

RECEIVED APR 17 2007



April 12, 2007

Via Certified Mail: 7005-1160-0001-7020-8888

Mr. Ivan Huntoon  
Director, Central Region  
Pipeline and Hazardous Materials Safety Administration  
901 Locust Street, Suite 462  
Kansas City, MO 64106

**RE: CPF No. 3-2007-5008M**

Dear Mr. Huntoon:

This letter is in response to your *Notice of Amendment* letter dated March 7, 2007 and received by our office on March 13, 2007, regarding the pipeline safety inspections of Kinder Morgan Energy Partner L.P.'s (KMEP) North System. These inspections were conducted in Calendar year 2005.

PHMSA indicates in the referenced letter they identified the apparent inadequacies found within Kinder Morgan Energy Partners, L.P.'s Plans or procedure as described below. Kinder Morgan Products Pipeline, which includes the KMEP North System, recently completed a project to consolidate and standardize O&M procedures project across our operating regions. The procedures were reviewed by a team of PHMSA and state inspectors the week of November 29, 2006. Buddy Sheets of the Southwest Region was the lead inspector.

The Mid-Continent procedures, which are the subject of this NOA, will no longer be used after the implementation of the consolidated Liquids Operation and Maintenance Plan (L-O&M). We are addressing each alleged deficiency below; however, as a general measure, we respectfully request an extension of 60 days from the date you provide a response to Kinder Morgan's request for clarification to the Proposed Compliance Order for the Notice of Probable Violation CPF# 3-2007-5007. Although the L-O&M has procedures addressing inspection of atmospheric, low pressure and high pressure tanks, there is a chance that the procedures will need revising as a result of your clarification.

For your convenience, we have included the original proposed inadequacies identified in bold text and then followed by our response identified by italic text.

(a)

**§195.432 Breakout tanks.** (b) Each operator shall inspect the physical integrity of in-service atmospheric and low-pressure steel aboveground breakout tanks according to section 4 of API Standard 653. However, if

structural conditions prevent access to the tank bottom, the bottom integrity may be assessed according to a plan included in the operations and maintenance manual under §195.402(c) (3).

Kinder Morgan's Procedures do not provide for the requirement to inspect low-pressure steel aboveground breakout tanks according to section 4 of API 653 in its Operations and Maintenance Manual. These procedures do not provide a description of how each element required by API 653 is to be accomplished or provide for full documentation of the inspections.

*As allowed by item IV. of the Response Options for Pipeline Operators in Compliance Proceedings Kinder Morgan requests a 60 day extension after PHMSA responds to Kinder Morgan's request for clarification to the Proposed Compliance Order for the Notice of Probable Violation CPF# 3-2007-5007 regarding low pressure tanks. Kinder Morgan submitted a separate response asking for clarification to specific items associated with the API tank standard.*

(b)

**§195.432 Breakout tanks. (c) Each operator shall inspect the physical integrity of in-service steel aboveground breakout tanks built to API Standard 2510 according to section 6 of API 510.**

Kinder Morgan's Procedures do not provide for the requirement to inspect high-pressure steel ASME pressure vessels which are steel aboveground breakout tanks according to section 6 of API 510 in its Operations and Maintenance Manual. These procedures do not provide a description of how each element required by API 510 is to be accomplished or provide for full documentation of the inspections.

*As allowed by item IV. of the Response Options for Pipeline Operators in Compliance Proceedings Kinder Morgan requests a 60 day extension after PHMSA responds to Kinder Morgan's request for clarification to the Proposed Compliance Order for Notice of Probable Violation CPF# 3-2007-5007 regarding our proposed inspection process for high pressure tanks. Kinder Morgan submitted a separate response asking for clarification to specific items associated with the API tank standard.*

(c)

**§195.214 Welding procedures (a) Welding must be performed by a qualified welder in accordance with welding procedures qualified under Section 5 of API 1104 or Section IX of the ASME Boiler and Pressure Vessel Code. The quality of the test welds used to qualify the welding procedure shall be determined by destructive testing.**

Kinder Morgan has not qualified Welding Procedures ES-8405 for use on Grade A through X-65 materials in accordance with Section 5 of API 1104. Welding Procedure ES-8405 states is applicable for all materials from Grade A through X70. Kinder Morgan lacks welding procedure qualification tests of Welding Procedure ES-8405 for specified minimum yield strength less than or equal to 42,000 psi, for specified minimum yield

strength greater than 42,000 psi but less (See API 1104 Section 5.4.2.2). Kinder Morgan's Coupon Test Reports (11-5P-70+, 5/17/85) and 13-5P-70+, 8/24/93) only qualify Welding Procedure ES-8405 for use on X70 materials; additional qualifications tests are required for materials other than the X70 listed in this procedure.

As part of our Liquid Operation and Maintenance Manual consolidation process, Kinder Morgan Products Pipeline is implementing a single list of all applicable welding procedures across the Liquid Product Pipeline Group. To meet PHMSA requirements requested above, Kinder Morgan submits the following SMAW procedures (see Attachments).

