

Submitted for recognition as an American National Standard

**NATIONAL AEROSPACE AND DEFENSE CONTRACTORS
ACCREDITATION PROGRAM (NADCAP)**

**SURVEY CHECKLISTS FOR THE
NDT SUPPLIERS ACCREDITATION PROGRAM**

1. Scope

- 1.1** This standard includes the forms to be used by a third party to survey a nondestructive test facility with respect to penetrant, magnetic particle, ultrasonic, and/or radiographic methods.

2. References

2.1 Applicable Documents

2.1.1 SAE Publications

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001

AS7001 - National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Program Description

AS7002 - National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Rules for Implementation

AS7003 - National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Program Operation

AMS-2641 - Vehicle, Magnetic Particle Inspection, Petroleum Base

2.1.2 ASNT Publications

Available from The American Society for Nondestructive Testing, 4153 Arlingate Plaza, Caller #28518, Columbus, OH 43228-0518.

Recommended Practice No. SNT-TC-1A, Personnel Qualification and Certification in Nondestructive Testing

SAE Technical Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions.

2.1.3 ASTM Publications

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

- ASTM D 95 Test Method for Water in Petroleum Products and Bituminous Materials by Distillation
- ASTM E 155 Reference Radiographs for Inspection of Aluminum and Magnesium Castings
- ASTM E 186 Reference Radiographs for Heavy-Walled (2 - 4-1/2 in. (51 - 114 mm)) Steel Castings
- ASTM E 192 Reference Radiographs of Investment Steel Castings for Aerospace Applications
- ASTM E 317 Practice for Evaluating Performance Characteristics of Ultrasonic Pulse-Echo Testing Systems Without the Use of Electronic Measurement Instruments
- ASTM E 428 Practice for Fabrication and Control of Steel Reference Blocks Used in Ultrasonic Inspection
- ASTM E 446 Reference Radiographs of Steel Castings Up to 2 in. (51 mm) in Thickness

2.1.4 Military Publications

Available from Naval Publications and Forms Center, Attn: NPODS, 5801 Tabor Avenue, Philadelphia, PA 19120-5099.

2.1.5 Military Standards

- MIL-STD-410 Nondestructive Personnel Qualification and Certification
- MIL-STD-453 Inspection, Radiographic
- MIL-STD-2154 Inspection, Ultrasonic, Wrought Metals, Process for
- MIL-STD-6866 Inspection, Liquid Penetrant
- MIL-STD-45662 Calibration Systems Requirements

2.1.6 Military Specifications

- DOD-F-87935 Fluid, Magnetic Particle Inspection, Suspension Medium (Metric)
- MIL-I-25135 Inspection Materials, Penetrants

3. Requirements**3.1** Survey information has been divided into parts as follows:**Appendix A - SURVEY OF NONDESTRUCTIVE TEST FACILITY**

This part contains general information that would be collected for a survey of any company for any of the four basic NDT methods.

Appendix B - PENETRANT SURVEY**Appendix C - MAGNETIC PARTICLE SURVEY****Appendix D - ULTRASONIC SURVEY**

3.1 (Continued):**Appendix E - RADIOGRAPHY SURVEY**

These survey forms cover information not included in Appendix A required for completion of a survey for the particular method being accredited. These forms shall be used in conjunction with and become part of the SURVEY OF NDT FACILITY form (Appendix A).

3.1.1 These forms are appended to this standard.

3.1.2 In completing these forms, surveyors are to be advised that

- (a) Each question requires an answer.
- (b) The intended response shall be circled.
- (c) When a blank line is provided, the required data shall be shown.
- (d) If the answer references an attachment, it shall become a part of the survey record and shall show the survey identification number on each page.
- (e) Not applicable (N/A) responses are intended for items that are not required based on the materials/requirement in use at the facility. All other N/A responses must be explained.
- (f) All discrepancies shall be documented by completing the Supplier Corrective Action Request form (AS7100/1, Page A-2) during the exit interview.

PREPARED BY THE
PRI NADCAP COUNCIL

SAENORM.COM : Click to view the full PDF of as7100_1

SURVEY NO. _____

APPENDIX A

SURVEY OF NONDESTRUCTIVE TEST FACILITY

COMPANY: _____ SURVEY DATE: _____

DIVISION: _____ PHONE: _____

ADDRESS: _____ FACILITY: _____

CITY/STATE/ZIP: _____

NATURE OF BUSINESS:

IN-HOUSE PRODUCTS ONLY: _____ ACCEPTS OUTSIDE WORK: ✓

TOTAL EMPLOYEES: OA PERSONNEL: NDT:

TOTAL EMPLOYEES: _____ QA PERSONNEL: _____
 Exclude NDT _____ Certified _____
 SQUARE FEET OF WORK AREA: _____ NO. OF SHIFTS WORKED: _____

CONTACTS

POSITION

**SURVEYED FOR
ACCREDITATION**

<u>METHOD</u>	<u>RECOMMENDED</u>	<u>NOT RECOMMENDED</u>	<u>DATE</u>
PENETRANT			
MAGNETIC PARTICLE			
RADIOGRAPHY			
ULTRASONIC			
OTHER:			

COMMENTS: _____

Attach additional sheets if required.

REASON FOR VISIT

INITIAL SURVEY: FOLLOW-UP SURVEY: REACCREDITATION SURVEY: _____

SURVEYOR'S SIGNATURE: _____ DATE: _____

CORRECTIVE ACTION VERIFIED: _____ DATE: _____

Surveyor

SURVEY NO. _____

SUPPLIER CORRECTIVE ACTION REQUEST

It Has Been Determined That The Following Items Are Not In Compliance:
Attach exhibits as applicable.

ITEM #NON-COMPLIANCE

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Attach extra sheets as required.

SURVEYOR'S SIGNATURE: _____ DATE: _____

NON-COMPLIANCES HAVE BEEN REVIEWED WITH THE UNDERSIGNED SUPPLIER'S REPRESENTATIVE:

_____ TITLE: _____ DATE: _____

CORRECTIVE ACTION RESPONSE

ITEM #PLANNED CORRECTIVE ACTIONWILL COMPLETE BY

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Attach extra sheets as required.

THESE CORRECTIVE ACTIONS WILL BE ACCOMPLISHED AT NO EXPENSE TO THE U.S.
GOVERNMENT, CUSTOMER, SURVEYING ORGANIZATION, OR MEMBER ORGANIZATIONS

SURVEYOR'S SIGNATURE: _____ DATE: _____

SUPPLIER REPRESENTATIVE: _____ DATE: _____

TITLE: _____

(This page shall be completed by the surveyor and the supplier's representative
as part of the exit interview.)

A1. SYSTEM:

A1.1 Are all applicable specifications available?
(To include, but not limited to the following)

- | | | |
|---|-----|----|
| (a) Customer | YES | NO |
| (b) Industry specifications (ASTM, SAE, etc.) | YES | NO |
| (c) U.S. Government specifications | YES | NO |
| (d) Company specifications | YES | NO |
| (e) Other: _____ | YES | NO |

A1.2 Is there a system in place to update specifications and remove obsolete documents? YES NO

A1.2.1 Is there evidence of compliance to the procedure? YES NO

A1.3 Unique Customer Requirements:

- | | | |
|---|-----|----|
| (a) Is there a system in place to ensure that unique customer requirements are implemented? | YES | NO |
| (b) Who has the responsibility for identifying and implementing these requirements? | | |

(function and title)

(c) How are these requirements documented?

