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LIQUID PENETRANT EXAMINATION PROCEDURE

(Visible Dye, Solvent-Removable Method) in
Accordance with ASME Code Sections III and V

HOKE INCORPORATED
CRESSKILL, NEW JERSEY

DATE October 6, 1971

PREPARED - James F. Sullivan
PROJECT ENGINEER

APPROVED - John R. Smith

APPROVED - Maurice A. Webb
DIRECTOR OF ENGINEERING

CHANGE LETTER	DATE	APP'D	PAGES AFFECTED	REMARKS
A	1-20-72	gpa	1, 5, 6, 2	Revised Section 8.1
B	2-21-72	JFG		
C	5-28-72	FRS	2, 5, 6	Revised para 3.1, 3.2 Added "SNT-TC-1A" to para. 2.3 Added para. 8.1.6
D	11/1/72		para 5.4 & 7.1	
E	11/21/72		5, 6	Clarified par 8.1, 8.1.3, 8.1.6

9104090143 910202
PDR 0A999 EMVHOKE
99901205 PDR

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Procedure was demonstrated to satisfaction
of ANI.

ROB 11/24/77 PDB
2/13/87

Change Letter	Date	App'd	Pages Affected	Remarks
F	7-9-73	<i>ls</i>	2	Clarified Para. 3.2
G	9-13-73	<i>ls</i>	3, 5	60* was 50* added para. 8 9 was 8; 10 was 9
H	4-24-74	<i>ls</i>	1A,2,6,7, E-154	Revised per HEDL V0016
I	6-11-74	<i>see 10/8/75</i>	2,3,4	Editorial Change Par. 1.0,2.3,4.1, 5.2,5.4 Par. 3.0 Revised to allow special customer requests. Par. 7.1 revised to permit water wash Appendix A Added
J	10/8/75	<i>see 10/8/75</i>	ALL	Revised to comply to 1974 Code - Added Supplement No. 1 for special customer accept- ance standards.
K	1/20/76	<i>see 4/30/76</i>	ALL	Wording changes, Supplement No. 1 included in App. and amended for customer request. Added Para 4.1.2 Page 3.

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Change Letter	Date	App'd	Pages Affected	Remarks
L	9/28/76	<i>ZJG 9/29</i>	2	Added Para. 3.3
			1	Changes in Appendix A Para. A1 & A2
			2	Changes in Appendix A Para. A3.2
			3	Changes in Appendix A Addition to A3.4
M	3/11/77	<i>ZJG 3/11/77</i>	2A 2	Delete Ardrox Matl. Added NOTE to Sec.3.1 (SRA 312)
N	10/10/77	<i>VCO Lovitt 10/10/77</i>	3 & 4	Add 1" adjacent areas, profuse bleeding areas and adequate illumination (Sec. V) (SRA 393)
P	6/25/80	<i>VCO Lovitt 6/25/80</i>		Change halogen to chloride per Summer '79 Addenda.
			2A	Delete Turco materials & add Ardrox materials.
			2 App A	Delete aerosol containers (SRA 793)
Q	7/21/83	<i>JL</i>	2, 2A, 5, & Suppl.1	See SRA-1061. <i>BRB 8/25/83</i>
R	2/13/87	<i>RB</i>	2A	Change Developer Part No. 9D8 to 9D1B See SRA-1527 <i>RD 8/13/87</i>
S	7/27/87	<i>RB</i>	3.2, Appendix A Page 2	See SRA 1580
T	1/5/88	<i>ES</i>	2A, 7, TR Appendix A Page 2 & 4	Form; See SRA 1610
U	2/21/89	<i>TS</i>	All	Change SNT-TC-1A to 1984 edition and update (See SRA 1705). Demonstrated to ANI at MOS 7/13/89 <i>Hdo 9/9/89</i>

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1.0 SCOPE

This document specifies the method, materials and standards for solvent-removable, visible dye liquid penetrant examination in accordance with ASME Code Section III and Section V.

2.0 GENERAL REQUIREMENTS

- 2.1 This procedure provides the method of performing liquid penetrant examination to detect discontinuities open to the surface such as cracks, voids or porosity. The adjacent area, for a distance of one inch either side, shall be included in this test.
- 2.2 This procedure shall be used to examine ferrous and non-ferrous materials in the following forms: cast, forged, bar, sheet, including swaged and welded conditions, up to and including twelve inch diameter.
- 2.3 This procedure shall be performed only by personnel qualified to the standards of SNT-TC-1A (1984) as qualified by a Level III Examiner and supervised by the Hoke Quality Control Manager. Interpretation and evaluation of results of examination shall be performed only by Level II or Level III Examiners. Qualification documentation shall be recorded and filed in the Quality Control Office.

3.0 EXAMINATION MATERIALS

- 3.1 Each batch of the penetrant materials and cleaning solvents must be analyzed and certified by the manufacturer as to the actual sulphur and halogen content in accordance with ASME Section V Article 6.

- 3.1.1 Analyze for sulphur content as follows:
a) An individual sample of the penetrant materials shall be prepared for analysis by heating 50 grams (100 grams for cleaner/remover material) of the material in a 150mm nominal diameter glass Petri dish at a temperature of 194°F to 212°F for 60 minutes.

CAUTION: Provide adequate ventilation to dissipate the emitted vapor.

- b) Analyze the residue as follows: If the residue is less than 0.0025 grams (0.005 grams for cleaner/remover material), the material is acceptable without further analysis. If the residue is 0.0025 grams or more (0.005 grams or more for cleaner/remover material), the procedure in 3.1.1(a) shall be repeated and the residue analyzed per ASTM D 129 or ASTM D 1552 or, alternately, the material may be decomposed in accordance with ASTM D 129 and analyzed per ASTM D 516 Method B.

NOTE: The alternate methods of residue analysis specified above can be used on both penetrant materials and cleaner/remover materials.

- c) The sulphur content shall not exceed 1% of the residue by weight.

3.1.2 Analyze for chlorine and fluorine as follows:

- a) Same as 3.1.1(a) above, including the CAUTION note.
b) Analyze the residue as follows: If the residue is less than 0.0025 grams (0.005 grams for cleaner/remover material), the material is acceptable without further analysis. If the residue is 0.0025 grams or more (0.005 grams or more for cleaner/remover material), the procedure in 3.1.1(a) shall be repeated and the residue analyzed per ASTM D808 or SE-165 Annex 2 for chlorine and SE-165 Annex 3 for fluorine.
c) The chlorine plus fluorine content shall not exceed 1% of the residue by weight.

3.1.3 Modifications to these requirements may be required by certain customers and are addressed in the appropriate appendix/supplement.

3.2 Penetrant materials used shall be Ardrex (formerly Uresco Ardrex) Co. visible dye penetrant 996 (aerosol or bulk), cleaner/remover 9PR50 (aerosol), and wet non-aqueous developer suspension 9D1B (aerosol or bulk).

Aerosol propellant must be verified that it is non-halogenated.

4.0 SURFACE PREPARATION

General Requirements - Surfaces to be examined and adjacent areas within 1 inch shall be dry and free from scale, slag, and adhering or embedded sand or other extraneous materials.

- 4.1.1 As-welded surfaces, following the removal of slag, shall be considered suitable for liquid penetrant examination without grinding, if this does not interfere with interpretation of the test results and if the weld contour blends into the base metal without undercutting. Shot, sand, grit and vapor blasting shall not be done on surfaces which are to be examined, unless the process has been approved in conjunction with the L.P. examination.
- 4.1.2 Surfaces which are inaccessible or which would produce meaningless examination results, shall not be examined by this procedure. Examples of such surfaces are small inside diameters, drilled holes, threaded or knurled surfaces, or engraved areas.
- 4.2 Surfaces, for which a specific finish is required, shall be given this surface finish prior to the final liquid penetrant examination prescribed by the applicable specifications. Examination at intermediate stages of fabrication shall be permitted.

5.0 TEST PROCEDURE

NOTE: Acetone per Federal Spec. O-A-51 meets the halogen and sulphur requirements of Paragraph 3.1 (ref. ASME Code Section V Subarticle T-625).