1. 407.012, API Group  $\leq$  X-42
2. 407.022, API Group  $>$  X-42 &  $<$  X-65
3. 407.041, API Group X-65
4. 407.060, API Group X-70

(d)

**§195.234 Welds: Nondestructive testing. (b) Any nondestructive testing of welds must be performed-**

- (1) In accordance with a written set of procedures for nondestructive testing; and

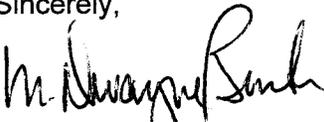
**Kinder Morgan's NDT procedures did not include written procedures for ultrasonic or magnetic particle testing of welds.**

*Kinder Morgan will submit a modified procedure that will include ultrasonic or magnetic particle testing of welds. However as allowed by item IV of the Response Options for Pipeline Operators in Compliance Proceedings Kinder Morgan requests an extension until May 18, 2007 to submit the revised procedures.*

Kinder Morgan is committed to operating our pipelines safely, in respect of the environment and in compliance with all governmental regulations.

If you have any questions or need further assistance contact me at 713 369-9356 or Jaime Hernandez at 713-369-9443.

Sincerely,



M. Dwayne Burton  
Vice President  
Pipeline Operations  
Kinder Morgan, Inc.

Attachments

**PROCESS/CODE: SMAW - Shielded metal arc (manual)/API 1104**

**PIPE AND FITTING MATERIAL:**

- Specified minimum yield strength (SMYS) – Less than or equal to 42,000 psi
- Low carbon or low alloy carbon steel pipe, fittings or flanges
- ASTM A381, grades Y35 through Y42, API 5L grades B through X42 or specifications with similar physical or chemical properties.

**PIPE DIAMETER GROUP: Greater than 12-3/4 inches**

**WALL THICKNESS GROUP: 0.188 inch to 0.750 inch**

**JOINT DESIGN: Butt** - see figure on next page

**FILLER METAL AND NUMBER OF PASSES:** Filler metal (cellulosic electrode) selection shall be based on the pipe or fitting material with the highest SMYS. See Tables 1 and 2 (A - C).

**ELECTRICAL CHARACTERISTICS:** See Table 3 (A - C).

**POSITION:** Fixed

**DIRECTION OF WELDING:** Downhill

**TIME LAPSE BETWEEN PASSES:** The time lapse between root and second passes should be as soon as practical but shall not be more than 10 minutes and as soon as practical between the second and next pass.

**TYPE OF LINE-UP CLAMP AND REMOVAL:** An external clamp or internal clamp as determined by Company. The external clamp shall be held in place until a maximum practical amount of the root pass is completed (a minimum of 50 percent) in equally spaced increments around the pipe and the pipe has been properly rested. The internal clamp shall be held in place until a minimum of 90 percent of the root pass is completed and the pipe has been properly rested. No pipe movement shall be permitted on tie-ins before the entire weld is completed.

**CLEANING:** Rust, dirt, moisture and foreign matter shall be removed from the bevel surface before welding. Slag or flux remaining on any bead shall be removed from each pass with a power grinder or wire brush before the next pass is applied. The finished weld shall be cleaned and any spatter removed from the adjacent pipe surface.

**PREHEAT/POST HEAT:** A minimum 200° F preheat or inter-pass temperature may be required when the ambient temperature is below 50° F or when completing previously unfinished welds. A minimum 200° F preheat and inter-pass temperature shall be required for valves or fittings having a nominal wall thickness greater than or equal to 0.450 inch. Heating may be required to remove moisture from the bevel region before welding.

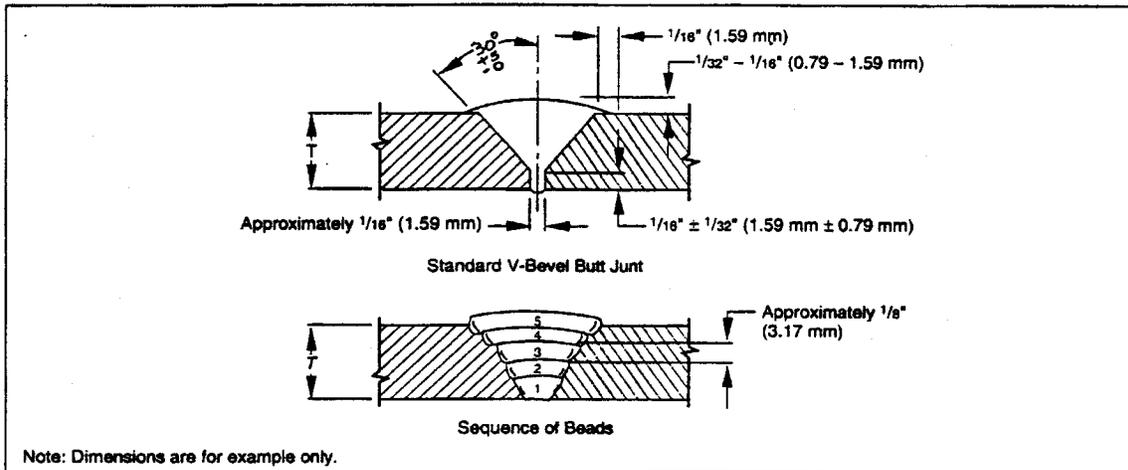
Pipe can be heated with a propane torch and a wide area heating head or similar Company representative-approved method. The weld area will be adequately heated for at least 3 inches on either side of the joint. The temperature shall be verified with a hand held pyrometer, tempstick or similar indicator approved by Company representative.