(d) How are these requirements communicated to the inspectors?

(e) How are these requirements kept up to date with respect to the revision specified by the customer?

(f) Does this system appear to be adequate? YES NO

A1. SYSTEM: (Continued)

A1.4 Does the supplier have a self-audit procedure? YES NO

A1.5 Are all rejected parts adequately segregated until rework and reinspection/disposition has been completed? YES NO

Describe the system _____

A1.6 Do inspection stamps contain the following:

(a) Letter symbol for the method applied? YES NO

(b) The facility identifier? YES NO

(c) The inspector's identification number? YES NO

A1.7 Are parts too small for stamping identified by packaging or tagging? YES NO

A1.8 Are accepted parts marked by type and acceptance class, when specified by the inspection procedure? YES NO N/A

A1.9 Has a system been established for issuance, recall, and traceability of inspection stamps? YES NO

A1.10 Is there a system in place that provides for, acceptance, control, inspection, and return of parts per applicable purchase order? YES NO

A1.11 Is there a system in place to ensure that sub-tier suppliers (e.g. calibration services, cleaning and etching processors, etc.) comply with prime contractor requirements? YES NO

A2. PERSONNEL RECORDS:

A2.1 Is a written procedure for qualification and certification of NDI personnel available for review on site? YES NO

Document Title: _____

Document Number: _____ Date Approved: _____

A2.2 Are records of qualification and certification of inspection personnel complete, accurate, and available for review and contain the following? YES NO

(a) Name of certified individual? YES NO

(b) Level of certification? YES NO

(c) Limitations? YES NO

(d) Date of certification or recertification? YES NO

(e) Expiration date of certification? YES NO

(f) Records of training, experience, and examinations? YES NO

(g) Signature of qualifying examiner? YES NO

(h) Signature of authorized representative of outside agency, if utilized? YES NO N/A

(i) Signature of authorized employer's representative attesting to certification if different from (g)? YES NO N/A

A2.3 Have general, specific, and practical tests been given within the last 3 years and are on file and available for review?

(a) Level I and Level II YES NO

(b) Level III YES NO

(c) Does the grading system conform to the requirements of MIL-STD-410? YES NO

(d) Do tests meet the requirements of Mil-Std-410? YES NO

If not, what requirements are met? _____

(e) Are tests periodically revised or changed? YES NO

A2. PERSONNEL RECORDS: (Continued)

A2.3 (Continued):

(f) Do questions represent the applicable level of certification? YES NO

(g) Do the "specific" examination questions reflect the equipment and procedures used within this facility? YES NO

A2.4 Are records of eye test results current for inspection personnel and available for review? YES NO

(a) Near vision, at least one eye: Ortho-Rater 8 or Jaeger #2 @ 12 inches. YES NO

(b) Color vision normal for colors in applicable method. YES NO

(c) Are eye tests given annually? YES NO

A2.5 Are written recertification examinations given every three years for Level I and Level II personnel? YES NO

A2.7 Are Level III certified personnel available? YES NO

(a) Certified MIL-STD-410 Level III? YES NO

If yes, by whom? _____

(b) Certified ASNT Level III? YES NO

If yes, give ASNT Certification Number: _____

(c) Other YES NO

If yes, by whom? _____

A2.8 Do Level I personnel accept/reject parts? If yes, explain (Attach extra sheet) YES NO

A2.9 Is a training course outline for each level in place and does it address the following:

(a) Adequate technical theory for the method? YES NO

(b) Specifications and procedures? YES NO

(c) Techniques? YES NO

(d) Equipment, calibration, and standards? YES NO

(e) Materials? YES NO

(f) Training hours? YES NO

(g) Instructor requirements? YES NO

A2. PERSONNEL RECORDS: (Continued)

- | | | | |
|-------|--|-----|----|
| A2.10 | Is there a written policy describing conditions under which certification will be revoked? | YES | NO |
| A2.11 | Is there a policy for requalification of personnel that fail the certification/recertification tests or have had their certifications revoked? | YES | NO |

A3. INSPECTION REPORTS/RECORDS/PROCEDURES:

- | | | | |
|------|---|-----|----|
| A3.1 | Does the written procedure, general or specific, contain the following information as applicable: | | |
| (a) | The procedure I.D. number, applicable program, if program specific, and the date the procedure was approved? | YES | NO |
| (b) | The part number, material, shape and dimensions significant to the part to be examined? | YES | NO |
| (c) | Equipment to be used? | YES | NO |
| (d) | Materials to be used? | YES | NO |
| (e) | Surface preparation (finishing, cleaning, pickling)? | YES | NO |
| (f) | Applicable acceptance class and zone per engineering drawing specification? | YES | NO |
| (g) | A statement to the effect that quality assurance provisions will be met? | YES | NO |
| (h) | A statement to the effect that the procedure complies with all applicable specification requirements? | YES | NO |
| (i) | A statement to the effect that all personnel are qualified and certified to the applicable contract requirements? | YES | NO |
| (j) | Records and methods of marking parts after inspection? | YES | NO |
| | Stamp _____, Tag, _____, Dye _____, Other _____ | | |
| (k) | Approved deviations are listed and validated? | YES | NO |
| A3.2 | Any evidence of unauthorized specification, drawing, or procedure changes? | YES | NO |

A3. INSPECTION REPORTS/RECORDS/PROCEDURES: (Continued)

A3.3 Are technique cards prepared by the Level II or III and approved by the Level III in the applicable inspection method? YES NO

A3.4 Are inspection reports supplied with each part or lot of parts and signed by the authorized certified person? YES NO

A3.5 Is an inspection record maintained for records of all parts submitted for NDI? YES NO

If answer to 3.5 is No, describe how the above information is recorded:

Attach additional sheets if required.

A3.6 Is a system in place to insure inspection records are maintained per purchase or contract requirements? YES NO

A3.7 Are procedures for material handling and processing defined and adequate, i.e., titanium, beryllium, etc? YES NO

A3.8 Does documentation of inspection, as a minimum, cover the following?

(a) Part number and serial number, if applicable? YES NO

(b) Number of parts in lot? YES NO

(c) Number inspected and number accepted? YES NO

(d) Date of the inspection? YES NO

(e) I.D. of inspector performing the inspection? YES NO

(f) Material description? YES NO

(g) Nature of discrepancy and rejection tag number, if applicable? YES NO

A3. INSPECTION REPORTS/RECORDS/PROCEDURES: (Continued)

A3.9 Do inspection reports contain the following as a minimum:

- | | | |
|--|-----|----|
| (a) NDT facility name? | YES | NO |
| (b) Date of inspection? | YES | NO |
| (c) Part number and serial number if applicable? | YES | NO |
| (d) Number of parts in lot, number inspected, number accepted? | YES | NO |
| (e) Applicable specification number/acceptance criteria? | YES | NO |
| (f) Rejection tag number, if applicable? | YES | NO |
| (g) Signature of authorized person? | YES | NO |

A3.10 Is a work order or shop traveler in use that shows?

