

BENDING PROCEDURE 12

**P. O. Box 5811
Kingwood, Texas 77325**



**Office: 832 418 9180
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1.0 PURPOSE

To establish and maintain documented procedures to ensure that the testing is carried out as per the applicable specifications / standards for the Bend manufactured by Bendco.

2.0 SCOPE

This work instruction is intended to determine tensile test of Base Metal and Weld Metal of Hot Pulled Induction Bend manufactured by Bendco.

3.0 RESPONSIBILITY

Engineer / Sr. Engineer / Assistant Manager (LAB) & HOD (QA/QC) shall be responsible for testing and maintain the record of testing result.

4.0 SPECIFICATION

- ASTM A 370 Latest Edition: "Standard Test Methods and Definitions for Mechanical Testing Of Steel Products".
- API 5L 45th Edition Dec 2012: "Specification for Line Pipe".
- ISO 15590-1:2009: 'Petroleum and natural gas industries —Induction bends, fittings and flanges for Pipeline transportation systems.'
- ASTM E4:2010: Standard Practices for Force Verification of Testing Machines
- Quality Assurance Plan –QAP, Process Chart
- Customer Specification / Other specification.

4.0 DESCRIPTION OF MACHINE

<ADD DESCRIPTION OR PHOTOGRAPH>

5.0 TEST SPECIMEN TOLERANCE

The test specimen prepared from the Bend shall be as per specification API 5L 45th Edition Dec 2012/ ASTM A370:2012 / Drawings.

6.0 SAMPLE ORIENTATION

MANUFACTURING PROCEDURE SPECIFICATION AND INSPECTION TEST PLAN FOR INDUCTION BENDING TENSILE TEST		PAGE 1	PASADENA, TEXAS November 17, 2020
	CONTROL COPY DATA		DATE
Prepared By:	GORDON AAKER		DECEMBER 07, 2016
Reviewed By:			
Approved By:			
Issued By:			
Issued To:			

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6.1 Transverse Base Metal Tensile shall be taken from locations at Intrados & Extrados of Bend.

6.2 Longitudinal Base metal tensile shall be taken along the mother pipe axis at Intrados & Extrados of Bend if so required by the specification.

6.3 Transverse Weld Metal Tensile shall be taken at 90° to the weld seam. All weld tensile test specimen shall be taken along the weld seam, if so required by the specification.

7.0 PREPARATION OF TEST SAMPLE

7.1 The Base Metal Transverse specimen may be either strip specimen or round bar specimen. All specimens shall represent the full wall thickness of the Bend pipe from which the specimen are cut, except for round bar tensile specimen.

7.2 For Weld Tensile, specimen shall be taken in transverse direction with the weld at the center and shall represent the full wall thickness of the Bend pipe from which the specimen was cut. Weld reinforcement may be removed (optional).

7.3 Specimens shall be flattened without heating.

7.4 For strip specimens, the specified width of the reduced section shall be as per relevant drawing.

7.5 Testing of strip specimens shall be with flat face testing grips.

7.6 Transverse round bar specimens are to be taken from non-flattening bend of mother pipe sections. The 0.500 in (12.7mm) diameter round bar specimens shall be used when bend mother pipe size allows, 0.350 in (8.9 mm) diameter round bar specimen shall be used when bend mother pipe size allows & 0.250 in (6.4 mm) diameter round bar specimen shall be used for other sizes as per API 5L 45th Edition Table 21.

8.0 METHOD

8.1 Check power is properly supplied. Apply some graphite grease to the tapered surface of the grip for the smooth motion.

Control Panel with Computerized



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Specimen for Tensile

8.2 Select the proper grip in upper and lower jaw.

8.3 The preparation of test piece shall be as per applicable specification.



8.4 Measure the thickness & width of test specimen & calculate cross sectional area of test specimen.

8.5 Mark the gauge length as 50.0 mm for API 5L 45th Edition Dec 2012 or as required by other applicable specification.

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Test Piece in the Grip

8.6 Fit the test piece in the grip of upper and lower jaw.

8.7 Left valve is kept in fully closed position and the right valve in nominal open position.

8.8 Open the right valve & close it after the lower table is slightly lifted.

8.9 Now adjust the load to 'ZERO' by TARE push button.

8.10 Start the machine & increase the load gradually. Determination of yield point shall be done by any one of the method as described in clause 13 of ASTM A370 or API 5L 45th Edition Dec 2012 / Customer specification

8.11 Close the right control valve, take out the broken pieces of the test piece and measure the final gauge length. Find out the result with the help of following formulas:

CROSS SECTIONAL AREA = THICKNESS OF SPECIMEN x WIDTH OF SPECIMEN

YIELD STRENGTH = YIELD LOAD / CROSS SECTIONAL AREA

TENSILE STRENGTH = ULTIMATE LOAD / CROSS SECTIONAL AREA

PERCENT ELONGATION = ((FINAL GAUGE LENGTH – INITIAL GAUGE LENGTH) / INITIAL GAUGE LENGTH) x 100

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9.0 CALIBRATION OF TESTING EQUIPMENT

The UTM shall be calibrated once a year as specified by API 5L 45th Edition Dec 2012, ASTM E4 - 2010 and IS: 1828:2008 Part 1 / ISO 7500-1:2004 by approved external agency.

10.0 ACCEPTANCE CRITERIA

As per approved Process Chart & QAP

11.0 RE-TEST CRITERIA

API 5L 45th Edition Dec 2012/ Customer specification / QAP

12.0 INVALIDATION OF TESTS

Specimen showing material defects or defective preparation, whether observed before or after breaking, may be discarded and replacements shall be considered as original specimens.

13.0 RECORDS

Test results shall be recorded on Bendco Form:

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