

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 bends manufactured by Bendco.

2.0 SCOPE

This work instruction is intended to determine the % shear area and the absorbed energy.

3.0 RESPONSIBILITY

Officer/Engineer/Sr. Engineer /Asst. Manager (LAB) & HOD (QA/QC) shall be responsible for testing & maintaining of records.

4.0 APPLICABLE CODES

- ASTM A 370 Latest Edition: "Standard Test Methods and Definitions for Mechanical Testing of Steel Products".
- ASTM E23 – 2007: Standard Test Methods for Notched Bar Impact Testing of Metallic Materials
- ISO 148-1-2009: Metallic materials - Charpy pendulum impact test Part Test Method
- 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.'
- Quality Assurance Plan – QAP/Process Chart
- Customer Specification / Other specification.

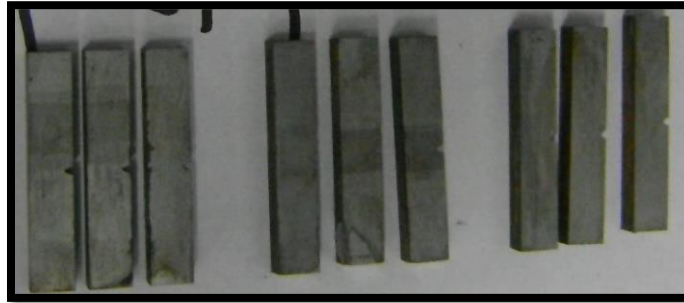
5.0 SAMPLE ORIENTATION

Samples are selected at random as per API 5L 45th Edition Dec 2012 / ISO 15590-1: 2009 / Customer specification / Other specifications. Samples are cut from base metal in transverse direction, weld metal with weld in center & from HAZ with HAZ in center or as directed by customer specification.

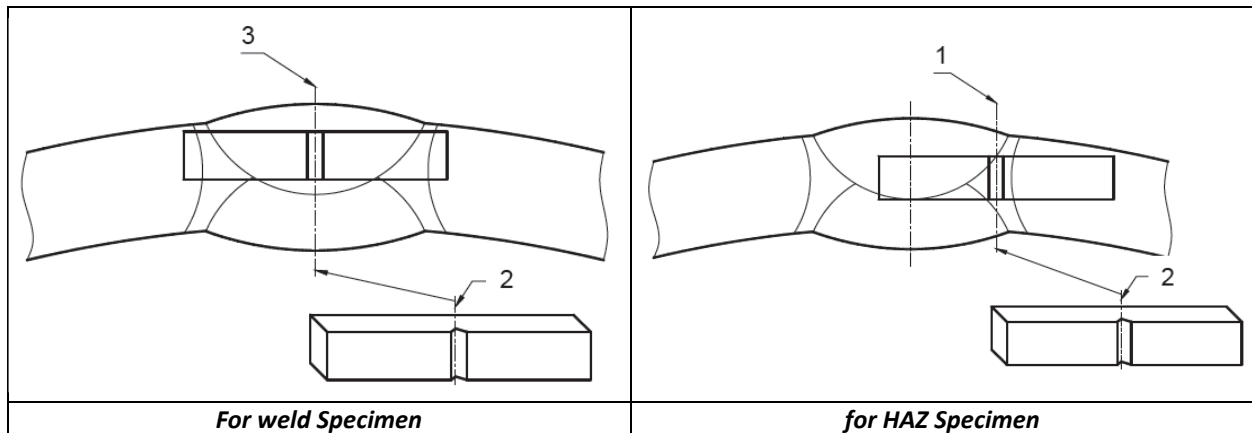
6.0 PREPARATION OF TEST SAMPLE

6.1 The samples shall be taken & prepared as per API 5L 45th Edition Dec 2012 / ASTM 370 Latest Edition

MANUFACTURING PROCEDURE SPECIFICATION AND INSPECTION TEST PLAN FOR INDUCTION BENDING CHARPY IMPACT 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:			



6.2 One set of three specimens from base metal taken each from Intrados & Extrados of Bend, weld, HAZ & other locations as required shall be taken from the Bend pipe as detailed in QAP/Process Chart. Location of Notch of test specimen for the Weld & HAZ as per below Figure.



