

STDP *Standard Procedure*

PROJECT	NON-DESTRUCTIVE EXAMINATION PROCEDURE	DOC. NO. : JA-PAS-810
	LIQUID PENETRANT EXAMINATION	REV. NO. : 0 PAGE : 1 OF 11

LIQUID PENETRANT EXAMINATION

JAICO

PREPARED BY : _____ DATE : _____

REVIEWED BY : _____ DATE : _____

APPROVED BY : _____ DATE : _____

CUSTOMER

REVIEWED BY : _____ DATE : _____

APPROVED BY : _____ DATE : _____

REMARK :

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1.0 SCOPE AND PURPOSE

1.1 This procedure describes the requirements and techniques for Liquid Penetrant Examination (PT) of ferrous and nonferrous materials and welds of these materials in ASME Code job.

1.2 This procedure covers the method for color contrast solvent removable penetrant examination to detect flaws that are open to the surface.

2.0 APPLICABLE CODES AND STANDARDS

The following Codes and Standards are referred to herein.

- (a) ASME Code Sec.V ('95 Ed. & Latest Applicable Addenda)
- (b) ASME Code Sec.VIII, Div.1 ('95 Ed. & Latest Applicable Addenda)
- (c) SNT-TC-1A (Current Code Adopted Editions)

3.0 PERSONNEL QUALIFICATION

3.1 All Personnel performing the PT shall be certified in accordance with the "JA-WR-1(Standard of NDE Personnel Qualification and Certification)" which complies with the requirements of SNT-TC-1A.

3.2 The results of Liquid Penetrant Examination must be evaluated only by personnel certified to JAICO PT Level II or Level III.

4.0 PENETRANT MATERIALS

4.1 Materials

4.1.1 Liquid penetrant inspection materials consist of visible penetrants, solvent removers and developers.

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4.1.2 A family of liquid penetrant inspection materials consist of the applicable penetrant, solvent removers, and developer, as recommended by the manufacturer.

4.1.3 Intermixing of penetrant materials from different families is not permitted.

4.2 Control of Contaminants

The certificate of contaminant content for all penetrant materials used on nickel base alloys, austenitic stainless steels, and titanium shall be obtained. These certifications shall include the penetrant manufacturer's batch numbers and the test results obtained in accordance with T-641 of Art.6, ASME Sec. V.

Table I. Acceptable Liquid Penetrant Examination Materials

Brand	Type		
	Penetrant	Remover	Developer
KYUNG DO	P2	R1-3	D4

4.3 Handling of Materials

4.3.1 Penetrant systems and/or families shall not be mixed.

4.3.2 Safety precautions shall be in accordance with instructions furnished with each manufactured penetrant materials.

4.3.3 Highly volatile solvents shall be used cautiously since the vapor may be toxic and the liquids may irritate the skin.

5.0 EXAMINATION PROCEDURE

5.1 Surface Preparation

5.1.1 In general, satisfactory results may be obtained when the surface of the part is in the as-welded, as-rolled, as-cast, or as-forged condition. However, surface preparation by grinding, machining, or other methods may be necessary where surface irregularities could mask indications of unacceptable discontinuities.

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5.1.2 Prior to each liquid penetrant examination, the surface to be examined and all adjacent areas within at least 1 in. (25mm) shall be dry and free of all dirt, grease, lint, scale, welding flux, weld spatter, paint, oil and other extraneous matter that could obscure surface openings or otherwise interfere with the examination.

5.2 Preexamination Cleaning

5.2.1 The surface to be examined and adjacent areas within 1 in. (25mm) shall be thoroughly washed with precleaner in such a manner that foreign material and contaminants are removed.

5.2.2 The examination surface shall then be wiped dry with a lint free clothes or absorbent papers, allowing a minimum of 5 minutes for complete evaporation.

5.2.3 Typical cleaning agents which may be used are detergents, organic solvents, descaling solutions, and paint removers. Degreasing and ultrasonic cleaning methods may also be used.

5.3 Penetrant Application

5.3.1 The penetrant may be applied by any suitable means, such as spraying. If the penetrant is applied by spraying using compressed-air-type apparatus, filters shall be placed on the up-stream side near the air inlet to preclude contamination of the penetrant by oil, water, dirt, or sediment that may have collected in the lines.

5.3.2 The length of the penetration time shall be as minimum 5 min., maximum 60 min. or as recommended by the penetrant manufacturer.

5.3.3 As a standard technique, the temperature of the penetrant and the surface of the part to be processed shall not be below 60°F nor above 125°F throughout the examination period. Local heating or cooling is permitted provided the part temperature remains in the range of 60°F to 125°F during the examination.