- | | | |
|--|-----|----|
| (a) Product identification traceable to applicable purchase order number, part number, or product specification? | YES | NO |
| (b) Applicable specification and procedure? | YES | NO |
| (c) Inspection method? | YES | NO |
| (d) Inspection acceptance or operation performed? | YES | NO |
| (e) Quantity Inspected? | YES | NO |
| (f) Correct sequence of fabrication and inspection operations? | YES | NO |

A3.11 Were any non-certified/in-training personnel observed performing operations without proper supervision?	YES	NO
---	-----	----

A4. CALIBRATION:

A4.1 Is a system in place to assure equipment calibration and control?	YES	NO
--	-----	----

A4.2 Is calibration performed in-house?	YES	NO
---	-----	----

Is calibration performed by an outside service?	YES	NO
---	-----	----

Who supplies the calibration service?

Name: _____

Address: _____

Attach extra sheets as required.

A4. CALIBRATION: (Continued)

A4.3 Does the system specify calibration intervals? YES NO

A4.4 Is equipment properly tagged? YES NO

(a) Date last calibrated? YES NO

(b) Date of next calibration? YES NO

(c) Any out-of-date calibrations observed? YES NO

(d) Calibration not required? YES NO

(e) Calibration before use? YES NO

A4.5 Do calibration and maintenance records include:

(a) Inventory of equipment requiring calibration? YES NO

(b) Manufacturer's name, model, and serial number of each item in inventory? YES NO

(c) Calibration frequency? YES NO

(d) Reference to procedure and calibration standard used? YES NO

(e) Date last calibrated and date of next calibration? YES NO

(f) Name of individual performing the calibration? YES NO

(g) If out of tolerance, what actions were taken with hardware and equipment?

Attach additional sheets if required.

A5. FACILITIES:

A5.1 Is the equipment arranged to permit a uniform and controlled flow of materials and/or parts through the shop?	Poor	Fair	Good	Excellent
--	------	------	------	-----------

A5.2 Is housekeeping neat and orderly?	Poor	Fair	Good	Excellent
--	------	------	------	-----------

A5.3 Is the inspection area properly lighted or protected to assure acceptable inspection conditions?	Poor	Fair	Good	Excellent
---	------	------	------	-----------

A5.4 Is the inspection area free of contamination or materials that may interfere with the inspection process?	Poor	Fair	Good	Excellent
--	------	------	------	-----------

A5.5 Are facilities available for application of protective coatings?			YES	NO	N/A
---	--	--	-----	----	-----

A5.6 Is there evidence of part damage due to handling?			YES	NO
--	--	--	-----	----

A5.7 Is material/part storage adequate to preclude damage?			YES	NO
--	--	--	-----	----

A5.8 Surveyors General Impression: (Attitude, behavior, are employees neat, busy, etc.)				
---	--	--	--	--

A5.9 Supplier's Comments:				
---------------------------	--	--	--	--

SAENORM.COM : Click to view the full PDF of as7100_1

SURVEY NO. _____

APPENDIX B
PENETRANT SURVEY

Instructions to the Surveyor:

This form shall be used in conjunction with and shall become a part of the SURVEY OF NDT FACILITY form (Appendix A).

Each question requires an answer.

Circle the intended response.

Fill in data when a blank line is provided.

If the surveyor's answer references an attachment, it shall become part of this survey record. The survey identification number shall be recorded on each page of every attachment.

Not applicable (N/A) responses are intended for items that are not required based on the materials/equipment in use at this facility.

All other N/A responses shall be explained.

Document any discrepancies by completing the Supplier Corrective Action Request form (AS7100/1, Page A-2) during the exit interview.

Parenthetical information is the reference paragraph from MIL-STD-6866.

B1. MATERIALS AND EQUIPMENT:

B1.1 List all penetrant materials used at this facility (4.4.1).

<u>Level or Group</u>	<u>Type/Method/Form</u>	<u>Manufacturer</u>	<u>Pen.</u>	<u>Emul.</u>	<u>Dev.</u>	<u>Listed on QPL?</u>	
_____	_____	_____	_____	_____	_____	YES	NO
_____	_____	_____	_____	_____	_____	YES	NO
_____	_____	_____	_____	_____	_____	YES	NO
_____	_____	_____	_____	_____	_____	YES	NO
_____	_____	_____	_____	_____	_____	YES	NO

B1.2 List the procedure for qualification of penetrant inspection materials if other than MIL-I-25135.

B1.3 Does the facility have traceability to the manufacturer's certifications for each batch of penetrant, emulsifier, and developer in use?

YES NO

B1.4 List the tank sizes (length x width x depth, units of feet).

<u>Level or Group</u>	<u>Penetrant</u>	<u>Emulsifier</u>	<u>Developer</u>	<u>Inspection Booth</u>
_____	___X___X___	___X___X___	___X___X___	___X___X___
_____	___X___X___	___X___X___	___X___X___	___X___X___
_____	___X___X___	___X___X___	___X___X___	___X___X___
_____	___X___X___	___X___X___	___X___X___	___X___X___
_____	___X___X___	___X___X___	___X___X___	___X___X___
_____	___X___X___	___X___X___	___X___X___	___X___X___

B1.5 Is spray penetrant application available for larger parts? YES NO

B1.6 Is automated equipment in use at this facility? YES NO

B1.7 List the generic types of parts that are penetrant inspected at this facility.

<u>Manual Processing Equipment</u>	<u>Automated Processing Equipment</u>
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

B1.8 List the largest size part that can be penetrant inspected by this facility. (____in.) x (____in.) x (____in.)

B2. PROCEDURES:

B2.1 NDT Facility Written Procedure (4.6):

B2.1.1 Do detailed written procedures exist to document penetrant inspection requirements for various categories of parts? YES NO

a) Do the procedures include controls to ensure that the customer specific requirements are met? YES NO

b) Is responsibility clearly assigned for review of customer specific requirements and planning to implement any such unique requirements. YES NO

c) How are customer specific requirements for processing parameters and acceptance criteria documented and communicated to the inspectors?

B2.1.2 Does the procedure include:

- | | | | |
|--|-----|----|-----|
| (a) An identification number, applicable program, material category, or part number(s)? | YES | NO | |
| (b) Date of approval and approval by a Level III? | YES | NO | |
| (c) Requirement that all personnel are qualified and certified to appropriate level? | YES | NO | |
| (d) Equipment to be used including any unique requirements for automated vs. manual equipment? | YES | NO | N/A |
| (e) Requirements for precleaning and/or etching process including materials, processing times, metal removal, and drying parameters? | YES | NO | |
| (f) Brand name and specific type of penetrant, sensitivity level, emulsifier, developer, and classifications in accordance with MIL-I-25135? | YES | NO | |
| (g) Complete processing parameters for the penetrant inspection materials including dwell times, application methods, drying times, concentrations, temperatures, and controls to prevent excessive drying or overheating, as appropriate? | YES | NO | |
| (h) Method of removing excess penetrant and of drying the surface prior to applying the developer, spray water nozzle type, water pressure, and water temperature? | YES | NO | |
| (i) Method of developer application, length of developing time, drying time and temperature for aqueous wet developer? | YES | NO | |
| (j) Evaluation procedure including blacklight intensity, white light intensity, dark adaptation time, prohibition of photochromatic lenses, acceptance criteria, and controls for mechanical evaluation and solvent cleaning evaluation? | YES | NO | |
| (k) Identification of the components or areas within a component to be inspected? | YES | NO | |
| (l) Any special equipment required including type and intensity of light, if different from standard processing? | YES | NO | N/A |
| (m) Complete postcleaning procedures? | YES | NO | |
| (n) Method and location of marking? | YES | NO | |
| (o) Method for control of software or programming used for automated processing equipment? | YES | NO | N/A |

(p) Statement to the effect that the procedure complies with the applicable specification requirements? YES NO

(q) System to ensure that the process control tests and checks are performed? YES NO

B2.1.3 Does the procedure provide a means to ensure that the appropriate work instructions (including sequence of operations, processing parameters, technique information, unique requirements) are made available to inspection personnel on the shop floor? YES NO

B2.1.4 Obtain examples of the following forms:

(a) Copy of completed technique card or procedure.