6.3 The specimen shall be full sized or largest obtainable sub-size in case bend pipe diameter and thickness doesn't permit full size specimen.

6.4 The specimen shall be oriented with the major axis transverse to the pipe axis with the axis of notch oriented through the pipe wall thickness or as directed by the customer specification.

6.5 The specimens are finally prepared by milling & grinding and checked for dimensional tolerances and shall be as per ASTM A370 Latest Edition / ASTM E 23 -2007 / Approved Drawing

Preparation of Test Specimens

7.0 METHOD

MANUFACTURING PROCEDURE SPECIFICATION AND INSPECTION TEST PLAN FOR INDUCTION BENDING CHARPY IMPACT TEST		PAGE 2	PASADENA, TEXAS November 17, 2020
	CONTROL COPY DATA		DATE
Prepared By:	GORDON AAKER		DECEMBER 07, 2016
Reviewed By:			
Approved By:			
Issued By:			
Issued To:			

7.1 All specimens shall be kept in cooling medium usually chilled fluids (such as water, ice plus water, dry ice plus organic solvents or liquid nitrogen) & shall be cooled to the specified Temp.

7.2 Samples shall be soak for at least 5 min in liquid media after attaining the required test temperature. Temperature shall be measured by calibrated thermometer. Temperature control shall be within $\pm 1^{\circ}\text{C}$. Prior to each test, maintain the self-centering tong and test anvil at the same temperature as that of the specimen

7.3 Give a free swing to the pendulum for checking its zero (calibration check).

Free Swing of Pendulum

7.4 Carefully center the test specimen in the anvil by self-centering tong and release the pendulum to break the specimen.

7.5 Note the absorbed energy (in Joules) of each specimen.

7.6 If the pendulum is not released within 5 sec after removing the specimen from the conditioning medium, specimen shall not be broken. The specimen shall be again returned back to the conditioning medium.



7.7 Shear Area shall be determined by any of the following method.

Determined of shear area

MANUFACTURING PROCEDURE SPECIFICATION AND INSPECTION TEST PLAN FOR INDUCTION BENDING CHARPY IMPACT TEST		PAGE 3	PASADENA, TEXAS November 17, 2020
	CONTROL COPY DATA		DATE
Prepared By:	GORDON AAKER		DECEMBER 07, 2016
Reviewed By:			
Approved By:			
Issued By:			
Issued To:			

7.8 Measure the length and width of brittle portion of fracture specimen and determine the percent shear from Table 5 of ASTM A 370 Latest Edition.

7.9 Compare the appearance of the fracture of the specimen with a fracture appearance chart Fig 14 of ASTM A370 Latest Edition.

8.0 CALIBRATION OF TESTING EQUIPMENT

The Charpy Impact tester shall be calibrated once a year as specified by API 5L 45th Edition Dec 2012 as per ASTM E 23:2007 by approved external agency.

9.0 ACCEPTANCE CRITERIA



As per Process Chart / QAP

10.0 RE-TEST CRITERIA

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

11.0 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.

12.0 RECORDS

MANUFACTURING PROCEDURE SPECIFICATION
AND INSPECTION TEST PLAN FOR INDUCTION BENDING
CHARPY IMPACT TEST

PAGE 4

PASADENA, TEXAS
November 17, 2020

	CONTROL COPY DATA		DATE
Prepared By:	GORDON AAKER		DECEMBER 07, 2016
Reviewed By:			
Approved By:			
Issued By:			
Issued To:			

Test results shall be recorded on Bendco Form:

MANUFACTURING PROCEDURE SPECIFICATION AND INSPECTION TEST PLAN FOR INDUCTION BENDING CHARPY IMPACT TEST		PAGE 5	PASADENA, TEXAS November 17, 2020
	CONTROL COPY DATA		DATE
Prepared By:	GORDON AAKER		DECEMBER 07, 2016
Reviewed By:			
Approved By:			
Issued By:			
Issued To:			