**SHIELDING GAS AND FLOW RATE:** Not applicable.

**SPEED OF TRAVEL:** See Table 3 (A - C).

**OTHER:** None

**JOINT DESIGN**



**A. Filler Metal – E-6010 & E-7010 Welding Rod Combination**

NOM. PIPE DIAMETER	NOM. WALL THICKNESS	ROOT PASS	HOT PASS	FILLER PASSES	COVER PASS
Greater than 12"	0.188" through 0.750"	5/32" E-6010 AWS A5.1	5/32" E-7010 AWS A5.1	3/16" E-7010 AWS A5.5	3/16" E-7010 AWS A5.5

NOM. WALL THICKNESS RANGE (inches)	MIN. NO. OF PASSES
0.188 through 0.250	3
0.251 through 0.375	4
0.376 through 0.500	5
0.501 through 0.625	7
0.626 through 0.750	9

ELECTRODE DIAMETER >	5/32"		3/16"		
	AMPS-VOLTS	AMPS-VOLTS	ELEC. POLARITY	CURRENT	I.P.M.
Root	50/200-20/37	---	Positive	DC	3-14
Hot	50/215-20/40	---	Positive	DC	3-19
Filler	---	60/220-20/40	Positive	DC	3-15
Cover	---	50-215-20/38	Positive	DC	3-14

**B. Filler Metal – E-7010 Welding Rod Combination (all passes)**

NOM. PIPE DIAMETER	NOM. WALL THICKNESS	ROOT PASS	HOT PASS	FILLER PASSES	COVER PASS
Greater than 12"	0.188" through 0.750"	5/32" E-7010 AWS A5.5	5/32" E-7010 AWS A5.5	3/16" E-7010 AWS A5.5	3/16" E-7010 AWS A5.5

TABLE 2-B: MINIMUM NO. OF PASSES	
NOM. WALL THICKNESS RANGE (inches)	MIN. NO. OF PASSES
0.188 through 0.250	3
0.251 through 0.375	4
0.376 through 0.500	5
0.501 through 0.625	7
0.626 through 0.750	9

TABLE 3-B: ELECTRODE ELECTRICAL CHARACTERISTICS AND TRAVEL SPEED (INCHES PER MIN. / I.P.M.)					
ELECTRODE DIAMETER >	5/32"	3/16"			
PASS	AMPS-VOLTS	AMPS-VOLTS	ELEC. POLARITY	CURRENT	I.P.M.
Root	50/200-20/37	---	Positive	DC	3-14
Hot	50/215-20/40	---	Positive	DC	3-19
Filler	---	60/220-20/40	Positive	DC	3-15
Cover	---	50/215-20/38	Positive	DC	3-14

**C. Filler Metal – E-6010 & E-8010 Welding Rod Combination**

TABLE 1-C: ELECTRODE SELECTION					
NOM. PIPE DIAMETER	NOM. WALL THICKNESS	ROOT PASS	HOT PASS	FILLER PASSES	COVER PASS
Greater than 12"	0.188" through 0.750"	1/8" E-6010 AWS A5.5	5/32" E-8010 AWS A5.5	3/16" E-8010 AWS A5.5	3/16" E-8010 AWS A5.5

TABLE 2-C: MINIMUM NO. OF PASSES	
NOM. WALL THICKNESS RANGE (inches)	MIN. NO. OF PASSES
0.188 through 0.250	3
0.251 through 0.375	4
0.376 through 0.500	5
0.501 through 0.625	7
0.626 through 0.750	9

TABLE 3-C: ELECTRODE ELECTRICAL CHARACTERISTICS AND TRAVEL SPEED (INCHES PER MIN. / I.P.M.)						
ELECTRODE DIAMETER >	1/8"	5/32"	3/16"			
PASS	AMPS-VOLTS	AMPS-VOLTS	AMPS-VOLTS	ELEC. POLARITY	CURRENT	I.P.M.
Root	50/200-20/37	---	---	Positive	DC	3-14
Hot	---	50/215-20/40	---	Positive	DC	3-19
Filler	---	---	60/220-20/40	Positive	DC	3-15
Cover	---	---	50/215-20/38	Positive	DC	3-14