- 5.1 Pretest cleaning shall be done with an acetone (per Fed.Spec. O-A-51) wash on the test area followed by complete air drying, allowing a minimum evaporation time of five (5) minutes.
ABRASIVE CLEANING SHALL NOT BE USED.
- 5.2 Penetrant application shall be brushed, dipped or sprayed on a clean, dry surface and shall be wetted for 15-20 minutes. The penetrant and test surface shall be maintained at a temperature recommended by the manufacturer but in no case less than 60°F nor greater than 100°F.

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- 5.3 Penetrant shall be removed from all surfaces as follows:
- 5.3.1 As much excess penetrant as possible shall be removed by first wiping the surface thoroughly with a clean, dry, lint-free cloth or absorbent paper.
 - 5.3.2 The remaining excess penetrant shall be removed by wiping the surface with a clean, lint-free cloth or absorbent paper dampened with penetrant remover. Acetone shall not be used to remove excess penetrant.
 - 5.3.3 Flushing of the surface with any liquid following application of the penetrant and prior to developing shall be prohibited.
- 5.4 The drying of the test surfaces after the removal of the excess penetrant shall be accomplished only by normal evaporation, or by blotting with absorbent paper or clean, lint-free cloth. Forced air circulation in excess of normal ventilation on the inspection area shall not be used. The time for surface drying after removal of excess penetrant and prior to application of the developer shall be limited to a minimum of 5 minutes and a maximum of ten minutes.

6.0 DEVELOPING

- 6.1 After penetrant has been removed and parts are dried, a thin, uniform coating of developer shall be sprayed on the test area. The developer shall be thoroughly agitated both before using and periodically during application. Since the true size and type of discontinuities are difficult to evaluate if the penetrant diffuses excessively into the developer, observe the surface during application of the developer for indications which tend to bleed profusely.
- 6.2 Final examination shall be made a minimum of 7 minutes and no later than 30 minutes after the developer has dried. If bleed-out does not alter the inspection results, development periods of over 30 minutes are permitted. The examination shall be performed under adequate illumination to ensure no loss of sensitivity.

7.0

FINAL CLEANING

When the examination is concluded, the penetrant materials shall be removed as soon as possible. Absorbent paper or a clean, lint-free cloth may be used to remove the dry, white powder. The residual material shall be removed with an acetone dampened cloth, or by water washing using TritonX or Igepal (or equivalent detergent containing non-ionic wetting agents) followed by acetone cleaning.

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8.0 EVALUATION OF INDICATIONS

8.1 Mechanical discontinuities at the surface will be indicated by bleeding out of the penetrant; however, localized surface discontinuities, such as may occur from machining marks or surface conditions, may produce similar indications which are not relevant to the detection of unacceptable discontinuities.

8.2 Any indication in excess of the acceptance standards, which is believed to be non-relevant, shall be regarded as a defect and shall be re-examined to verify whether or not actual defects are present. Surface conditioning may precede the re-examination. Non-relevant indications and broad areas of pigmentation which would mask indications of defects are unacceptable, and the areas shall be cleaned and re-examined.

8.3 Relevant indications are those which result from imperfections. Linear indications are those indications in which the length is more than three times the width. Rounded indications are indications which are circular or elliptical with the length equal to or less than three times the width.

9.0 ACCEPTANCE STANDARDS

9.1 Acceptance standards shall be according to ASME Section III, as listed below, and in supplements/appendices to this procedure, addressing specific customers requirements.

NOTE: Refer to the Nuclear Traveler to determine inspection requirements.

9.1.1 Castings, forgings, bar, seamless and welded (without filler metal) tubular products and fittings and weld repair of same for bodies, bonnets, seats, stub extensions to bodies and plugs.

The following relevant indications are unacceptable:

- a. Linear indications greater than 1/16" long for materials less than 5/8" thick, greater than 1/8" long for materials from 5/8" thick to under 2" thick and 3/16" long for materials 2" thick and greater.

- b. Rounded indications with any dimension greater than 1/8" for thicknesses less than 5/8" and greater than 3/16" for thicknesses 5/8" and greater.
- c. Four or more indications in a line separated by 1/16" or less, edge-to-edge.
- d. Ten or more indications in any 6 square inches of area, whose major dimension is no more than 6" with the dimensions taken in the most unfavorable location relative to the indications being evaluated.

9.1.2 Welds (other than bellows and repair welds to above). The following relevant indications are unacceptable:

- a. Any cracks and linear indications.
- b. Rounded indications with dimensions greater than 3/16".
- c. Four or more rounded indications in a line separated by 1/16 inch or less, edge-to-edge.
- d.
 - 1) Ten or more rounded indications in any six square inches of surface, with the major dimension of this area not to exceed six inches with the area taken in the most unfavorable location relative to the indications being evaluated.
 - 2) Indications whose major dimensions are greater than 1/16 inch shall be considered relevant.

9.1.3 Finished stems.

- a. There shall be no defects, linear or otherwise.

9.1.4 Hardfaced surfaces of seats and plugs (after machining).

- a. Any cracks or linear indications are unacceptable, as are rounded pores exceeding 2 pores for 6"

of circumference with the pore size not exceeding 1/64". Pore spacing must be greater than 1/16"

9.1.5 Bellows and bellows welds. Unacceptable indications are:

- a. Any cracks, linear, or rounded indications. (Also there shall be no indication in the sheet or tube before forming bellows).

9.1.6 Bolts, studs and nuts (greater than 1" nominal bolt size).

The examination shall be performed on the material stock at approximately the finished diameter before threading and after heading (if involved). The following relevant indications are unacceptable:

- a. Linear nonaxial indications.
- b. Linear axial indications greater than 1" in length.

10.0 RECORDS

10.1 A record of all Liquid Penetrant Examinations shall be maintained for a minimum of seven years. Examination certificates, when necessary, shall be supplied to the customer. Results shall be recorded on Liquid Penetrant Test Report (sample of Form LPTR attached).

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CRESSKILL, NEW JERSEY



HOKE INCORPORATED

ONE TENAKILL PARK • CRESSKILL, N.J. 07626
899 SIMUEL ROAD • SPARTANBURG, S.C. 29303

LIQUID PENETRANT TEST REPORT

PART DESCRIPTION _____

PART NUMBER _____ REV. _____

QUANTITY (QTY) _____ HEAT CODE _____

ASSY. ORDER NO./
NUCLEAR TRAVELER NO. _____ CUSTOMER SPEC. NO. _____

CUSTOMER _____ SALES ORDER/PROJECT NO. _____

CUSTOMER P.O. NO. _____ CUSTOMER P/N _____

TEST DESCRIPTION

SPECIFICATION _____ REV. _____

DYE PENETRANT MATERIALS: ARDROX
 MAGNAFLUX SPOTCHECK
 OTHER (SPECIFY BELOW)

	BATCH NO.
DYE	
REMOVER/ CLEANER	
DEVELOPER	

TYPE OF OBSERVATION Visual

INSPECTION RESULTS

QTY ACCEPTED _____ S/N _____

QTY REJECTED _____ S/N _____

QC NCR NO. _____

REMARKS:

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OPERATOR _____ LEVEL _____ DATE _____

INSPECTOR _____ LEVEL _____ DATE _____

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SPEC./REVISION AUTHORIZATION

NEW RELEASE

SPEC. CHANGE

SRA No. 207.1

SHEET 1 OF 1

REQUEST (INCLUDE REASON):

HP5-85 (to be REV. J)

ADD reuse water test requirements per NRC audit findings and recommendations.

ACTION TAKEN (ADD ADDITIONAL SHEETS AS NEEDED):

PAGE 3:

Para 2.1: Insertion, add "X100" for Igmpal, add "00-630"

Para 2.2: Delete "Potable Water meeting reqts of Public Health Service drinking water stds" & insert "Tap water" Delete "Max chloride content-25ppm in 22 electrical conductivity-400 microhmhos/cc, pH 6.0 to 8.0"

PAGE 4:

Para 2.3: Under 1st column, add "or demineralized water"

Under 2nd column, change pH 6.0 to pH 5.5. Add "(See para 7.4 for test reqts)"

Para 2.4: Under 2nd column, add "(Must be certified halogen free)"

Para 3.1: Delete all after middle of 1st line, and insert "in accordance with HP5-58 or HP5-138, depending upon the material"

PAGE 5: Delete subparagraphs 3.1.2 & 3.1.4

PAGE 6:

Add para 7.4 and 7.4.1 regarding testing of Grade 'B' water & describe methods

PAGE 7:

At end, add "At Spartanburg the ultrasonic cleaner may be used"

PAGE 8: Para 4.1:

Rewrite. Add alternate method of cleaning in accordance with reqts and updating other drawings.