(b) Copy of completed shop traveler or work order.

(c) Copy of completed NDT report format.

B3. LABORATORY PROCESS CONTROLS:

B3.1 Penetrant Brightness Test (5.8.4.1.1):

(a) Is a means documented to ensure that the fluorescent brightness of in-use penetrant is being tested? YES NO

(b) At what frequency is this test being performed? QUARTERLY OTHER ____

(c) Is the test procedure in accordance with MIL-I-25135, 4.5.7? YES NO

(d) What is the minimum acceptable limit? 90% OTHER ____

(e) Are records of this test on file and do they indicate acceptable results? YES NO

(f) List the date of most recent test and the measured brightness. DATE _____
BRIGHTNESS _____

B3.2 Water Content of Water-Washable Penetrants (5.8.4.1.2):

(a) Is a means documented to ensure that the water content or water tolerance of in-use Method A is being tested? YES NO N/A

(b) At what frequency is this test being performed? MONTHLY OTHER ____

(c) What test procedure is used? ASTM D95 OTHER ____

- (d) What is the maximum acceptable limit used? 5% OTHER ____
- (e) Are records of this test on file and do they indicate acceptable results? YES NO
- (f) List the date of most recent test and the water content. DATE _____
CONTENT _____

B3.3 Water Content of Lipophillic Emulsifiers (5.8.4.2.2):

- (a) Is a means of documented to ensure that the water content or water tolerance of in-use Method B emulsifier is being checked? YES NO N/A
- (b) At what frequency is this check being performed? MONTHLY OTHER ____
- (c) What test procedure is used? ASTM D95 OTHER ____
- (d) What is the maximum acceptable limit used? 5% OTHER ____
- (e) Are records of this check on file and do they indicate acceptable control? YES NO
- (f) List the date of most recent test and the water content. DATE _____
CONTENT _____
- (g) Can the facility properly demonstrate this check? YES NO

B3.4 Concentration of Hydrophillic Emulsifiers (5.8.4.2.3):

- (a) Is a means documented to ensure that the concentration of in-use Method D emulsifier is being checked? YES NO N/A
- (b) At what frequency is this check being performed? WEEKLY OTHER ____
- (c) What instrument is used? REFRACTOMETER OTHER ____
- (d) What are the acceptance limits? +3% OTHER ____
- (e) Are records of this check on file and do they indicate acceptable control? YES NO
- (f) List the date of most recent check and the concentration. DATE _____
CONCENTRATION _____
- (g) Can the facility properly demonstrate this check? YES NO

B3.5 Concentration of Aqueous Developer (5.8.4.3.2):

- (a) Is a means documented to ensure that the concentration of in-use Form b and c developer is being checked? YES NO N/A
- (b) At what frequency is this check being performed? WEEKLY OTHER _____
- (c) What test instrument is used? HYDROMETER OTHER _____
- (d) What are the acceptance limits? _____
- (e) Are records of this check on file and do they indicate acceptable control? YES NO
- (f) List the date of most recent check and the concentration. DATE _____
CONCENTRATION _____
- (g) Can the facility properly demonstrate this check? YES NO

B3.6 Dryer Controls (5.4):

- (a) Is dryer oven in use at the facility? YES NO
- (b) Is the dryer oven temperature controlled? YES NO
- (c) At what frequency is calibration of the temperature controller being performed? _____
- (d) Is the calibration current? YES NO
- (e) List the type of temperature controller. _____
- (f) List the date of the last calibration. _____
- (g) List the date of the next scheduled calibration. _____

B3.7 Black Light Meters:

- (a) List the type and model of blacklight meter. _____
- (b) At what frequency is calibration of the meter being performed? _____
- (c) List the tolerance for calibration. _____
- (d) Describe the method or procedure for calibration. _____
- (e) Is the calibration current? YES NO

(f) List the date of the last calibration. _____

(g) List the date of the next scheduled calibration. _____

B3.8 White Light Meters:

(a) List the type and model of white light meter. _____

(b) At what frequency is it calibrated? _____

(c) What is the tolerance for calibration? _____

(d) Is the calibration current? YES NO

(e) List the date of the last calibration. _____

(f) List the date of the next scheduled calibration. _____

B4. PENETRANT AREA PROCESS CONTROLS:

B4.1 Precleaning (5.1):

(a) Is equipment in place to ensure that parts are adequately cleaned to remove grease, oil, scale, rust, etc and dried prior to penetrant inspection? YES NO

(b) List the precleaning methods used and types of contaminant encountered.

Alloy

Cleaning Method

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

B4.2 Pre-Penetrant Etching (5.1.4):

(a) Does the facility have the capability to perform pre-penetrant etching in-house? YES NO

- (b) List the alloy groups (i.e., steel, stainless steel, aluminum, etc.) and etching solutions.

<u>Alloy</u>	<u>Etching Solution</u>
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

- (c) Are process controls in place to ensure consistent etch rates (i.e., temperature solution activity, etc)? YES NO

- (d) Do operator instructions adequately address circumstances requiring pre-penetrant etching? YES NO

- (e) Do operator instructions adequately describe the etching process procedure? YES NO

- (f) List the name and address of subcontract etching facilities.

B4.3 Penetrant System Performance (5.8.3):

- (a) Is a means documented to ensure that the system performance is checked? YES NO

- (b) At what frequency is this check being performed? DAILY/SHIFT
OTHER _____

- (c) List the type of known defect standard and the acceptance criteria for each level or group.

(d) Are records of this check on file and do they indicate acceptable control? YES NO

(e) List the date of most recent check. _____

(f) Can the facility properly demonstrate this check for each sensitivity level in use? YES NO

(g) Is a means documented to ensure that the known defect standard is periodically checked to prevent degradation of its sensitivity? YES NO

(h) How often is this check performed? MONTHLY OTHER _____

B4.4 Sensitivity of In-Use Penetrant (5.8.4.1.4):

(a) Is a means documented to ensure that the sensitivity change of in-use penetrants is checked? YES NO N/A

(b) At what frequency is this check being performed? MONTHLY OTHER _____

(c) List the type of known defect standard and the acceptance criteria for each level or group.