**PROCESS/CODE: SMAW - Shielded metal arc (manual)/API 1104****PIPE AND FITTING MATERIAL:**

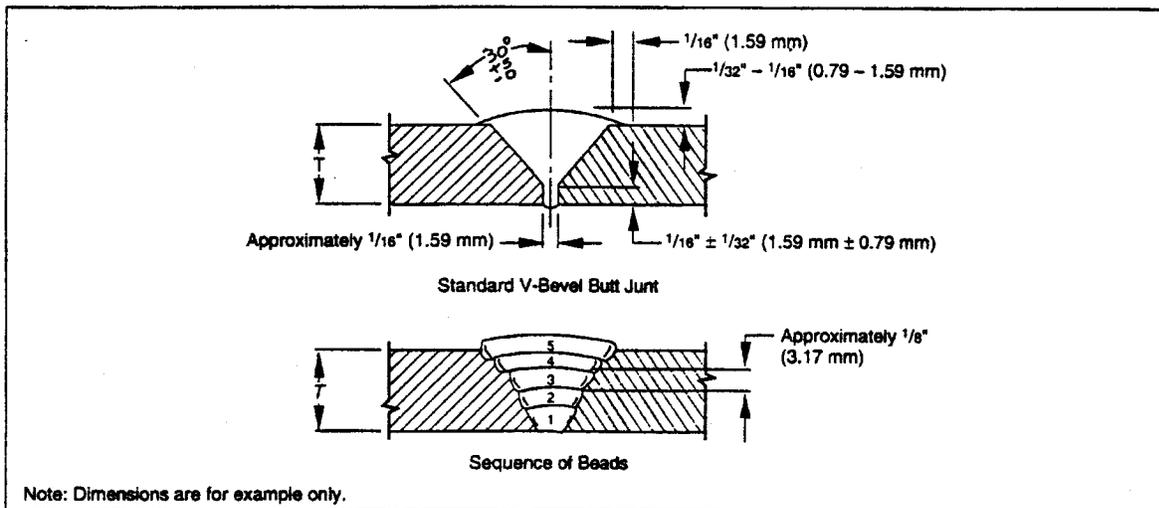
- Specified minimum yield strength (SMYS) – **Greater than 42,000 psi and less than 65,000 psi**
- Low carbon or low alloy carbon steel pipe, fittings or flanges
- ASTM A381, grades Y52 through Y60, API 5L grades X46 through X60 or specifications with similar physical or chemical properties.

**PIPE DIAMETER GROUP: Greater than 12-3/4 inches****WALL THICKNESS GROUP: 0.188 inch to 0.750 inch****JOINT DESIGN: Butt** - see figure on next page**FILLER METAL AND NUMBER OF PASSES:** Filler metal (**cellulosic electrode**) selection shall be based on the pipe or fitting material with the highest SMYS. See Tables 1 and 2 (A-D).**ELECTRICAL CHARACTERISTICS:** See Table 3 (A-D).**POSITION:** Fixed**DIRECTION OF WELDING:** Downhill**TIME LAPSE BETWEEN PASSES:** The time lapse between root and second passes should be as soon as practical but shall not be more than 10 minutes and as soon as practical between the second and next pass.**TYPE OF LINE-UP CLAMP AND REMOVAL:** An external clamp or internal clamp as determined by Company. The external clamp shall be held in place until a maximum practical amount of the root pass is completed (a minimum of 50 percent) in equally spaced increments around the pipe and the pipe has been properly rested. The internal clamp shall be held in place until a minimum of 90 percent of the root pass is completed and the pipe has been properly rested. No pipe movement shall be permitted on tie-ins before the entire weld is completed.**CLEANING:** Rust, dirt, moisture and foreign matter shall be removed from the bevel surface before welding. Slag or flux remaining on any bead shall be removed from each pass with a power grinder or wire brush before the next pass is applied. The finished weld shall be cleaned and any spatter removed from the adjacent pipe surface.**PREHEAT/POST HEAT:** A minimum 200° F preheat or inter-pass temperature may be required when the ambient temperature is below 50° F or when completing previously unfinished welds. A minimum 200° F preheat and inter-pass temperature shall be required for valves or fittings having a nominal wall thickness greater than or equal to 0.450 inch. Heating may be required to remove moisture from the bevel region before welding.

Pipe can be heated with a propane torch and a wide area heating head or similar Company representative-approved method. The weld area will be adequately heated for at least 3 inches on either side of the joint. The temperature shall be verified with a hand held pyrometer, tempstick or similar indicator approved by Company representative.