PAGE 9:

Para 7.3: Delete last 2 lines & insert "shall be followed with residue test or visual check and the parts shall be certified"

ONLY PARTS CONFORMING TO THE NEW REVISION MAY BE USED.

REWORK SCRAP PRESENT STOCK AND IN PROCESS.

MANUFACTURE TO THE NEW REVISION MAY BE DEFERRED TO THE NEXT MANUFACTURED LOT.

REVISION DOES NOT AFFECT STOCK OR MANUFACTURING.

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TO	QTY		SIGN	DATE
	SRA	SPEC		
MFG. ENGR.	1	1*	RAJ	10/19
QC-CRESSKILL				
QC-SPARTANBURG	1	1*	RAJ	10/24
ASSY. DEPT.	1	4*	E	10/24
GOVT. SALES				
PURCHASING				
DRAFTING	ORIG	5	MAP	10/19/90
PROJ. ENGR.	1		RAJ	10/19/90
DIR. OF ENGR.	1		RAJ	10/19/90
MARKETING				
P&IC-CRESSKILL				
P&IC-SPART.				
N.O.A.	1		RAJ	10/19/90
PROD. SUPT.				
WELDING ENGR.				
WELDING DEPT.				
LAB	1	1*	RAJ	10/19/90
TOTAL	7	12		

PREPARED BY RAJ DATE 10-16-90
 REQUESTED BY RAJ DATE 10-15-90
 CHANGED BY RAJ DATE 10-17-90
 CHECKED BY RAJ DATE 10-17-90

AUTHORIZATION

PROJ ENGR. RAJ DATE 10-17-90
 DIR. OF ENGR. RAJ DATE 10-17-90
 QC(CRESSKILL) RAJ DATE 10/19/90
 MFG ENGR. RAJ DATE 10/19/90

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CLEANING FOR NUCLEAR SERVICE
(OR OXYGEN APPLICATIONS)

HOKE INCORPORATED
CRESSKILL, NEW JERSEY

DATE January 9, 1974

APPROVED - [Signature] Q. C. Manager
APPROVED - [Signature] PROJECT ENGINEER
APPROVED - [Signature] Nuclear Order Administrator
APPROVED - [Signature] ASSEMBLY FOREMAN
APPROVED - [Signature] DIRECTOR OF ENGINEERING

CHANGE LETTER	DATE	APP'D	PAGES AFFECTED	REMARKS
A	6/10/74	[Signature]	6	Revised drying Procedure Ref HEDL DTRF V0012(SRA103)
B	7/6/77	[Signature]	3	Par. 3.1 "Machining" changed to "Welding"(SRA358)
C	8/9/77	[Signature]	3	Para. 3.1 (SRA371)
D	9/26/77	[Signature]	3,4	Added Para 2.6 Revised para 3.1 and 3.3 Ref. A.I. Par HO-015 (SRA384)
E	10-12-77	[Signature]	3,6,9	Customer Request SRA 395
F	10-16-78	[Signature]	6,7, 8 8	See SRA-573

(See Page 2)

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Change Letter	Date	App'd	Pages Affected	Remarks
G	9/4/79	(B)	6,8,9	Para. 6.2.3, 7.3, 8.1 revised to clarify (SRA702)
H	6/27/88	<i>[Signature]</i>	All	Update (See SRA 1683)
J	10/17/90	<i>[Signature]</i>	3,4,5,6, 7,9	See SRA# 2021

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HOKE INCORPORATED
CRESSKILL, NEW JERSEY

CLEANING FOR NUCLEAR SERVICE
(OR OXYGEN APPLICATIONS)

1.0 APPLICATIONS

1.1 General

This specification covers the removal of oil and grease and other soil from parts during fabrication and assembly for use in nuclear applications or oxygen service. Degreasing agents used in accordance with this specification will not contain HALOGENS (F, Cl, Br, I, At).

1.2 Specific

1.2.1 Any metal part may be cleaned in this manner.
(See CAUTION note following para. 4.2)

1.2.2 Assemblies with non-metallic portions and non-metallic parts should be cleaned with detergent solution only after original cleaning to HUS-2.

1.2.3 This cleaning procedure may also be used for products which will be mass spectrometer leak tested.

2.0 MATERIALS

2.1 Detergent (Containing non-ionic Triton X100, Igepal, wetting agents) CC-630, or equivalent.

2.2 Grade 'C' Water
Tap Water.

- | | | |
|-----|---|---|
| 2.3 | Grade 'B' Water
(Wonder Water, by Allied Distilled Water Co., or equivalent) or demineralized water. | Max. chloride content - 1.0 ppm; max. electrical conductivity - 20 micromhos/cc. pH 5.5 to 8.0. See paragraph 7.4 for test requirements). |
| 2.4 | Acetone (CH ₃ COCH ₃) | Federal Spec. 0-A-51
Technical Grade
(Must be certified halogen free) |
| 2.5 | Denatured Alcohol
(CH ₃ CO ₂ CH ₃)

Machining Lubricants | Federal Spec. 0-E-760, Type III

Max sulfur & chloride content, 5000ppm |

PRECAUTIONS

The following precautions shall be taken during machining, fabrication, and assembly operations.

3.1 Stainless Steels

All austenitic (300 Series) stainless steel bar and forgings shall be purchased in the solution annealed condition. If passivation is specified for a forging, it shall be done after machining. Passivation shall not be done on components that have been stellite, welded or weld repaired.

When specified on the detail drawing, passivation shall be performed in accordance with HPS-58 or HPS-138 depending upon the material.

3.2 Exposure to Contaminated Atmospheres

Metals and components shall be protected from the general shop atmosphere, or other contaminated atmospheres, insofar as possible during fabrication and temporary storage. Bodies, bonnet assemblies, and other wetted components shall be boxed or covered during storage.

3.3 Use of Lubricants

A lubricant may be employed during machining operations provided that the lubricant is removed immediately after completion of each operation for which it is used by the methods of HPS-1.

Lubricants used shall not contain more than 5000ppm of sulfur or chloride.

3.4 Mercury Control

During the manufacturing processes, tests, and inspections, the components or assemblies shall not come in direct contact with mercury or any of its compounds.

3.5 Exclusion of Foreign Materials

Extreme care shall be taken during fabrication to prevent contamination by foreign materials. Temporary polyethylene plugs or seals shall be installed to keep contaminants out of a clean part during subsequent fabrication and storage.

3.6 Aluminum

Aluminum shall not be used, either as soft pads or hammers, to reduce marring during assembly and handling of nickel-base or stainless steel components.

3.7 Wire Brushing

If wire brushing of stainless steel parts is required, type 304 stainless steel brushes shall be used. These brushes shall not have previously been used on metals other than stainless steel.

4.0 DEGREASING PROCEDURE

4.1 CAUTION: Acetone is highly flammable. Take proper safety precautions when using and storing this material. Display "No-Smoking" signs adjacent to the operation.

4.2 Remove heavy dirt by scrubbing with a non-shedding bristle brush and a solution of up to one fluid ounce of non-ionic detergent per gallon of Grade 'C' water. Agitate and use brush as necessary.

CAUTION: Sub-assemblies that contain crevices or inaccessible areas, such as bodies containing socket welded tubing and bonnet assemblies, shall not be detergent cleaned, but shall be cleaned in acetone only per para. 4.4. At Spartanburg, the ultrasonic cleaner may be used.

4.3 Rinse components thoroughly in Grade 'C' water at a temperature of 120° to 160°F for five minutes. Parts shall be rinsed immediately to prevent drying of detergent.