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5.4 Excess Penetrant Removal

Excess solvent removable penetrants shall be removed by wiping with a cloth or absorbent paper, repeating the operation until most traces of penetrant have been removed. The remaining traces shall be removed by lightly wiping the surface with cloth or absorbent paper moistened with solvent. To minimize removal of penetrant from discontinuities, care shall be taken to avoid the use of excess solvent. Flushing the surface with solvent, following the application of the penetrant and prior to developing, is prohibited.

5.5 Drying

In case of solvent-removable penetrants where excess penetrant is removed with solvent wipe-off technique, the surfaces may be dried by natural evaporation, blotting, wiping or forced air.

5.6 Application of Developer

5.6.1 The nonaqueous developer shall be applied as soon as possible after penetrant removal; the time interval shall not exceed 30 minutes and be applied by a pressurized spray gun using clean compressed air. After sufficient agitation of the pressurized container to ensure the particles in suspended powder shall be sprayed on the surface.

5.6.2 Dipping or flooding parts with nonaqueous developers is prohibited, since it will flush the penetrant from within the discontinuities through its solvent action.

5.7 Interpretation

5.7.1 The true size and type of discontinuities are difficult to evaluate if the penetrant diffuses excessively into the developer. Consequently, the surface shall be closely observed during the application of the developer to monitor the behavior of indications which tend to bleed-out profusely.

5.7.2 Final interpretation shall be made after allowing the penetrant to bleed out for 7 to 30 min.

If bleed-out does not alter the examination results, longer periods are permitted.

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5.7.3 If the surface to be examined is large enough to preclude complete examination within the prescribed time, the surface shall be examined in increments.

5.7.4 With a color contrast penetrant, the developer forms a reasonably uniform white coating. Surface discontinuities are indicated by bleed-out of the penetrant which is normally a deep red color that stains the developer. Indications with a light pink color may indicate excessive cleaning.

5.7.5 Inadequate cleaning may leave an excessive background making interpretation difficult. In this case, reexamination shall be performed after adequate cleaning.

5.7.6 Adequate illumination is required to ensure adequate sensitivity during the examination and evaluation of indications.

5.8 Evaluation of Indications

An indication is the evidence of a mechanical imperfection. Only indications with major dimensions greater than 1/16 in. shall be considered relevant.

5.8.1 A linear indication is one having a length greater than three times the width.

5.8.2 A rounded indication is one of circular or elliptical shape with the length equal to or less than three times the width.

5.8.3 Any questionable or doubtful indications shall be reexamined to determine whether or not they are relevant.

5.9 Post Cleaning

5.9.1 Post cleaning is necessary in those cases where residual penetrant or developer could interfere with subsequent processing or with service requirements. It is particularly important where residual penetrant materials might combine with other factors in service to produce corrosion.

5.9.2 In the case of developers, it is recommended that if post removal is necessary, that it be carried out as promptly as possible after examination so that it does not fix on the part.

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6.0 ACCEPTANCE STANDARDS

6.1 All surfaces to be examined shall be free of :

- (a) relevant linear indications
- (b) relevant rounded indications greater than 3/16 in.
- (c) four or more relevant rounded indications in a line separated by 1/16 in. or less (edge to edge)
- (d) 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.

7.0 REEXAMINATION

7.1 Treatment of Indications Believed Nonrelevant

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

7.2 Examination of Areas From Which Defects Have Been Removed

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.

7.3 Reexamination of Repair Areas

After repairs have been made, the repaired area shall be blended into the surrounding surface so as 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, except that then the depth of repair is less than the radiograph sensitivity required, reradiography may be omitted.

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8.0 RECORDS

- 8.1 Liquid penetrant examination records shall be filed for the period required by contract unless otherwise agree to by the interested parties.
- 8.2 Examination condition and interpretation & evaluation shall be recorded on the Report of Liquid Penetrant Examination (Exhibit 1-1, 1-2) attached to this procedure.

9.0 ATTACHMENT

REPORT OF LIQUID PENETRANT EXAMINATION

EXHIBIT 1-1 : REPORT OF LIQUID PENETRANT EXAMINATION (A)

EXHIBIT 1-2 : REPORT OF LIQUID PENETRANT EXAMINATION (B)

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EXHIBIT 1-1 : REPORT OF LIQUID PENETRANT EXAMINATION (A)

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EXHIBIT 1-2 : REPORT OF LIQUID PENETRANT EXAMINATION (B)