Department. Alternate methods of nondestructive examination (ultrasonic, magnetic particle, liquid penetrant, 100% visual inspections) will be considered in cases where radiography or other methods are not practical.

- (4) At pipeline tie-ins, including tie-ins of replacement sections, 100%.

ESI RESPONSE TO § 192.243

Radiography at 100% of the welds can be conducted in lieu of hydrotest at pipeline tie-ins.

Acceptability standards remain the same and the procedure must be approved by the Technology Manager or the Project Engineering Manager.

- (e) Except for a welder whose work is isolated from the principal welding activity, a sample of each welder's work for each day must be nondestructively tested, when nondestructive testing is required under § 192.241(b).

ESI RESPONSE TO § 192.243

To facilitate successful completion of this requirement, all welds must be clearly marked with a welder identification number. Records for each welder should be maintained in the Inspection Department for the life of the pipeline. Copies of records should be sent to the Environmental Department to be filed in the DOT Regulated Pipeline Files.

- (f) When nondestructive testing is required under § 192.241(b), each operator must retain, for the life of the pipeline, a record showing by milepost, engineering station, or by geographic feature, the number of girth welds made, the number nondestructively tested, the number rejected, and the disposition of the rejects.

§ 192.245 Repair or Removal of Defects

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Types of defects which can be effectively repaired with replacement include inadequate penetration (IP), inadequate penetration due to high-low (IPD), incomplete fusion (IF), incomplete fusion due to cold lap (IFD), internal concavity (IC), burn-through (BT), alma inclusions, porosity, and cracks. All types of cracks are unacceptable to ESI regardless of their size.

Acceptance limits for approved nondestructive testing can be found in section 6, API 1104 or ASME B31.3. In the case of DOT pipelines, the appropriate standard shall be used. For work to be performed inside ESI or Conoco Battery limits, the more stringent Standard of ASME B31.3 shall be used.

Nondestructive testing

All replacement pipe will be pressure-tested to the requirements for a new line installed in the same location. If the pressure test is made prior to installation, then all field girth butt welds that were not strength tested must be tested after installation by nondestructive tests meeting the requirements under DOT

§ 192.243. Upon requirements of nondestructive testing, each operator must retain for the life of the pipeline, a record showing by milepost, engineering station, or by geographic feature, the number of girth welds made, the number nondestructively tested, the number rejected, and the disposition of the rejects.

- (a) Each weld that is unacceptable under § 192.241(c) must be removed or repaired. Except for welds on an offshore pipeline being installed from a pipeline vessel, a weld must be removed if it has a crack that is more than 8% of the weld length.

ESI RESPONSE TO § 192.245

Types of defects which can be effectively repaired with replacement include inadequate penetration (IP), inadequate penetration due to high-low (IPD), incomplete fusion (IF), incomplete fusion due to cold lap (IFD), internal concavity (IC), burn-through (BT), alma inclusions, porosity, and cracks. However, cracks are unacceptable when the crack is not a shallow crater crack or a star crack; or, if one of these types, the length of the crack exceeds 5/32 inch. Acceptance limits for nondestructive testing are in section 6, API 1104.

- (b) Each weld that is repaired must have the defect removed down to sound metal and the segment to be repaired must be preheated if conditions exist which would

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adversely affect the quality of the weld repair. After repair, the segment of the weld that was repaired must be inspected to ensure its acceptability.

ESI RESPONSE TO § 192.245

Types of defects which can be effectively repaired with replacement include inadequate penetration (IP), inadequate penetration due to high-low (IPD), incomplete fusion (IF), incomplete fusion due to cold lap (IFD), internal concavity (IC), burn-through (BT), alumina inclusions, porosity, and cracks. However, cracks are unacceptable when the crack is not a shallow crater crack or a star crack; or, if one of these types, the length of the crack exceeds 5/32 inch. Acceptance limits for approved nondestructive testing can be found in section 6, API 1104 or ASME B31.3.

- (c) Repair of a crack, or of any defect in a previously repaired area must be in accordance with written weld repair procedures that have been qualified under § 192.225. Repair procedures must provide that the minimum mechanical properties specified for the welding procedure used to make the original weld are met upon completion of the final weld repair.

ESI RESPONSE TO § 192.245

Company Welding Procedures prohibit more than one (1) attempt to repair a crack and more than two (2) attempts to repair unacceptable indications of other types.

The following is a summary of welding related documents required to be submitted for ESI's approval prior to the start of fabrication of any DOT Pipeline project at the ESI Lake Charles Chemical Complex. It should be noted that discussed items are addressed in detail in the Company Engineering Specifications and Plant Engineering Specifications. The following documents should be included in the Basic Bid Package issued to each Contractor.

WELDING PROCEDURE SPECIFICATIONS**WELDER QUALIFICATIONS**