4.3.1 Rinse components with Grade 'B' water.

- 4.4 Following water rinse, clean the parts in oil-free, unused or redistilled acetone (see para. 7.3). At Spartanburg, the ultrasonic cleaner may be used. Components containing crevices or inaccessible areas are to be cleaned in acetone only (ref. para. 4.2).

Alternatively, the parts may be immersed, in acetone, in a clean metal or glass container and agitated and/or scrubbed, as necessary, with a non-shedding bristle brush.

5.0 DRYING

- 5.1 The units shall be dried in a clean, dry, oil-free, ventilated area. The drying shall be accomplished with the use of heat lamps to heat the components to drive off the residual acetone. Drying is to be performed within 30 minutes after rinsing.

6.0 FLUSHING

6.1 Applicability

These provisions apply to flushing components when proof flushing is specified on the nuclear traveler. The requirements and cleanliness criteria for the use of filter cloths specified herein apply only to the final flushes to demonstrate that the component is free of particulates.

6.2 Flushing Media Purity

- 6.2.1 Acetone or alcohol to be used for flushing shall be oil-free, redistilled, or unused and shall be checked for cleanliness in the manner described in para. 6.2.3.
- 6.2.2 Water to be used for flushing shall be Grade "B" and shall be checked for cleanliness in the manner described in para. 6.2.3.
- 6.2.3 Filter approximately 20 gallons of the applicable flushing media through a filter of a minimum of 2 unused KIMWIPES (stock no. 34255) supported by a stainless steel grid. The grid shall be ultrasonically cleaned in acetone per para. 4.4, before flushing.

The resulting filter shall be completely free of foreign material. This check shall be performed immediately prior to starting the flush. If packaged, distilled water (Wonder Water or equivalent) is to be used for component flush test, the cleanliness check may be waived.

6.3 Flushing Procedure

5 gallons of the flushing media shall be passed through the component by gravity feed and a filter as described in para 6.2.3 (supported by a strainer or other appropriate means) shall be used to filter the exit fluid. The filtering area of the Kimwipe shall be no larger than 1 square foot. The flushing media may be recirculated and used in other valves of the same lot provided that it is filtered through a 100 micron stainless steel filter prior to re-use.

6.3.1 Flow Rate of Flush

The flush shall be gravity flow.

6.3.2 Duration of Flush

Flushes shall be repeated until the filter meets the acceptance criteria specified in para. 6.4.

6.4 Flushing Acceptance Criteria

The acceptance criteria for flushing of components shall be as follows:

1. The general appearance of the filter shall be that of a clean, white, wet cloth showing no more than slight speckling and no more than slight soiling or staining of any kind from rust or dirt.
2. There shall be no particles on the filter larger than 1/32 in. in any dimension.
3. Readily apparent quantities of unusual impurities in the exit flush or on the filter, such as resin particles, abrasive grit, or other foreign matter, shall be reason for non-acceptance of the flush.

6.5 Drying

Following proof flushing, components shall be dried in accordance with para. 5.0.

7.0 CONTROL

7.1 Dry surfaces shall be examined for freedom from oil, insoluble dirt, and smut by wiping the part with a clean Kimwipe (stock no. 34255) or equivalent. Deposit on the wiper indicates a dirty metal surface which must be recleaned.

7.2 For oxygen cleaning only, an ultraviolet light with a minimum wave length of 3600 angstroms at a distance of 1 foot maximum shall be used to determine the freedom of surfaces from oil, grease and other hydrocarbons. Residue of hydrocarbons will fluoresce when exposed to ultraviolet light in a dark area.

7.3 Only oil-free, unused or redistilled acetone will be used for this cleaning process. The ultrasonic cleaning tanks, at Spartanburg, shall be drained and filled with unused or redistilled acetone for each batch of valve components to be cleaned or when the specified control test, para. 7.1, indicates parts are not clean. As a control for the cleanliness of the acetone for oxygen cleaning, para. 7.2, the ultraviolet examination shall be performed on 100% of the parts. Any reject by the ultraviolet light test will be cause for rejection of the entire batch. If a reject is discovered (para. 7.1 or 7.2), the acetone shall be replaced with redistilled or unused acetone and the parts shall be recleaned.

7.4 Tests shall be conducted on Grade 'B' water to ascertain acceptability of chloride content, electrical conductivity and pH. These tests shall be conducted on each lot of distilled water received, and at least monthly for demineralized water.

7.4.1 Reference Test Methods;

ASTM D512 Test Methods for Chloride Ion in Water
ASTM D1293 Test Methods for pH of Water
ASTM D1125 Test Methods for Electrical Conductivity and Resistivity of Water

8.0 PACKAGING

8.1 After inspection and test, all acceptable products shall be packaged in a double-polyethylene bag with a cleaning certification tag placed between the bags. Cleaned in-process parts shall be singly bagged. The bag shall be heat sealed.

8.2 Cleaning Certification Tag.

8.2.1 Alternate #1 (Nuclear Applications)

CLEANED IN HALOGEN FREE SOLUTIONS
FOR NUCLEAR APPLICATIONS
PER HPS-85
HOKE INC., CRESSKILL, N. J. 07626

8.2.2 Alternate #2 (Oxygen Service)

CLEANED IN HALOGEN FREE SOLUTIONS
FOR OXYGEN SERVICE
PER HPS-85
HOKE INC., CRESSKILL, N. J. 07626

NUCLEAR **SPEC./REVISION AUTHORIZATION**

NEW RELEASE

SPEC. CHANGE

SRA No. 1705

SHEET OF 1 2

REQUEST (INCLUDE REASON) Revise HPT-N145, Liquid Penetrant Examination Procedure, Rev. T, to comply with ASME audit recommendations and to update per latest (1986 Edition with Addenda through 1988) ASME Code requirements.

- ONLY PARTS CONFORMING TO THE NEW REVISION MAY BE USED
 - REWORK SCRAP PRESENT STOCK AND IN PROCESS.
- MANUFACTURE TO THE NEW REVISION MAY BE DEFERRED TO NEXT MANUFACTURED LOT.
- REVISION DOES NOT EFFECT STOCK OR MANUFACTURING.
- RELEASED FOR PRODUCTION.

Revise HPT-N145, Rev. T, as follows:

1. Add Rev. U to document number at bottom of each page and add revision bars in margin where required. Eliminate page numbers 1A and 1B, 2A (info. now on pages 2,3 and 5)-renumber all pages accordingly.
2. Page 1- Change spec title from "Liquid Penetrant Examination Procedure to ASME Section III" to "Liquid Penetrant Examination Procedure (Visible Dye, Solvent-Removable Method) in Accordance with ASME Code Sections III and V);" eliminate rev. letter in top right corner and typist's initials "jk" in lower left hand corner.
3. Add SRA numbers to previous changes Rev. M, N and P. Rev. M change on Pg. 2 changed from pencil to type.
4. Para. 2.3- Change edition of SNT-TC-1A from "1980" to "1984."
5. Para. 3.1- Revise and expand material testing requirements per latest ASME Code Section V Article 6 (now Paras.3.1 and 3.1.1-3.1.3). Reword sentence concerning customer requirements.
6. Para. 3.2- Change "Uresco/Ardrox" to "Ardrox (formerly Uresco Ardrox)."
7. Para. 4.0- Add "dry and."
8. Para. 5.1- Add acetone "(per Spec. O-A-51)" and new note regarding acetone halogen and sulphur content.
9. Para. 6.2- Add "If bleed-out does not alter the inspection results, development periods of over 30 minutes are permitted."
10. Para. 7.0- Change "alconex or equivalent detergent" to "TritonX or Igepal (or equivalent detergent containing non-ionic wetting agents)."

SPECIAL INSTRUCTIONS:

DISTRIBUTION

TO	QTY			SIGN	DATE
	ECN	ASSY	DET.		
MFG. ENGR.	1			JPC	4/1/89
INV CONTROL					
QUALITY CONTROL	1	1+		mvp	4/1/89
PURCHASING					
ASSEMBLY	1			JE	4/1/89
MILITARY SALES					
COST DEPT					
DRAFTING	Orig	4+		MAF	4/1/89
PROJ ENGR	1			MSJ	4/1/89
CHIEF ENGR.					
MARKETING					
SAFETY FILE					
PROD CONTROL					
ECN COORDINATOR					
MASTER SCHEDULER					
C.C. Spart-					
F. Tucker	1			FT	4/1/89
R. Johnson	1			RJ	4/1/89
TOTAL	6	5			
DWG RELEASE DATE	EST.		ACT.		