**SHIELDING GAS AND FLOW RATE:** Not applicable.**SPEED OF TRAVEL:** See Table 3 (A-D).**OTHER:** None

**JOINT DESIGN**



**A. Filler Metal – E-6010 & E-7010 Welding Rod Combination**

**TABLE 1-A: ELECTRODE SELECTION**

NOM. PIPE DIAMETER	NOM. WALL THICKNESS	ROOT PASS	HOT PASS	FILLER PASSES	COVER PASS
Greater than 12"	0.188" through 0.750"	5/32" E-6010 AWS A5.1	5/32" E-7010 AWS A5.5	3/16" E-7010 AWS A5.5	3/16" E-7010 AWS A5.5

**TABLE 2-A: MINIMUM NO. OF PASSES**

NOM. WALL THICKNESS RANGE (inches)	MIN. NO. OF PASSES
0.188 through 0.250	3
0.251 through 0.375	4
0.376 through 0.500	5
0.501 through 0.625	7
0.626 through 0.750	9

**TABLE 3-A: ELECTRODE ELECTRICAL CHARACTERISTICS AND TRAVEL SPEED (INCHES PER MIN. / I.P.M.)**

ELECTRODE DIAMETER >	5/32"		3/16"		
	AMPS-VOLTS	AMPS-VOLTS	ELEC. POLARITY	CURRENT	I.P.M.
Root	50/200-20/37	---	Positive	DC	3-14
Hot	50/215-20/40	---	Positive	DC	3-19
Filler	---	60/220-20/40	Positive	DC	3-15
Cover	---	50/215-20/38	Positive	DC	3-14

**B. Filler Metal – E-7010 Welding Rod (all passes)**

TABLE 1-B: ELECTRODE SELECTION					
NOM. PIPE DIAMETER	NOM. WALL THICKNESS	ROOT PASS	HOT PASS	FILLER PASSES	COVER PASS
Greater than 12"	0.188" through 0.750"	5/32" E-7010 AWS A5.5	5/32" E-7010 AWS A5.5	3/16" E-7010 AWS A5.5	3/16" E-7010 AWS A5.5

TABLE 2-B: MINIMUM NO. OF PASSES	
NOM. WALL THICKNESS RANGE (inches)	MIN. NO. OF PASSES
0.188 through 0.250	3
0.251 through 0.375	4
0.376 through 0.500	5
0.501 through 0.625	7
0.626 through 0.750	9

TABLE 3-B: ELECTRODE ELECTRICAL CHARACTERISTICS AND TRAVEL SPEED (INCHES PER MIN. / I.P.M.)					
ELECTRODE DIAMETER>	5/32"	3/16"			
PASS	AMPS-VOLTS	AMPS-VOLTS	ELECTRODE POLARITY	CURRENT	I.P.M.
Root	50/200-20/37	---	Positive	DC	3-14
Hot	50/215-20/40	---	Positive	DC	3-19
Filler	---	60/220-20/40	Positive	DC	3-15
Cover	---	50/215-20/38	Positive	DC	3-14

**C. Filler Metal – E-6010 & E-8010 Welding Rod Combination**

TABLE 1-C: ELECTRODE SELECTION					
NOM. PIPE DIAMETER	NOM. WALL THICKNESS	ROOT PASS	HOT PASS	FILLER PASSES	COVER PASS
Greater than 12"	0.188" through 0.750"	1/8-5/32" E-6010 AWS A5.1	5/32" E-8010 AWS A5.5	3/16" E-8010 AWS A5.5	3/16" E-8010 AWS A5.5

TABLE 2-C: MINIMUM NO. OF PASSES	
NOM. WALL THICKNESS RANGE (inches)	MIN. NO. OF PASSES
0.188 through 0.250	3
0.251 through 0.375	4
0.376 through 0.500	5
0.501 through 0.625	7
0.626 through 0.750	9

TABLE 3-C: ELECTRODE ELECTRICAL CHARACTERISTICS AND TRAVEL SPEED (INCHES PER MIN. / I.P.M.)						
ELECTRODE DIAMETER >	1/8"	5/32"	3/16"			
PASS	AMPS-VOLTS	AMPS-VOLTS	AMPS-VOLTS	ELECTRODE POLARITY	CURRENT	I.P.M.
Root	50/200-20/37	50/200-20/37	---	Positive	DC	3-14
Hot	---	50/215-20/40	---	Positive	DC	3-19
Filler	---	---	60/220-20/40	Positive	DC	3-15
Cover	---	---	50/215-20/38	Positive	DC	3-14

**D. Filler Metal – E-8010 Welding Rod (all passes)**

TABLE 1-D: ELECTRODE SELECTION					
NOM. PIPE DIAMETER	NOM. WALL THICKNESS	ROOT PASS	HOT PASS	FILLER PASSES	COVER PASS
Greater than 12"	0.188" through 0.750"	5/32" E-8010 AWS A5.5	5/32" E-8010 AWS A5.5	3/16" E-8010 AWS A5.5	3/16" E-8010 AWS A5.5

TABLE 2-D: MINIMUM NO. OF PASSES	
NOM. WALL THICKNESS RANGE (inches)	MIN. NO. OF PASSES
0.188 through 0.250	3
0.251 through 0.375	4
0.376 through 0.500	5
0.501 through 0.625	7
0.626 through 0.750	9