(d) Are records of this check on file and do they indicate acceptable control? YES NO

(e) List the date of most recent test. _____

(f) Is a means documented to ensure that the known defect standard is periodically checked to prevent degradation of its sensitivity? YES NO

(g) List the date of the most recent check. _____

B4.5 Removability of Water-Washable Penetrants (5.8.4.1.3):

(a) Is a means documented to ensure removability testing for in-use water-washable penetrant? YES NO N/A

(b) At what frequency is this test being performed? MONTHLY OTHER _____

(c) Is the test procedure in accordance with MIL-I-25135 (4.5.16.2)? YES NO

(d) Are records of this test on file and do they indicate acceptable results? YES NO

(e) List the date of the most recent test. _____

(f) Can the facility properly demonstrate this test? YES NO

B4.6 Penetrant Application (5.2):

(a) Are the temperatures of penetrant materials and parts maintained between 40 and 120°F? YES NO

Other range? _____

(b) Does a means exist for controlling penetrant dwell time? YES NO

(c) When the temperature of the parts or penetrant is below 50°F, is the penetrant dwell time doubled? YES NO N/A

(d) Are electrostatic spray operations controlled to ensure complete coverage of parts? YES NO N/A

(e) Are the content of all tanks labeled, tanks covered (as appropriate), and all tanks in the system arranged to prevent mixing of materials? YES NO

B4.7 Use of Emulsifier (5.3.2.1 and 5.3.4.2):

(a) Does a means exist for controlling emulsifier dwell time? YES NO N/A

(b) Are application methods of emulsifiers properly controlled? YES NO N/A

B4.8 Removability of Emulsifiers (5.8.4.2.1):

(a) Is a means documented to ensure that removability is checked for in-use emulsifier? YES NO N/A

(b) At what frequency is this check being performed? WEEKLY OTHER _____

(c) Is the test procedure in accordance with MIL-I-25135? YES NO

(d) Are records of this check on file and do they indicate acceptable control? YES NO

(e) List the date of most recent check. _____

(f) Can the facility properly demonstrate this check? YES NO

B4.9 Penetrant Removal (5.3):

(a) Is the rinse water controlled to provide a coarse, conical spray? YES NO

- (b) What is the rinse water temperature control range? 50-100°F OTHER ____
- (c) How is the rinse water temperature monitored? _____
- (d) At what frequency is calibration being performed on the temperature monitor? _____
- (e) Is the rinse water temperature monitor calibration current? YES NO
- (f) What is the rinse water pressure control range? 40 psi max
OTHER ____
- (g) How is the water pressure monitored? _____
- (h) At what frequency is calibration being performed on the pressure monitor? _____
- (i) Is the rinse water pressure monitor calibration current? YES NO
- (j) Are hydro-nozzles used only for Level 1 and 2 sensitivity? YES NO N/A
- (k) What is the air pressure range on the hydro-air gun? 25 psi max
OTHER ____
- (l) How is the air pressure monitored? _____
- (m) At what frequency is calibration being performed on the air pressure monitor? _____
- (n) Is the air pressure monitor calibration current? YES NO
- (o) Is penetrant removal performed under a black light? YES NO
- (p) List the calibration dates for:
- | | Last | Next |
|-----------------------------|-------|-------|
| - Water temperature monitor | _____ | _____ |
| - Water pressure monitor | _____ | _____ |
| - Air pressure monitor | _____ | _____ |

B4.10 Dry Developer Characteristics (5.8.4.3.1):

- (a) Is a means documented to ensure that the in-use dry developer is being checked? YES NO N/A
- (b) At what frequency is this check being performed? DAILY OTHER ____
- (c) Does this check ensure that the developer is not caked and that recycled dry developer has not picked up excessive fluorescent material? YES NO

(d) Are records of this check on file and do they indicate acceptable control? YES NO

(e) List the date of most recent check. _____

(f) Can the facility properly demonstrate this check? YES NO

(g) Does the facility have a system to periodically add/replace developer? YES NO

B4.11 Aqueous Developer Characteristics (5.8.4.3.2):

(a) Is a means documented to ensure that the characteristics of in-use aqueous developer are being checked? YES NO N/A

(b) At what frequency is this check being performed? DAILY OTHER _____

(c) Does this check ensure that the aqueous developer uniformly wets the parts and that it does not contain fluorescent material? YES NO

(d) Are records of this check on file and do they indicate acceptable control? YES NO

(e) List the date of most recent check. _____

(f) Can the facility properly demonstrate this check? YES NO

B4.12 Black Light Measurements (5.8.1):

(a) Is a means documented to ensure that blacklight intensity is checked? YES NO

(b) At what frequency is this check being performed? DAILY OTHER _____

(c) What is the minimum acceptable limit? 800 $\mu\text{W}/\text{cm}^2$ at 15 in OTHER _____

(d) Are records of this check on file and do they indicate acceptable results? YES NO

(e) List the date of most recent check and the recorded blacklight intensity. DATE _____ INTENSITY _____

(f) Can the facility properly demonstrate this check? YES NO

B4.13 White Light Measurements (4.5.2):

(a) Is a means documented to ensure that background white light is controlled for Type I and III penetrants? YES NO

- (b) At what frequency is it checked? _____
- (c) What is the maximum acceptable limit? 2 ft-candles
OTHER _____
- (d) Are records of this check on file and do they indicate acceptable results? YES NO
- (e) List the date of most recent check. _____
- (f) Can the facility properly demonstrate this check? YES NO
- (g) Is the white light in the undarkened inspection area maintained at 100 foot-candles or more? YES NO

B4.14 Inspection Area:

- (a) Is a magnifying glass available for evaluating indications? YES NO
- (b) List magnifying power. (ie. 3X, 10X) _____
- (c) Is a boroscope available for evaluating indications? YES NO
- (d) Are calibrated measuring scales available for sizing indications? YES NO
- (e) Is the area free of fluorescent material or other contamination that may interfere with the inspection process? YES NO

B5. COMPLIANCE:

Select a minimum of 3 lots of parts at random from current production to determine compliance with these requirements. These parts should be selected to represent a variety of customer requirements and several different types of processing equipment if more than one penetrant line is in use at this facility. Investigate the purchase order specifications to identify any unique acceptance, process control, or procedure requirements applicable to these parts. Witness the facility's ability to perform inspection of these parts in accordance with the requirements.

NOTE: If no parts are available during the survey, this demonstration may be waived provided another NDT method is successfully demonstrated and a system is in place to accomplish the remainder of this compliance section.

<u>Part Description</u>	<u>Customer</u>	<u>Specification</u>	<u>Compliance</u>
_____	_____	_____	YES NO
_____	_____	_____	YES NO
_____	_____	_____	YES NO

B5.1 Customer Specifications:

- | | | |
|---|-----|----|
| (a) Is the facility using the appropriate specification and revision as required by the purchase order? | YES | NO |
| (b) Are the unique requirements appropriately made available to the penetrant inspectors? | YES | NO |

B5.2 Cleaning and Etching:

- | | | |
|--|-----|----|
| (a) Are parts properly cleaned and/or etched in accordance with customer requirements? | YES | NO |
| (b) Are parts dry prior to penetrant application? | YES | NO |

B5.3 Penetrant Application:

- | | | |
|---|-----|----|
| (a) Are parts properly masked, when required? | YES | NO |
| (b) Are precautions taken to ensure that parts are completely covered with the penetrant? | YES | NO |
| (c) Are parts properly drained? | YES | NO |
| (d) Is dwell time adequately controlled? | YES | NO |
| (e) If parts exceed maximum dwell time, are parts re-dipped? | YES | NO |
| (f) Is the correct class of penetrant used? | YES | NO |

B5.4 Penetrant Removal:

- | | | | |
|--|-----|----|-----|
| (a) Are parts washed under black light? | YES | NO | |
| (b) Is the light adequate to permit good washing? | YES | NO | |
| (c) When washing a basket of parts, is the wash water allowed to continually fall on the balance of the parts? | YES | NO | |
| (d) Is emulsifier contact time adequately controlled?
How? _____ | YES | NO | N/A |
| (e) List the type of emulsifier and the emulsification time used. _____ | | | |
| (f) If hydrophilic emulsifier is used, are the pre-rinse parameters (i.e., temperature, pressure, and time) documented and controlled? | YES | NO | N/A |

- | | | | |
|--|-----|----|-----|
| (g) If hydrophilic emulsifier is used, are concentrations kept below:
35% for application by immersion, and
5% for application by spray? | YES | NO | N/A |
| (h) Is entire part flooded with water prior to reaching maximum contact time? | YES | NO | N/A |

B5.5 Developer Application:

- | | | | |
|---|-----|----|------------------|
| (a) Is a developer in use at this facility? | YES | NO | |
| (b) When aqueous developers are used, is excess water removed from the parts prior to developer application? | YES | NO | N/A |
| (c) When applying the developer, are the parts completely covered? | YES | NO | |
| (d) Is air used to remove excess dry developer?
List the air pressure used. | YES | NO | N/A
_____ psi |
| (e) Are parts thoroughly dry prior to application of dry developer? | YES | NO | N/A |
| (f) If aqueous soluble developers are used in combination with Type I, Method A or any Type II penetrant, is specific customer documentation or approval on file? | YES | NO | N/A |
| (g) Is the developing time adequately controlled?
List the developing time. | YES | NO | _____ minutes |

B5.6 Evaluation:

- | | | | |
|--|--|----|--|
| (a) Did inspectors allow at least 1 minute to condition their eyes to the darkness? | YES | NO | |
| (b) Is the background white light less than 2 foot-candles as measured at the inspection surface with the blacklight on? | YES | NO | |
| (c) Are black lights providing adequate illumination of at least 1000 $\mu\text{W}/\text{cm}^2$ at surface of components being inspected? | YES | NO | |
| (d) List the blacklight intensity measured at the time of this survey. | _____ $\mu\text{W}/\text{cm}^2$ @ _____ INCHES | | |
| (e) Did the inspector evaluate every indication and reject parts containing relevant indications of defects that exceed the acceptance limits? | YES | NO | |

- | | | | |
|---|-----|----|-----|
| (f) Are all rejectable indications marked on the part and recorded on the appropriate paperwork? | YES | NO | |
| (g) Is all pertinent paperwork traceable to the part? | YES | NO | |
| (h) If approval for metal removal has been obtained from the customer, are all areas etched prior to processing and reinspection? | YES | NO | N/A |
| (i) Are the specific accept/reject criteria readily available to the inspector? | YES | NO | |
| (j) Do the accept/reject criteria properly reflect the customer/drawing criteria? | YES | NO | |

B5.7 Post Cleaning:

- | | | |
|---|-----|----|
| (a) Is an adequate post process cleaning operation performed? | YES | NO |
|---|-----|----|

B5.8 Inspector Qualification (4.3):

- | | | |
|---|-----|----|
| (a) Are the inspection personnel certified to the correct levels for the work they are performing? (review personnel records) | YES | NO |
|---|-----|----|

B5.9 Marking (5.9.5):

- | | | |
|--|-----|----|
| (a) Are the parts marked in accordance with the specification? | YES | NO |
|--|-----|----|

- (b) Mark with the appropriate ink stamp (symbol and color) below:

100% of Lot Inspected

Accept

Reject

Sample from Lot Inspected

Accept

Reject

List any additional observations, as appropriate.

SAENORM.COM : Click to view the full PDF of as7100_1

B6. SURVEY CRITIQUE:

B6.1 NDT Facility: Please critique and comment on the survey form and survey procedure. Specific examples to illustrate your concerns and opinions would be appreciated. Your comments may be submitted anonymously, if you so desire. Send response to:

Operations Manager
NADCAP Technical Division
PRI
400 Commonwealth Drive
Warrendale, PA 15096-0001

[illegible]

B6.2 Survey Observations: Surveyor - Use this page to furnish additional information or data, when required.

SAENORM.COM - Click to view the full PDF of as7100_1

SAENORM.COM : Click to view the full PDF of as7100_1

SURVEY NO. _____

APPENDIX C
MAGNETIC PARTICLE SURVEY

Instructions to the Surveyor:

This form shall be used in conjunction with and shall become a part of the SURVEY OF NDT FACILITY form (Appendix A).

Each question requires an answer.

Circle the intended response.

Fill in data when a blank line is provided.

If the surveyor's answer references an attachment, it shall become part of this survey record. The survey identification number shall be recorded on each page of every attachment.

Not applicable (N/A) responses are intended for items that are not required based on the materials/equipment in use at this facility.

All other N/A responses shall be explained.

Document any discrepancies by completing the Supplier Corrective Action Request form (AS7100/1, Page A-2) during the exit interview.

OFFICE AREA ITEMS

C1. MATERIALS AND SPECIFICATIONS:

C1.1 List all magnetic particles used at this facility.

<u>Manufacturer</u>	<u>Type</u>	<u>Conforms To</u>
_____	_____	_____
_____	_____	_____

C1.2 Is a manufacturer's certification available? YES NO

C1.3 Does the liquid vehicle used for carrying magnetic particles in the wet process conform to the requirements of: YES NO

AMS 2641 _____

DoD-F-87935 _____

Other (CUSTOMER APPROVAL REQUIRED) _____

C1.4 Are certifications available for the suspension carrier? YES NO

C1.5 Complete EQUIPMENT LIST on page C-11 or attach separate list that defines magnetic particle inspection equipment.

C2. PROCEDURES:

C2.1 Have copies been obtained of the following:

- | | | |
|-------------------------------------|-----|----|
| (a) Copy of traveler or work order? | YES | NO |
| (b) Copy of technique card? | YES | NO |
| (c) Copy of NDT Report? | YES | NO |

C2.2 Have written procedures been prepared for all parts by Level II or III and been approved by Level III in magnetic particle inspection?	YES	NO
---	-----	----

C2.3 Are miscellaneous small parts such as bolts, washers, pins, etc. combined in, and controlled by, general written procedures?	YES	NO	N/A
---	-----	----	-----

C2.4 Does the written procedure, general or specific, contain the following information as a minimum:

- | | | |
|---|-----|----|
| (a) Controls to ensure that customer specific requirements are met? | YES | NO |
| (b) An identification number or part number? | YES | NO |
| (c) Dated approval by a Level III? | YES | NO |
| (d) Certification requirements for inspection personnel? | YES | NO |
| (e) Equipment to be used? | YES | NO |
| (f) Type of magnetization to be used? | YES | NO |
| (g) Number of turns for fixed coil? _____ | | |
| (h) Type of particles to be used? | | |

Manufacturer: _____
 Fluorescent: _____ Nonfluorescent: _____
 Color: _____ Wet: _____ Dry: _____

If more than one, attach additional sheet.