PREPARED BY W.S. Zick DATE 2/22/89
 REQUESTED BY W.S. Zick DATE 7/21/88
 CHANGED BY W.S. Zick DATE 2/21/89
 CHECKED BY R.J. DATE 2/28/89

See Sheet 2 of 2 for Level III N.D.E. Inspector review and approval.

AUTHORIZATION
 PROJ. ENG. W.S. Zick DATE 2/23/89
 CONF. ENG. R DATE 2/1/89
 QUAL. CONT. R DATE 2/2/89
 N.O.A. R.J. Johnson DATE 2/28/89
 A.N. I. L. B. DATE 4/5/89
 MFG. ENGR. JPC DATE 4/1/89

GRESSKILL, NEW JERSEY

HOKE INCORPORATED

+Uncontrolled copy

NUCLEAR **SPEC./REVISION AUTHORIZATION**

NEW RELEASE

SPEC. CHANGE

SRA No. 1705

SHEET 2 OF 2

REQUEST (INCLUDE REASON)

Revise HPT-N145, Liquid Penetrant Examination Procedure, Rev. T.

Continued:

11. Para. 8.3- Change "unacceptable mechanical discontinuities" to "imperfections." Also see item #17.
12. Para. 9.1- Change wording, add "appendices", add note to refer to the Nuclear Traveler for inspection requirements.
13. Para. 10.1 and Form- include latest Liquid Penetrant Test Report form (Form LPTR).
14. Made minor punctuation, spelling, grammatical corrections to Paras. 2.2, 2.3, 3.2, 4.0, 4.1.1, 5.1, 5.2, 5.3, 5.3.1, 5.3.2, 5.4, 6.1, 7.0, 8.1, 9.1.1, 9.1.1c and d, 9.1.2c and d1, 9.1.3a, 9.1.4 and 9.1.4a, 10.1, 1.0, 2.1.
15. Para. 6.1-at beginning of third sentence, add "Since the true size and type of discontinuities are difficult to evaluate if the penetrant diffuses excessively into the developer,"
16. Para. 8.1-change "localized surface imperfections" to "localized surface discontinuities,"
17. Para. 8.3-in last sentence, add "equal to or."

To be Rev. U

- ONLY PARTS CONFORMING TO THE NEW REVISION MAY BE USED
- REWORK SCRAP PRESENT STOCK AND IN PROCESS.
- MANUFACTURE TO THE NEW REVISION MAY BE DEFERRED TO NEXT MANUFACTURED LOT.
- REVISION DOES NOT EFFECT STOCK OR MANUFACTURING.
- RELEASED FOR PRODUCTION.

SPECIAL INSTRUCTIONS:

DISTRIBUTION

TO	QTY			SIGN	DATE
	ECN	ASSY	DET.		
MFG. ENGR.	1				
INV CONTROL					
QUALITY CONTROL	1	1+			
PURCHASING					
ASSEMBLY	1				
MILITARY SALES					
COST DEPT.					
DRAFTING	Orig.	4+			
PROJ ENGR.					
CHIEF ENGR.					
MARKETING					
SAFETY FILE					
PROD CONTROL					
ECN COORDINATOR					
MASTER SCHEDULER					
O.C. Spart-					
F. Tucker	1				
R. Johnson	1				
TOTAL	6	5			
DWG RELEASE DATE		EST.		ACT	

PREPARED BY *W.S. Juel* DATE *2/22/89*
 REQUESTED BY *W.S. Juel* DATE *2/1/89*
 CHANGED BY *W.S. Juel* DATE *2/1/89*
 CHECKED BY *XDJ* DATE *2/28/89*

Revision has been reviewed and approved by Level III N.D.E. Inspector.

[Signature]
 Level III Inspector

2/20/89
 Date

AUTHORIZATION

PROJ. ENG. *W.S. Juel* DATE *2/23/89*
 CONF. ENG. *R.* DATE *3/1/89*
 QUAL. CONT. *[Signature]* DATE *3/7/89*
 N.O.A. *R.D. Johnson* DATE *2/28/89*
 A.N.I. *[Signature]* DATE *4/9/89*
 MFG. ENGR. *[Signature]* DATE *4/15/89*

CRESSKILL, NEW JERSEY

HOKE INCORPORATED

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LIQUID PENETRANT EXAMINATION PROCEDURE

(Visible Dye, Solvent-Removable Method) in
Accordance with ASME Code Sections III and V

HOKE INCORPORATED
CRESSKILL, NEW JERSEY

DATE October 6, 1971

PREPARED - James F. Sullivan
PROJECT ENGINEER

APPROVED - John K. Smith III

APPROVED - Maurice I. Webb
DIRECTOR OF ENGINEERING

CHANGE LETTER	DATE	APP'D	PAGES AFFECTED	REMARKS
A	1-20-72	JFS	1, 5, 6, 2	Revised Section 8.1
B	2-21-72	JFS		
C	3-28-72	RS	2, 5, 6	Revised para 3.1, 3.2 Added "SNT-TC-1A" to para. 2 Added para. 8.1.6
D	4/27/72	JFS	para 5.4.8 7.1	
E	7/27/72	JFS	5, 6	Clarified par 8.1. 8.1.2, 8.1.6

9104090143
DOC. NO. HPT-N145

Rev. U
Procedure was demonstrated to satisfaction
of ANI.

PAGE 1 OF 2

ROB 11/24/77 PDB
AV3/87

Change Letter	Date	App'd	Pages Affected	Remarks
F	7-9-73	<i>LS</i>	2	Clarified Para. 3.2
G	9-13-73	<i>EB</i>	3, 5	60* was 50* added para. 8 9 was 8; 10 was 9
H	4-24-74	<i>EB</i>	1A, 2, 6, 7, E-154	Revised per HEDL V0016
I	6-11-74	<i>EB</i>	2, 3, 4	Editorial Change Par. 1.0, 2.3, 4.1, 5.2, 5.4 Par. 3.0 Revised to allow special customer requests. Par. 7.1 revised to permit water wash Appendix A Added
J	10/8/75	<i>KDY VCC 10/8/75</i>	ALL	Revised to comply to 1974 Code - Added Supplement No. 1 for special customer accept- ance standards.
K	1/20/76	<i>VCC 1/20/76</i>	ALL	Wording changes, Supplement No. 1 included in App. and amended for customer request. Added Para 4.1.2 Page 3.

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HOKE INCORPORATED
CRESSKILL, NEW JERSEY

Change Letter	Date	App'd	Pages Affected	Remarks
L	9/28/76	<i>ZJG 9/29</i>	2	Added Para. 3.3
			1	Changes in Appendix A Para. A1 & A2
			2	Changes in Appendix A Para. A3.2
			3	Changes in Appendix A Addition to A3.4
M	3/11/77	<i>ZJG 3/11/77</i>	2A 2	Delete Ardrox Matl. Added NOTE to Sec. 3.1 (SRA 312)
N	10/10/77	<i>VCO Lovitt 10/10/77</i>	3 & 4	Add 1" adjacent areas, profuse bleeding areas and adequate illumination (Sec. V) (SRA 393)
P	6/25/80	<i>VCO Lovitt 6/25/80</i>		Change halogen to chloride per Summer '79 Addenda.
			2A	Delete Turco materials & add Ardrox materials.
			2 App A	Delete aerosol containers (SRA 793)
Q	7/21/83	<i>JL</i>	2, 2A, 5, & Suppl. 1	See SRA-1061. <i>BRB 8/25/83</i>
R	7/13/87	<i>RB</i>	2A	Change Developer Part No. 9D8 to 9D1B See SRA-1527 <i>RDB 8/13/87</i>
S	7/27/87	<i>RB</i>	3.2, Appendix A Page 2	See SRA 1580
T	1/5/88	<i>RB</i>	2A, 7, TR Form; Appendix A Page 2 & 4	See SRA 1610
U	2/21/89	<i>7057</i>	All	Change SNT-TC-1A to 1984 edition and update (See SRA 1705). Demonstrated to ANI at MOS 7/13/89 <i>HAO 7/19/89</i>

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HOKE INCORPORATED
CRESSKILL, NEW JERSEY

1.0 SCOPE

This document specifies the method, materials and standards for solvent-removable, visible dye liquid penetrant examination in accordance with ASME Code Section III and Section V.