TABLE 3-D: ELECTRODE ELECTRICAL CHARACTERISTICS AND TRAVEL SPEED (INCHES PER MIN. / I.P.M.)					
ELECTRODE DIAMETER >	5/32"	3/16"			
PASS	AMPS-VOLTS	AMPS-VOLTS	ELEC. POLARITY	CURRENT	I.P.M.
Root	50/200-20/37	---	Positive	DC	3-14
Hot	50/215-20/40	---	Positive	DC	3-19
Filler	---	60/220-20/40	Positive	DC	3-15
Cover	---	50/215-20/38	Positive	DC	3-14

**PROCESS/CODE:**  SMAW - Shielded metal arc (manual)/API 1104

**PIPE AND FITTING MATERIAL:**

- Specified minimum yield strength (SMYS) **65,000 psi**
- Low carbon or low alloy carbon steel pipe, fittings or flanges
- ASTM A381, grade Y65, API 5L grade X65 or specifications with similar physical or chemical properties.
- Backing material: AISI SAE 1008 hot rolled mild steel. Steel banding strap shall not be used.

**PIPE DIAMETER GROUP (NOMINAL):**  Greater than 12-3/4 inches

**WALL THICKNESS GROUP (NOMINAL):**  0.188 inch through 0.750 inch

**JOINT DESIGN:**  Butt with backing strip - see figure on next page

**FILLER METAL AND NUMBER OF PASSES:** Filler metal (cellulosic electrode) selection shall be based on the pipe or fitting material with the highest SMYS. See Tables 1 and 2.

**ELECTRICAL CHARACTERISTICS:** See Table 3.

**POSITION:** Fixed

**DIRECTION OF WELDING:** Downhill

**TIME LAPSE BETWEEN PASSES:** The time lapse between root and second passes should be as soon as practical but shall not be more than 5 minutes and as soon as practical between the second and next pass.

**TYPE OF LINE-UP CLAMP AND REMOVAL:** External line-up clamp.

Sleeve Longitudinal Welds: External chain load binder or other supporting device as required shall be held in place until a minimum of 90 percent of the root pass of both longitudinal welds is completed. Use fillet welding procedure for sleeve ends.

Girth Welds: The external clamp shall be held in place until a maximum practical amount of the root pass is completed (a minimum of 50 percent of the root pass) in equally spaced increments around the pipe. No pipe movement shall be permitted before the weld is completed.

**CLEANING:** Rust, dirt, moisture and foreign matter shall be removed from the bevel surface before welding. Slag or flux remaining on any bead shall be removed from each pass with a power grinder or wire brush before the next pass is applied. The finished weld shall be cleaned and any spatter removed from the adjacent pipe surface.

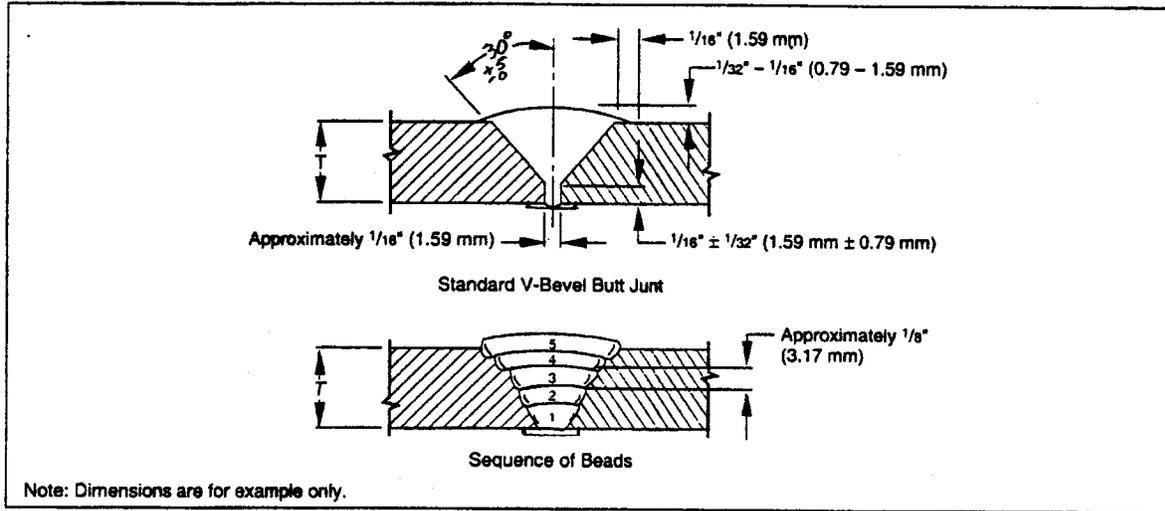
**PREHEAT/POST HEAT:** A minimum 200° F preheat or interpass temperature may be required when the ambient temperature is below 50° F or when completing previously unfinished welds. A minimum 200° F preheat and inter-pass temperature shall be required for valves or fittings having a nominal wall thickness greater than or equal to 0.450 inch. Heating may be required to remove moisture from the bevel region before welding.

Pipe can be heated with a propane torch and a wide area heating head or similar Company representative-approved method. The weld area will be adequately heated for at least 3 inches on either side of the joint. The temperature shall be verified with a hand held pyrometer, tempstick or similar indicator approved by Company representative.