- | | | |
|---|-----|----|
| (i) Pulse duration? | YES | NO |
| (j) Magnitude of current? | YES | NO |
| (k) Direction of magnetic field? | YES | NO |
| (l) Statement that the equipment has a variable current control with 30 or more points? | YES | NO |

(m) State current limits of the magnetizing unit?		YES	NO	
(n) Details of demagnetization procedures, including the use of the magnetic field indicators?		YES	NO	
C2.5	If coating or plating is permitted prior to inspection, is the coating thickness 0.003 inches thick or less?	YES	NO	N/A
C3.	<u>LABORATORY PROCESS CONTROLS:</u>			
C3.1	Are records maintained for the following tests:			
	(a) Particle Concentration?	YES	NO	
	(b) Comparison Tests?	YES	NO	
	(c) Viscosity Check?	YES	NO	
	(d) Ammeter Output Check?	YES	NO	
	(e) Shunt Meter Test?	YES	NO	
	(f) Internal Shorting?	YES	NO	
	(g) Ultraviolet (Black) Light Intensity?	YES	NO	N/A
	(h) White Light Intensity?	YES	NO	N/A
C3.2	Is there a procedure in place to discard the suspension when any of the following conditions exist:	YES	NO	N/A
Under Black Light	1. A noticeable reduction in fluorescence of the magnetic particles?	YES	NO	N/A
	2. Vehicle containing noticeable fluorescence?	YES	NO	N/A
	3. Vehicle milky or blue-white in color?	YES	NO	N/A
Under White Light	4. Noticeable reduction in brilliance or color of the magnetic particles?	YES	NO	N/A
	5. Vehicle which is turbid, discolored, or contains foreign particles?	YES	NO	

- C3.3 Are records of black light meter calibration available for review? YES NO
- (a) Is calibration current? YES NO
- (b) Calibration Frequency: Biannual _____ Other _____
- C3.4 Are records of white light meter calibration available for review? YES NO
- (a) Is Calibration Current? YES NO
- (b) Calibration Frequency: Biannual _____ Other _____
- C3.5 Is the Ketos ring certified and in good condition? YES NO
- C3.6 Are all field indicators calibrated? YES NO
- (a) Interval _____
- (b) Accuracy Requirement _____
- (c) Last Calibration Date _____
- C3.7 Is the black light intensity checked with a suitable light meter? YES NO N/A
- (a) Type & model _____
- C3.8 Do the black lights used for magnetic particle inspection exhibit intensity greater than or equal to 1000 $\mu\text{W}/\text{cm}^2$ when measured at the inspection surface? YES NO N/A
- (a) Measured Intensity _____
- C3.9 Is white light intensity checked with a suitable light meter? YES NO N/A
- (a) Type & model _____
- C3.10 At what interval is the test meter shunt calibrated?
- (a) Interval _____
- (b) Traceable to NIST? YES NO

C3.11 At what interval is an internal shorting test performed?
(Set machine at maximum current and activate with no conductor between heads. There should be no deflection of the meter.)

(a) Interval _____

C3.12 Is a test meter/shunt combination available for calibrating the ampere meters of magnetizing equipment?

YES NO

Manufacturer: _____ Model: _____

C3.13 At what interval is the magnetic particle machine ammeter and output checked? (The test meter/shunt combination and ammeter shall not differ by more than 5% nor may the ohmmeter be off by 10% at the unit's maximum output.)

(a) Interval _____

C3.14 Is the pulse duration of the magnetization current flow controlled from 0.5 to 1.0 second?

YES NO

(a) Duration _____

C3.15 At what interval is the pulse timer calibrated for a 0.5 second pulse?

YES NO

(a) Interval _____

C3.16 At what interval is the timing device used to calibrate the pulse timer calibrated?

(a) Interval _____

(b) Traceable to NIST?

YES NO

C4. INSPECTION AREA:

C4.1 Is a timing device available for use in calibrating the unit timer?

YES NO

Manufacturer: _____ Model: _____

C4.2 Is equipment checked to assure a current decay rate sufficient for quick break magnetization?

YES NO N/A

(a) Interval _____

(b) Amperage _____

C4.3	Is the inspection performed following all processes that would adversely affect the part (Heat Treat, Forming, Machining, Welding, etc)?	YES	NO	
C4.4	Are all parts cleaned prior to magnetic particle inspection as applicable to remove paint, scale, oil dirt and other foreign materials that may interfere with the MP inspection process?	YES	NO	
C4.5	Are parts masked as required to protect faying and/or bearing surfaces?	YES	NO	
C4.6	When required, are small openings leading to internal cavities properly plugged?	YES	NO	N/A
C4.7	Are technique cards (written procedures) on file in the inspection area for all parts to be inspected and available to inspectors?	YES	NO	
C4.8	Is magnetic particle inspection performed to approved written procedures?	YES	NO	
C4.9	Are solutions agitated prior to inspections and are sensitivity checks made to assure that magnetic particles are in suspension?	YES	NO	
C4.10	Magnetization Process - Circular			
	(a) Are central conductors available?	YES	NO	
	(b) Is a central conductor used in all cases where inspection of inside surfaces of cylindrically shaped parts is required?	YES	NO	N/A
	(c) When current is passed through the part itself, is care exercised to prevent burning at the electrode contact areas?	YES	NO	N/A
	(d) Are copper braided pads used between the part and the electrode contact?	YES	NO	N/A
C4.11	Are flexible cables used to induce circular magnetic fields?	YES	NO	N/A
	If "Yes", is a specific written procedure available and approved by authorized customer personnel?	YES	NO	N/A
C4.12	Are copper braid pads in use on the heads when passing current directly through the part to prevent arcing?	YES	NO	

C4.13 Magnetization Process - Longitudinal

(a) Is the part positioned inside the coil as close as possible to the coil inside surface with the long axis of the part parallel to the axis of the coil? YES NO N/A

C4.14 Is yoke equipment used only when applicable and in accordance with approved written procedures? YES NO N/A

C4.15 Are prods, clamps, leaches and other similar devices, when used according to approved written procedures, equipped with copper braid to prevent arcing of part surface? YES NO N/A

C4.16 Do inspectors accustom their eyes to darkness for a suitable time before performing any inspections requiring the use of black light? YES NO

(a) Duration _____

C4.17 Are aids such as magnifiers, mirrors, boroscopes and high intensity lights available for evaluating indications in interior areas of parts not readily accessible with standard lighting equipment? (List - Page C-11) YES NO N/A

C4.18 Are flux density measurements taken with field strength indicators as required? YES NO

Flux density measurements are taken with the following field strength indicator(s):

(a) Manufacturer: _____ Model: _____

(b) Manufacturer: _____ Model: _____

C4.19 Do personnel performing magnetic particle inspections wear glasses with photocromatic lenses? YES NO

C4.20 Evaluation Process

(a) Does the inspector evaluate every relevant indication? YES NO

(b) Does the inspector compare relevant indications with acceptance criteria? YES NO

(c) Are precautions taken when parts are handled during inspection not to smear or obliterate indications? YES NO

(d) Are indications not meeting the acceptance criteria marked on the part and recorded on the appropriate paperwork? YES NO

(e) Are all inspection results recorded and traceable to the hardware? YES NO

C4.21 Demagnetization

- (a) Are parts demagnetized between successive operations if residual magnetism might interfere with the interpretation of indications? YES NO
- (b) After demagnetization, are all parts tested with a magnetic field indicator? YES NO
- (c) Are coil and/or box type demag units AC operated? (List - Page C-11.) YES NO N/A
- (d) Are all parts demagnetized following magnetic particle inspection and exhibit no more than 2 Gauss or per customer specification as determined by the use of a field meter? YES NO
- (e) Are procedures in place to eliminate circumferential magnetization? YES NO