2.0 GENERAL REQUIREMENTS

- 2.1 This procedure provides the method of performing liquid penetrant examination to detect discontinuities open to the surface such as cracks, voids or porosity. The adjacent area, for a distance of one inch either side, shall be included in this test.
- 2.2 This procedure shall be used to examine ferrous and non-ferrous materials in the following forms: cast, forged, bar, sheet, including swaged and welded conditions, up to and including twelve inch diameter.
- 2.3 This procedure shall be performed only by personnel qualified to the standards of SNI-TC-1A (1984) as qualified by a Level III Examiner and supervised by the Hoke Quality Control Manager. Interpretation and evaluation of results of examination shall be performed only by Level II or Level III Examiners. Qualification documentation shall be recorded and filed in the Quality Control Office.

3.0 EXAMINATION MATERIALS

- 3.1 Each batch of the penetrant materials and cleaning solvents must be analyzed and certified by the manufacturer as to the actual sulphur and halogen content in accordance with ASME Section V Article 6.

- 3.1.1 Analyze for sulphur content as follows:
a) An individual sample of the penetrant materials shall be prepared for analysis by heating 50 grams (100 grams for cleaner/remover material) of the material in a 150mm nominal diameter glass Petri dish at a temperature of 194°F to 212°F for 60 minutes.

CAUTION: Provide adequate ventilation to dissipate the emitted vapor.

- b) Analyze the residue as follows: If the residue is less than 0.0025 grams (0.005 grams for cleaner/remover material), the material is acceptable without further analysis. If the residue is 0.0025 grams or more (0.005 grams or more for cleaner/remover material), the procedure in 3.1.1(a) shall be repeated and the residue analyzed per ASTM D 129 or ASTM D 1552 or, alternately, the material may be decomposed in accordance with ASTM D 129 and analyzed per ASTM D 516 Method B.

NOTE: The alternate methods of residue analysis specified above can be used on both penetrant materials and cleaner/remover materials.

- c) The sulphur content shall not exceed 1% of the residue by weight.

3.1.2 Analyze for chlorine and fluorine as follows:

- a) Same as 3.1.1(a) above, including the CAUTION note.
b) Analyze the residue as follows: If the residue is less than 0.0025 grams (0.005 grams for cleaner/remover material), the material is acceptable without further analysis. If the residue is 0.0025 grams or more (0.005 grams or more for cleaner/remover material), the procedure in 3.1.1(a) shall be repeated and the residue analyzed per ASTM D808 or SE-165 Annex 2 for chlorine and SE-165 Annex 3 for fluorine.
c) The chlorine plus fluorine content shall not exceed 1% of the residue by weight.

3.1.3 Modifications to these requirements may be required by certain customers and are addressed in the appropriate appendix/supplement.

3.2 Penetrant materials used shall be Ardrex (formerly Uresco Ardrex) Co. visible dye penetrant 996 (aerosol or bulk), cleaner/remover 9PR50 (aerosol), and wet non-aqueous developer suspension 9D1B (aerosol or bulk).

Aerosol propellant must be verified that it is non-halogenated.

4.0 SURFACE PREPARATION

General Requirements - Surfaces to be examined and adjacent areas within 1 inch shall be dry and free from scale, slag, and adhering or embedded sand or other extraneous materials.

- 4.1.1 As-welded surfaces, following the removal of slag, shall be considered suitable for liquid penetrant examination without grinding, if this does not interfere with interpretation of the test results and if the weld contour blends into the base metal without undercutting. Shot, sand, grit and vapor blasting shall not be done on surfaces which are to be examined, unless the process has been approved in conjunction with the L.P. examination.
- 4.1.2 Surfaces which are inaccessible or which would produce meaningless examination results, shall not be examined by this procedure. Examples of such surfaces are small inside diameters, drilled holes, threaded or knurled surfaces, or engraved areas.
- 4.2 Surfaces, for which a specific finish is required, shall be given this surface finish prior to the final liquid penetrant examination prescribed by the applicable specifications. Examination at intermediate stages of fabrication shall be permitted.

5.0 TEST PROCEDURE

NOTE: Acetone per Federal Spec. O-A-51 meets the halogen and sulphur requirements of Paragraph 3.1 (ref. ASME Code Section V Subarticle T-625).

- 5.1 Pretest cleaning shall be done with an acetone (per Fed.Spec. O-A-51) wash on the test area followed by complete air drying, allowing a minimum evaporation time of five (5) minutes.
ABRASIVE CLEANING SHALL NOT BE USED.
- 5.2 Penetrant application shall be brushed, dipped or sprayed on a clean, dry surface and shall be wetted for 15-20 minutes. The penetrant and test surface shall be maintained at a temperature recommended by the manufacturer but in no case less than 60°F nor greater than 100°F.

- 5.3 Penetrant shall be removed from all surfaces as follows:
- 5.3.1 As much excess penetrant as possible shall be removed by first wiping the surface thoroughly with a clean, dry, lint-free cloth or absorbent paper.
 - 5.3.2 The remaining excess penetrant shall be removed by wiping the surface with a clean, lint-free cloth or absorbent paper dampened with penetrant remover. Acetone shall not be used to remove excess penetrant.
 - 5.3.3 Flushing of the surface with any liquid following application of the penetrant and prior to developing shall be prohibited.
- 5.4 The drying of the test surfaces after the removal of the excess penetrant shall be accomplished only by normal evaporation, or by blotting with absorbent paper or clean, lint-free cloth. Forced air circulation in excess of normal ventilation on the inspection area shall not be used. The time for surface drying after removal of excess penetrant and prior to application of the developer shall be limited to a minimum of 5 minutes and a maximum of ten minutes.

6.0 DEVELOPING

- 6.1 After penetrant has been removed and parts are dried, a thin, uniform coating of developer shall be sprayed on the test area. The developer shall be thoroughly agitated both before using and periodically during application. Since the true size and type of discontinuities are difficult to evaluate if the penetrant diffuses excessively into the developer, observe the surface during application of the developer for indications which tend to bleed profusely.
- 6.2 Final examination shall be made a minimum of 7 minutes and no later than 30 minutes after the developer has dried. If bleed-out does not alter the inspection results, development periods of over 30 minutes are permitted. The examination shall be performed under adequate illumination to ensure no loss of sensitivity.

7.0

FINAL CLEANING

When the examination is concluded, the penetrant materials shall be removed as soon as possible. Absorbent paper or a clean, lint-free cloth may be used to remove the dry, white powder. The residual material shall be removed with an acetone dampened cloth, or by water washing using TritonX or Igepal (or equivalent detergent containing non-ionic wetting agents) followed by acetone cleaning.

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HOKE INCORPORATED
CRESSKILL, NEW JERSEY

8.0 EVALUATION OF INDICATIONS

8.1 Mechanical discontinuities at the surface will be indicated by bleeding out of the penetrant; however, localized surface discontinuities, such as may occur from machining marks or surface conditions, may produce similar indications which are not relevant to the detection of unacceptable discontinuities.

8.2 Any indication in excess of the acceptance standards, which is believed to be non-relevant, shall be regarded as a defect and shall be re-examined to verify whether or not actual defects are present. Surface conditioning may precede the re-examination. Non-relevant indications and broad areas of pigmentation which would mask indications of defects are unacceptable, and the areas shall be cleaned and re-examined.

8.3 Relevant indications are those which result from imperfections. Linear indications are those indications in which the length is more than three times the width. Rounded indications are indications which are circular or elliptical with the length equal to or less than three times the width.