**SHIELDING GAS AND FLOW RATE:** Not applicable.

**SPEED OF TRAVEL:** See Table 3.

**JOINT DESIGN**



NOM. PIPE DIAMETER	NOM. WALL THICKNESS	ROOT PASS	HOT PASS	FILLER & COVER PASSES
Greater than 12"	0.188" through 0.750"	5/32" E-7010 AWS A5.5	5/32" E-7010 AWS A5.5	3/16" E-7010 AWS A5.5

NOM. WALL THICKNESS RANGE (inches)	MIN. NO. OF PASSES
0.188 through 0.250	3
0.251 through 0.375	4
0.376 through 0.500	5
0.501 through 0.625	7
0.626 through 0.750	9

ELECTRODE DIAMETER >	5/32"		3/16"		
	AMPS-VOLTS	AMPS-VOLTS	ELEC. POLARITY	CURRENT	I.P.M.
Root	50/200-20/37	---	Positive	DC	3-14
Hot	50/215-20/40	---	Positive	DC	3-19
Filler	---	60/220-20/40	Positive	DC	3-15
Cover	---	50/215-20/38	Positive	DC	3-14

**PROCESS/CODE: SMAW - Shielded metal arc (manual)/API 1104****PIPE AND FITTING MATERIAL:**

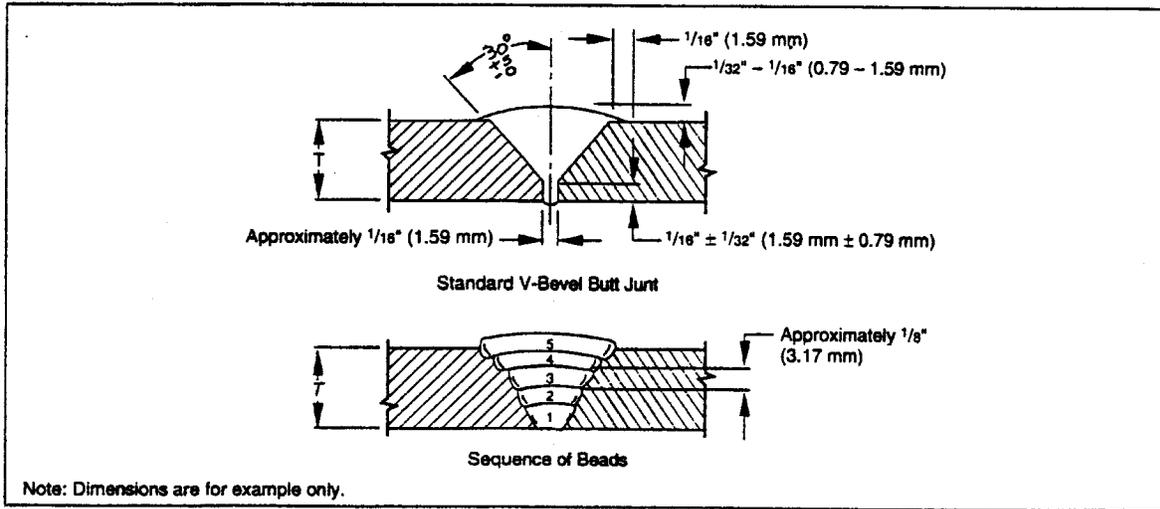
- Specified minimum yield strength (SMYS) - **70,000 psi**
- Low carbon or low alloy carbon steel pipe, fittings or flanges
- API 5L Grade X70 or specifications with similar mechanical properties or chemical compositions.

**PIPE DIAMETER GROUP: Greater than 12-3/4 inches****WALL THICKNESS GROUP: 0.188 inch and thicker****JOINT DESIGN: Butt** - see figure on next page**FILLER METAL AND NUMBER OF PASSES:** Filler metal (**cellulosic electrodes**) selection shall be based on the pipe or fitting material with the highest SMYS. See Tables 1 and 2 (A-C).**ELECTRICAL CHARACTERISTICS:** See Table 3 (A-C).**POSITION:** Fixed**DIRECTION OF WELDING:** Downhill**TIME LAPSE BETWEEN PASSES:** The time lapse between root and second passes should be as soon as practical but shall not be more than 9 minutes and as soon as practical between the second and next pass.**TYPE OF LINE-UP CLAMP AND REMOVAL:** An external clamp or internal clamp shall be used as determined by Company. The external clamp shall be held in place until a maximum practical amount of the root pass is completed (minimum of 50 percent) in equally spaced increments around the pipe and the pipe has been properly rested. The internal clamp shall be held in place until a minimum of 90 percent of the root pass is completed and the pipe has been properly rested. No pipe movement shall be permitted on tie-ins before the entire weld is completed.**CLEANING:** Rust, dirt, moisture and foreign matter shall be removed from the bevel surface before welding. Slag or flux remaining on any bead shall be removed from each pass with a power grinder or wire brush before the next pass is applied. The finished weld shall be cleaned and any spatter removed from the adjacent pipe surface.**PREHEAT/POST HEAT:** A minimum 200° F preheat or inter-pass temperature may be required when the ambient temperature is below 50° F or when completing previously unfinished welds. A minimum 200° F preheat and inter-pass temperature shall be required for pipe valves or fittings having a nominal wall thickness greater than or equal to 0.450 inch. Heating may be required to remove moisture from the bevel region before welding.

