

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 pipes manufactured by

2.0 SCOPE

This work instruction outlines Liquid Penetrant Examination by the solvent removable method using color contrast penetrant for the purpose of detecting surface discontinuities, which are open to the surface on repaired area of weldments and suspected area of base material of bend.

3.0 RESPONSIBILITY

Asst. Manager / Sr .Engineer / Engineer / Officer (Lab.) & HOD (QA/QC) Shall be responsible for testing and maintaining of records of testing results.

4.0 APPLICABLE CODE & STANDARDS

- API 5L 45th Edition 2012 "Specification for Line Pipe"
- ISO 15590-1:2009 Petroleum and natural gas industries — Induction bends, fittings and flanges for pipeline transportation systems — Part 1: Induction bends
- MSS-SP-75-2008 "Specification for high test, wrought, butt welding fitting
- ASME B 16.49:2007 Factory-Made, Wrought Steel, Butt welding Induction Bends for Transportation and Distribution Systems
- ISO 9712 "Qualification and certification of personnel"

5.0 PERSONNEL QUALIFICATION

5.1 NDT personnel shall be qualified as per WCL written practice & Vision examination shall be as per applicable SNT-TC-1A.

- 1) NDT L-III shall be responsible for overall supervision.
- 2) NDT L-II personnel shall perform tests and reports the results.

5.2 PENETRANT MATERIALS

MANUFACTURER	PRE-CLEAN	PENETRANT	EXCESS PENETRANT REMOVED	DEVELOPER
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MANUFACTURING PROCEDURE SPECIFICATION
AND INSPECTION TEST PLAN FOR INDUCTION BENDING
DYE PENETRANT

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PASADENA, TEXAS
November 17, 2020

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P-MET VADODARA	ACETONE COMMERCIAL GRADE	PP-15 PP-110 PP-110B	PC-21 PC120	PD-31/ 31 A PD-130 / PD-130A / PD- 5031B
MAGNAFLUX	ACETONE COMMERCIAL GRADE	SPOTCHECK SKL-SP	SKC-1	SPOTCHECK SK - 52

It shall be ensured that all the above penetrant materials do not contain excess presence of Chlorine, Fluorine and Sulphur as required by the code / specification. Manufactures test certificates shall be treated sufficient documentary proof in this regard. Intermixing of penetrant materials from different manufactures is prohibited.

6.0 SURFACE PREPARATION

6.1 Surface to be examined and adjacent areas within 1 inch (25 mm) shall be free from dirt, grease, lint, scale, welding flux, weld spatters, paint, oil or any other extraneous matter that would obscure surface openings or interfere with the test.

7.0 PRE - TEST CLEANING

7.1 The test area shall be thoroughly cleaned with the commercial grade acetone and then wiped with lint free material. The surface shall be allowed to dry by normal evaporation for a minimum 2 minutes. Adequate care shall be taken to ensure proper surface condition prior to testing.

7.2 TEMPERATURE: During testing the material temperature shall be between 40°F and 125°F (4°C and 52°C). Local heating or cooling is permitted provided the part temperature remains in the range mentioned above during the examination.

7.3 APPLICATION OF PENETRANT - The liquid penetrant shall be applied by spraying or brushing over the area and a dwell time of a minimum 7 minutes is required, for all materials. Higher dwell time up to 15 minutes may be employed for detecting tight defect, provided the penetrant remain wet during entire penetration dwell time. The time shall be checked by calibration timer.

7.4 EXCESS PENETRANT REMOVAL - The area with the applied penetrant shall be wiped with the clean lint free material. Cleaning is to be continued till all traces of color contrast penetrant is removed. Final cleaning is to be done with the lint free material dampened with the cleaner until the excess penetrant is removed, as determined

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by examination under a hand lamp with minimum 60 W bulb at maximum 12 inch distance. Surface shall be allowed to dry by normal evaporation for 2 to 3 minutes & the same time period shall be ensured with timer.

Care shall be taken to avoid the use of excess cleaner and the deposition of any contaminating material, which may lead to the misinterpretation of test results. Flushing the area with solvent for the purpose of penetrant removal is prohibited. Surface dryness shall be ensured before the application of developer.

7.5 APPLICATION OF DEVELOPER - The developer shall be applied as soon as possible after excess penetrant removal; the time interval shall not exceed 30 minutes prior to application, and developer must be thoroughly agitated to ensure adequate dispersion of suspended particles. Developer shall be applied by spraying to give a thin uniform coat. Length of time, the developer is to remain on specimen prior to inspection, shall not be less than 5 minutes or more than 60 minutes. Developing time for final examination begins as soon as developer coat is dry. The above time period shall be ensured with timer.

8.0 EVALUATION OF INDICATION

8.1 ILLUMINATION REQUIREMENT - On the surface of the part being examined, a minimum light intensity of 50 fc (500 lux) is required to ensure adequate sensitivity during examination and evaluation of indication. A hand lamp with minimum 60 W bulbs at maximum 12-inch distance is considered adequate to provide above level of illumination.

8.2 DEFINITIONS OF INDICATION - An indication is the evidence of mechanical imperfection. Only indications with major dimensions greater than 1/16 inch (1.6 mm) shall be consider relevant.

- A linear indication is one having a length greater than three times the width.
- A rounded indication is one of circular or elliptical shape with the length equal to or less than three times the width.
- Any questionable or doubtful indications shall be reexamined to determine whether they are relevant.

9.0 INTERPRETATION AND ACCEPTANCE OF INDICATIONS

9.1 The interpretation and acceptance of indications shall be as follows; All surfaces to be examined shall be free of:

- Relevant linear indications;
- Relevant rounded indications greater than 3/16 in. (4.8 mm);

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- Four or more relevant rounded indications in a line separated by 1/16 in. (1.6 mm) or less (edge to edge);
- An indication of an imperfection may be larger than the imperfection that causes it; however, the size of the indication is the basis for acceptance evaluation.

10.0 TREATMENT OF INDICATIONS BELIEVED NONRELEVANT

10.1 Any indication, which is believed to be no relevant, shall be regarded as imperfection unless it is shown by reexamination by the same method or using other nondestructive methods and/or by surface conditioning that no unacceptable imperfection is present.

11.0 EXAMINATION OF AREAS FROM WHICH DEFECTS HAVE BEEN REMOVED

11.1 After a defect is thought to have been removed and prior to making weld repairs, the area shall be examined by suitable methods to ensure it has been removed or reduced to an acceptably sized imperfection.

12.0 REEXAMINATION OF REPAIR AREAS

12.1 After repairs, have been made, the repaired area shall be blended into the surrounding surface to avoid sharp notches, crevices, or corners and reexamined by the liquid penetrant method and by all other methods of examination that were originally required for the affected area.

13.0 POST CLEANING

13.1 On completion of testing and interpretation, the part shall be cleaned in accordance with the applicable specification.

14.0 SAFETY

- inspection personnel involved in liquid penetrant examination should take precautions because of the toxic and inflammable nature of the chemicals used.
- Use of correct PPE's. (e.g. Nose masks, safety goggles, hand gloves etc.)

15.0 DISPOSITION OF BEND CONTAINING DEFECTS

Pipes containing defects shall be given one or more of the following dispositions:

- The defects shall be removed by grinding in accordance with the repair procedure.

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- The defective areas shall be repaired by welding in accordance with the repair procedure.
- The sections of pipe containing defects shall be cut off within the applicable limits for length.
- If the pipe is rejected, the same pipe is documented in NCR format no. - WCL/QA/F/04 Rev. 01.

16.0 RECORDS

Test results shall be recorded on ... Form:

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