9.0 ACCEPTANCE STANDARDS

9.1 Acceptance standards shall be according to ASME Section III, as listed below, and in supplements/appendices to this procedure, addressing specific customers requirements.

NOTE: Refer to the Nuclear Traveler to determine inspection requirements.

9.1.1 Castings, forgings, bar, seamless and welded (without filler metal) tubular products and fittings and weld repair of same for bodies, bonnets, seats, stub extensions to bodies and plugs.

The following relevant indications are unacceptable:

- a. Linear indications greater than 1/16" long for materials less than 5/8" thick, greater than 1/8" long for materials from 5/8" thick to under 2" thick and 3/16" long for materials 2" thick and greater.

- b. Rounded indications with any dimension greater than 1/8" for thicknesses less than 5/8" and greater than 3/16" for thicknesses 5/8" and greater.
- c. Four or more indications in a line separated by 1/16" or less, edge-to-edge.
- d. Ten or more indications in any 6 square inches of area, whose major dimension is no more than 6" with the dimensions taken in the most unfavorable location relative to the indications being evaluated.

9.1.2 Welds (other than bellows and repair welds to above). The following relevant indications are unacceptable:

- a. Any cracks and linear indications.
- b. Rounded indications with dimensions greater than 3/16".
- c. Four or more rounded indications in a line separated by 1/16 inch or less, edge-to-edge.
- d.
 - 1) Ten or more rounded indications in any six square inches of surface, with the major dimension of this area not to exceed six inches with the area taken in the most unfavorable location relative to the indications being evaluated.
 - 2) Indications whose major dimensions are greater than 1/16 inch shall be considered relevant.

9.1.3 Finished stems.

- a. There shall be no defects, linear or otherwise.

9.1.4 Hardfaced surfaces of seats and plugs (after machining).

- a. Any cracks or linear indications are unacceptable, as are rounded pores exceeding 2 pores for 6"

of circumference with the pore size not exceeding 1/64". Pore spacing must be greater than 1/16"

9.1.5 Bellows and bellows welds. Unacceptable indications are:

- a. Any cracks, linear, or rounded indications. (Also there shall be no indications in the sheet or tube before forming bellows).

9.1.6 Bolts, studs and nuts (greater than 1" nominal bolt size).

The examination shall be performed on the material stock at approximately the finished diameter before threading and after heading (if involved). The following relevant indications are unacceptable:

- a. Linear nonaxial indications.
- b. Linear axial indications greater than 1" in length.

10.0 RECORDS

10.1 A record of all Liquid Penetrant Examinations shall be maintained for a minimum of seven years. Examination certificates, when necessary, shall be supplied to the customer. Results shall be recorded on Liquid Penetrant Test Report (sample of Form LPTR attached).



HOKE INCORPORATED

ONE TENAKILL PARK • CRESSKILL, N.J. 07626
899 SIMUEL ROAD • SPARTANBURG, S.C. 29303

LIQUID PENETRANT TEST REPORT

PART DESCRIPTION _____

PART NUMBER _____ REV. _____

QUANTITY (QTY) _____ HEAT CODE _____

ASSY. ORDER NO./
NUCLEAR TRAVELER NO. _____ CUSTOMER SPEC. NO. _____

CUSTOMER _____ SALES ORDER/PROJECT NO. _____

CUSTOMER P.O. NO. _____ CUSTOMER P/N _____

TEST DESCRIPTION

SPECIFICATION _____ REV. _____

- DYE PENETRANT MATERIALS: ARDROX
 MAGNAFLUX SPOTCHECK
 OTHER (SPECIFY BELOW)

	BATCH NO.
DYE	
REMOVER/ CLEANER	
DEVELOPER	

TYPE OF OBSERVATION Visual

INSPECTION RESULTS

QTY ACCEPTED _____ S/N _____

QTY REJECTED _____ S/N _____

QC NCR NO. _____

REMARKS:

✱

OPERATOR _____ LEVEL _____ DATE _____

INSPECTOR _____ LEVEL _____ DATE _____

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Rev. U

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H58-20-50

O-RING CURE DATE CONTROL
cure Date Acc Control 80

QUARTERS

DATE	CURE DATE	EXPIRATION DATE	REVIEWED BY	COMMENTS	HT CODE
1-4-71	4Q 88	4Q 08	JFB		A

* A/R - ACCEPT / REJECT

H58-114-50

O-RING CURE DATE CONTROL
cure Date Age Control 90 QUARTERS

DATE	CURE DATE	EXPIRATION DATE	REVIEWED BY	COMMENTS	HT CODE
1-4-71	1Q 89	1Q 09	<i>RS</i>	<i>A</i>	

* A/R - ACCEPT / REJECT

H58-112-50 O-RING CURE DATE CONTROL 80 QUARTERS
cure Date Age Control

DATE	CURE DATE	EXPIRATION DATE	REVIEWED BY	COMMENTS	HT CODE
1-4-91	1Q89	1Q09	JES	A	

* A/R - ACCEPT / REJECT

H58-156-50 O-RING CURE DATE CONTROL 22 QUARTERS
cure Date Age Control

DATE	CURE DATE	EXPIRATION DATE	REVIEWED BY	COMMENTS	HT CODE
1-4-91	1987	1907	JEB	A	

* A/R - ACCEPT / REJECT



HOKE INCORPORATED

ONE TENAKILL PARK • CRESSKILL, N.J. 07626
PHONE: (201) 568-9100 TELEX: 13542B

CERTIFICATION TO SNT-TC-1A
LIQUID PENETRANT EXAMINATION
LEVEL III

This is to certify that James Free of Applied Technical Services Inc, Greenville, SC, is appointed by Hoke as the Level III Examiner for Magnetic Particles, Liquid Penetrant and Radiography examinations as of August 6, 1990. He is qualified to establish techniques, interpret specifications and codes, designate the test method and techniques used, and interpret results. He has sufficient education, experience and practical background in materials technology to assist in establishing tests and acceptance criteria when required. He has a knowledge of other commonly used NDT methods and he is responsible for instructing and conducting examinations of NDT Level I and NDT Level II personnel.

His experience and education records are on file at Hoke.

This certification is issued with examination in accordance with SNT-TC-1A based on the latest certification records dated 1/2/90.

A handwritten signature in cursive script, appearing to read "Ronald J. Williams".

Ronald J. Williams
Director of Quality

A handwritten signature in cursive script, appearing to read "Walter Jones III".

Walter Jones III
C.E.O.



APPLIED TECHNICAL SERVICES, INCORPORATED

Branch Office
 1218 Donaldson Road
 Greenville, South Carolina 29605
 (803) 299-0525
 Fax # (803) 277-5824

Main Office
 1190 Atlanta Industrial Drive
 Marietta, Georgia 30066
 (404) 423-1400
 Fax # (404) 424-6415

Branch Office
 108-A Castle Drive
 Madison, Alabama 35758
 (205) 857-7777
 Fax # (205) 830-4474

QUALIFICATION AND CERTIFICATION OF NONDESTRUCTIVE INSPECTION PERSONNEL

I hereby certify that the following named employee of Applied Technical Services possesses the necessary qualifications and is certified to perform the level of inspection as indicated.

Name: James Free
 Inspection Method: Liquid Penetrant
 Qualification Level: III
 Composite Score: SNT-TC-1A: 90.5, MIL-STD-410: 89.7
 Test Date: January 5, 1990
 Certification Expiration Date: January 5, 1995
 Certified in Accordance with SNT-TC-1A 1988 Edition
 Education: Diploma from Dothan High School.

Experience: ATS, 5/87 to 1/90. Performed penetrant inspection Certified Level II R.T., M.T., P.T., U.T., E.T. and trained Level I and II inspection personnel.

Technical Services Lab: 3/82 to 5/87. Performed penetrant inspections. Certified Level II R.T., M.T. and P.T. Trained, tested and supervised other NDT technicians.