Pipe heating can be done with a propane torch and a wide area heating head or similar Company representative-approved method. The weld area will be adequately heated for at least 3 inches on either side of the weld area. The temperature shall be verified with a hand held pyrometer, tempstick or similar indicator approved by Company representative.

**SHIELDING GAS AND FLOW RATE:** Not applicable.**SPEED OF TRAVEL:** See Table 3 (A-C).**OTHER:** None

**JOINT DESIGN**



**A. FILLER METAL – E-7010 Welding Rod (all passes)**

NOM. PIPE DIAMETER	NOM. WALL THICKNESS	ROOT PASS	HOT PASS	FILLER PASS	COVER PASS
Greater than 12"	0.188" through 0.750"	1/8 - 5/32" E-7010 AWS A5.5	1/8-5/32" E-7010 AWS A5.5	5/32-3/16" E-7010 AWS A5.5	5/32-3/16" E-7010 AWS A5.5

NOM. WALL THICKNESS RANGE (inches)	MIN. NO. OF PASSES
0.188 through 0.250	3
0.251 through 0.375	4
0.376 through 0.500	5
0.501 through 0.625	7
0.626 through 0.750	9

ELECTRODE DIAMETER >	ELECTRODE DIAMETER >			ELECTRODE DIAMETER >		
	1/8"	5/32"	3/16"	ELEC. POLARITY	CURRENT	I.P.M.
PASS	AMPS-VOLTS	AMPS-VOLTS	AMPS-VOLTS			
Root	50/200-20/37	50/200-20/37	---	Positive	DC	3-14
Hot	50/215-20/40	50/215-20/40	---	Positive	DC	3-19
Filler	---	60/220-20/40	60/220-20/40	Positive	DC	3-15
Cover	---	50/215-20/38	50/215-20/38	Positive	DC	3-14

**B. FILLER METAL – E-6010 & E-8010 Welding Rod Combination**

NOM. PIPE DIAMETER	NOM. WALL THICKNESS	ROOT PASS	HOT PASS	FILLER PASS	COVER PASS
Greater than 12"	0.188" and thicker	1/8 - 5/32" E-6010 AWS A5.1	5/32-3/16" E-8010 AWS A5.5	3/16" E-8010 AWS A5.5	3/16" E-8010 AWS A5.5

NOM. WALL THICKNESS RANGE (inches)	MIN. NO. OF PASSES
0.188 through 0.250	3
0.251 through 0.375	4
0.376 through 0.500	5
0.501 through 0.625	7
0.626 through 0.750	9
Greater than 0.750	9

ELECTRODE DIAMETER >	1/8"			5/32"			3/16"		
	PASS	AMPS-VOLTS	AMPS-VOLTS	AMPS-VOLTS	AMPS-VOLTS	AMPS-VOLTS	ELEC. POLARITY	CURRENT	I.P.M.
Root		50/200-20/37	50/200-20/37	---	---	---	Positive	DC	3-14
Hot		---	50/215-20/40	50/215-20/40	---	---	Positive	DC	3-19
Filler		---	---	60/220-20/40	---	---	Positive	DC	3-15
Cover		---	---	50/215-20/38	---	---	Positive	DC	3-14

**C. FILLER METAL - E-8010 Welding Rod (all passes)**

NOM. PIPE DIAMETER	NOM. WALL THICKNESS	ROOT PASS	HOT PASS	FILLER PASS	COVER PASS
Greater than 12"	0.188" through 0.750"	1/8 - 5/32" E-8010 AWS A5.5	5/32" E-8010 AWS A5.5	3/16" E-8010 AWS A5.5	3/16" E-8010 AWS A5.5

NOM. WALL THICKNESS RANGE (inches)	MIN. NO. OF PASSES
0.188 through 0.250	3
0.251 through 0.375	4
0.376 through 0.500	5
0.501 through 0.625	7
0.626 through 0.750	9

ELECTRODE DIAMETER >	1/8"			5/32"			3/16"		
	PASS	AMPS-VOLTS	AMPS-VOLTS	AMPS-VOLTS	AMPS-VOLTS	AMPS-VOLTS	ELEC. POLARITY	CURRENT	I.P.M.
Root		50/200-20/37	50/200-20/37	---	---	---	Positive	DC	3-14
Hot		---	50/215-20/40	---	---	---	Positive	DC	3-19
Filler		---	---	60/220-20/40	---	---	Positive	DC	3-15
Cover		---	---	50/215-20/38	---	---	Positive	DC	3-14