Training: Level I: 4 hrs. General Dynamics
 Instructor: L. Mazyette

Level II: 8 hrs. General Dynamics
 Instructor: J. Williamson

<u>SNT-TC-1A</u>			
	<u>Exam Grade</u>	<u>% Weight</u>	<u>Weight Score</u>
Basic:	92.3	.4	36.9
Specific:	90.0	.4	36.0
Method:	87.9	.2	17.6
Composite Grade:			90.5

<u>MIL-STD-410</u>			
	<u>Exam Grade</u>	<u>% Weight</u>	<u>Weight Score</u>
General:	87.9	.3	26.4
Specific:	90.0	.3	27.0
Practical:	90.0	.4	36.0
Composite Grade:			89.7

Authorized Signature: J. J. Mills
 J. J. Mills
 Level III Examiner

January 8, 1990
 Date



APPLIED TECHNICAL SERVICES, INCORPORATED

Branch Office

1218 Donaldson Road
Greenville, South Carolina 29605
(803) 299-0525
Fax # (803) 277-5824

Main Office

1190 Atlanta Industrial Drive
Marietta, Georgia 30066
(404) 423-1400
Fax # (404) 424-6515

Branch Office

138-A Castle Drive
Madison, Alabama 35758
(205) 837-7777
Fax # (205) 830-4474

Test	Meets Without Eye Correction	Meets With Eye Correction	Does Not Meet
1) Far Vision Snellen 20/30 or Ortho-Rater 7	Right Eye [] Left Eye [✓]	[✓] []	[] []
2) Near Vision Ortho-Rater 8 or Jaeger #1, at 12"	One Eye [✓]	[]	[]
Ortho-Rater 7 or Jaeger #3, at 12"	Other Eye []	[]	[]
3) Depth Perception Ortho-Rater and 3 out of 9 or Yerhoff any 5 out of 8		<u>Meets</u> [✓] []	<u>Does Not Meet</u> [] []
4) Color Perception Ortho-Rater Minimum of 4 or Pseudo-Iso Chromatic Minimum of 14		[] []	[] []
5) Red/Green Differentiation		[✓]	[]
6) Blue/Yellow Differentiation		[✓]	[]

I certify that I, DR. STEVE R. CHANDLER, administered an eye exam.
PRINT OR TYPE NAME OF EYE EXAMINER
 to JAMES A. FREE, on OCT. 11, 1990 which demonstrated
 the vision capabilities indicated above.

I hold one of the following job titles: Please check one:

- [X] Optometrist
- [] Medical Doctor
- [] Registered Nurse
- [] Certified Physician Assistant
- [] Level III or Designated Representative

State License Number 685
EYE CARE CENTER #04
P.O. BOX 1096
PIEDMONT, S.C. 29673
 Professional Address

[803] 295-3550
 Telephone Number

Steve R. Chandler
 Signature of Eye Examiner

HOKE INCORPORATED

1 TEXAS LARK
 CRESSKILL, NEW YORK (201) 568-9100

PURCHASE ORDER #4320

Order No. 4320	Pay C/O	Vendor Code	Suffix "X" Indicate No Overshipments permitted.
Certificate of compliance with req. specifications & drawings refer in spec.		Account Class. 02252005	JOB NO.
Requisitioned by RON LEWIS		Notify on Receipt RON LEWIS	

SUBMIT ALL VOUCHERS IN TRIPlicate TO ABOVE ADDRESS
 ATTN: ACCTS. PAYABLE

TO Tabco Environmental Services, Inc.
 747 Simbel Road
 Spartanburg, SC 29301

SHIP TO Hoke, Inc.
 899 Simbel Road
 Spartanburg, SC 29303

Terms Net 30	F.O.B.	Ship Via	Date Promised	<input type="checkbox"/> NOT FOR RESALE	EXEMPT REG. NO.
Delivery	<input type="checkbox"/> CONFIRMING ORDER OF		PER YOUR	<input type="checkbox"/> FOR MFG.	
Not Sooner Than	Not Later Than	Date	QUOTATION OF	<input type="checkbox"/> FOR R&D	

ITEM NO.	QUANTITY	UNIT	DESCRIPTION
1			Blanket Order to perform testing of demineralized water to ASTM D512-89 D1293-84 D1125-82 Once per month @ \$40.00
2			Gravimetric Analysis Once per month per HPS 125 @ \$18.00 Test reports must be furnished to Hoke Quality Assurance. Attn: Ron Lewis

CONFIRMING

EXPEDITING REGISTER

Purchase Order No. Must Appear On All Invoices, Delivery Slips, Cases, Packages, Certification, etc.

CONDITIONS

- All orders to be effective must bear authorized signature.
- No higher prices than indicated herein can be invoiced without our written authorization.
- Invoices rendered must certify that you are complying with all applicable provisions of Government Procurement labor regulations.
- Additional terms and conditions are listed on the back of this order.
- Acknowledgement must be returned by _____

INFORMATION RECEIVED

VENDOR'S SIGNATURE _____

REFER INQUIRIES TO: _____

Carolyn Dutton

AUTHORIZED SIGNATURE: _____

DATE: _____



HOKE INCORPORATED

ONE TENAKILL PARK • CRESSKILL, N.J. 07826
PHONE: (201) 568-9100 TELEEX: 135478

October 30, 1990

Mr. Alan Bagner
American Society of Mechanical Engineers
345 E. 47th Street
New York, New York 10016

SUBJECT: Company Organizational Revisions: Quality System Certification
(QSC-541, QSC-541-1, QSC-541-2); Certification of Authorization
(N-2809, M-2810)

Dear Sir:

Please be advised that we are in the process of implementing company organizational changes. Our estimated timetable for the completion of the related changes is the first quarter of 1991. As soon as these changes have been completed we will revise both of our Quality Manuals, and submit them for your review.

If I can be of any further assistance, please advise.

Very truly yours,

HOKE INCORPORATED

A handwritten signature in cursive script, appearing to read "Ronald J. Williams".

Ronald J. Williams
Director of Quality

RJW/clb

cc: W. Jones
J. Gannon
J. Doblosky
R.N. Fowler - Authorized Nuclear Inspection Supervisor

HOKE INCORPORATED

1 TENAKILL PARK
 CRESSKILL, NEW JERSEY 07624 (201) 568-9100

SUBMIT INVOICES IN TRIPLICATE TO ABOVE ADDRESS
 ATTN: ACCTS. PAYABLE

PURCHASE ORDER # 120

Order Date 1/23/74	Page Of	Vendor Code	Suffix "K" indicate NO Overshipments permitted <input type="checkbox"/>
Certificate of compliance <input type="checkbox"/> with req. specifications & drawing req. in dup.		Approved By JESSE L. GARDNER	JOB NO.
Requested by RON LEWIS		Notify on Receipt RON LEWIS	

TO Tabor Environmental Services, Inc. 747 Simmel Road Spartanburg, SC 29301	SHIP TO Hoke, Inc. 895 Simmel Road Spartanburg, SC 29303
---	--

Terms Net 30	F.O.B.	Ship Via	Date Promised	<input type="checkbox"/> NOT FOR RESALE	} EXEMPT REG. NO.
Delivery Not Sooner Than	Not Later Than	<input type="checkbox"/> CONFIRMING ORDER OF	DATE 1/24/74	FOR RESALE	

IT I.O.	QUANTITY	UNIT	DESCRIPTION
1			Blanket Order to perform testing of demineralized water to ASTM D512-89 D1293-84 D1125-82 Once per month @ \$40.00
2			Gravimetric Analysis Twice per month per HPS 125 @ \$18.00 Test reports must be furnished to Hoke Quality Assurance. Attn: Ron Lewis

CONFIRMING

EXPEDITING REGISTER

Purchase Order No. Must Appear On All Invoices, Delivery Slips, Cases, Receipts, Certification, etc. CONDITIONS 1) All orders to be effective must bear authorized signature. 2) No higher prices than indicated herein can be invoiced without our written authorization. 3) Invoices rendered must certify that you are complying with all applicable provisions of Government price and labor regulations. 4) Additional terms and conditions are listed on the back of this order. 5) Acknowledgement must be returned by _____	INFORMATION RECEIVED

VENDOR'S SIGNATURE: _____ REFER INQUIRIES TO: Carolyn Barton
 DATE: _____ AUTHORIZED SIGNATURE: _____

INSPECTION