C4.22 Are all parts cleaned after magnetic particle inspection? YES NO

(a) Method _____

C4.23 After inspection and appropriate cleaning, are all parts coated with preservative oil (or anti-seize compound as required) to prevent rusting? YES NO

C5. EQUIPMENT AND MATERIALS PERFORMANCE:

C5.1 Will AC yokes lift a minimum of 10 pounds with yoke spacing of 2 to 4 inches? (List - Page C-11.) YES NO N/A

C5.2 Will DC yokes or permanent magnet yokes lift 30 pounds with yoke spacing of 2 to 4 inches, or 50 pounds with spacing of 4 to 6 inches? (List - Page C-11.) YES NO N/A

C5.3 Is the magnetic particle system effectiveness checked by testing the Ketos ring (or equivalent) showing the required holes per amperage setting for the particular type of particles being used? (List if device is different.) YES NO

Wet Method

Dry Method

#3 Hole @ 1400 Amps
#5 Hole @ 2500 Amps
#6 Hole @ 3400 Amps

#4 Hole @ 1400 Amps
#6 Hole @ 2500 Amps
#7 Hole @ 3400 Amps

(a) Interval _____

C5.4 Are records of Ketos Ring hole numbers observed within the specified amperage (3.6) available for review? YES NO

- | | | | | |
|-------|---|-----|----|-----|
| C5.5 | Is a demonstration part with a known defect used to verify the equipment and material sensitivity on a daily basis? | YES | NO | |
| C5.6 | Are black and white light intensity checks being performed and values recorded? | YES | NO | |
| C5.7 | Is the magnetic particle inspection area equipped with white light with intensity equal to or greater than 100 foot-candles when checked at the inspection surface? | YES | NO | N/A |
| C5.8 | Is the maximum ambient white light in the fluorescent magnetic particle test area less than or equal to 2 foot-candles? | YES | NO | N/A |
| C5.9 | The concentration level for wet magnetic particle bath is maintained at: | | | |
| | (a) Fluorescent _____ | | | |
| | (b) Non-fluorescent _____ | | | |
| C5.10 | Is the suspension concentration tested at least once during each shift? | YES | NO | |
| C5.11 | Is a sample of new solution saved each time mixed? | YES | NO | |
| C5.12 | Does the viscosity of the magnetic particle suspension exceed 5.0 centistokes maximum at any operating temperature? | YES | NO | |

C6. COMPLIANCE:

Select parts at random from current production to determine compliance with these requirements. These parts should be selected to represent a variety of customer requirements and several different types of processing equipment if more than one magnetic particle line is in use at this facility. Investigate the purchase order specifications to identify any unique acceptance, process control, or procedure requirements applicable to these parts. Witness the facility's ability to perform inspection of these parts in accordance with the requirements.

NOTE: If no parts are available during the survey, this demonstration may be waived provided another NDT method is successfully demonstrated and a system is in place to accomplish the remainder of this compliance section.

C6.1 Customer Specifications:

- | | | |
|---|-----|----|
| (a) Is the facility using the appropriate specification and revision as required by the purchase order? | YES | NO |
| (b) Are unique requirements made available to the magnetic particle inspectors? | YES | NO |

SAENORM.COM : Click to view the full PDF of as7100_1

<u>Part Description</u>	<u>Customer</u>	<u>Specification</u>	<u>Compliance</u>	
			YES	NO
			YES	NO
			YES	NO

Comments: _____

SAENORM.COM : Click to view the full PDF of as7100_1

EQUIPMENT LIST

Magnetic Particle Inspection Units (Stationary)

<u>Manufacturer</u>	<u>Model</u>	<u>Length</u>	<u>Output (Max)</u>	<u>Quick Break</u>	<u>Condition</u>

Magnetic Particle Inspection Units (Portable)

<u>Manufacturer</u>	<u>Model</u>	<u>Type</u>	<u>Output (Max)</u>	<u>Tax Switch</u>	<u>Condition</u>

Yokes

<u>Manufacturer</u>	<u>Model</u>	<u>Perm or AC</u>	<u>Output (Max)</u>	<u>Condition</u>

Demagnetizing Units

<u>Manufacturer</u>	<u>Model</u>	<u>Perm or AC</u>	<u>Output (Max)</u>	<u>Condition</u>

Inspection Aids

C7. SURVEY CRITIQUE:

C7.1 NDT Facility: Please critique and comment on the survey form and survey procedure. Specific examples to illustrate your concerns and opinions would be appreciated. Your comments may be submitted anonymously, if you so desire. Send response to:

Operations Manager
NADCAP Technical Division
PRI
400 Commonwealth Drive
Warrendale, PA 15096-0001

C7.2 Survey Observations: Surveyor - Use this page to furnish additional information or data, when required.

SAENORM.COM : Click to view the full PDF of as7100_1

SURVEY NO. _____

APPENDIX D ULTRASONIC SURVEY

Instructions to the Surveyor:

This form shall be used in conjunction with and shall become a part of the SURVEY OF NDT FACILITY form (Appendix A).

Each question requires an answer.

Circle the intended response.

Fill in data when a blank line is provided.

If the surveyor's answer references an attachment, it shall become part of this survey record. The survey identification number shall be recorded on each page of every attachment.

Not applicable (N/A) responses are intended for items that are not required based on the materials/equipment in use at this facility.

All other N/A responses shall be explained.

Document any discrepancies by completing the Supplier Corrective Action Request form (AS7100/1-1A, Page A-2) during the exit interview.

Parenthetical information is the reference paragraph from MIL-STD-2154.

D1. RECORDS:

- | | | | | |
|------|---|-----|----|-----|
| D1.1 | Are verification records available to verify correctness of manufactured reference standards made after September 30, 1982? (5.3.3) | YES | NO | N/A |
| D1.2 | Are certifications including Set Points and DAC curves available for commercial blocks made prior to September 30, 1982 for each instrument/transducer combination? (5.3.3) | YES | NO | N/A |
| (a) | Are metrology or layup inspection data and/or radiographic data to verify holes are in proper alignment as required for the reference standards in use? (5.3.3.1) | YES | NO | |
| (b) | Is there available comparison amplitude plots of all holes or notches showing amplitude linearity to class size (indicate linear amplifier or linear dB presentation)? (5.3.3.2) | YES | NO | |
| (c) | For cylindrical standards, is there a listing of angle of incidence or offset distance D for maximum amplitude responses for all grades, or metrology repair of FBH size material thickness and notch size when applicable? (5.3.3.3) | YES | NO | N/A |
| (d) | Are measured surface finishes (RMS, AA or RHR) of ultrasonic test standards available? (5.3.3.4) | YES | NO | |
| (e) | Is there certification that standards material is of proper alloy and type (heat treat), and free of discontinuities detrimental to reliable response from reference standard? (5.3.3.5) | YES | NO | |

	(f) Is there a chart available with dimensions showing location of all reference holes or notches? (5.3.3.6)	YES	NO	
D1.3	Are calibration records available of ASTM E317 calibrations for ultrasonic equipment in use? (5.2.1)	YES	NO	N/A
	(a) Other calibration procedure? _____			
	(b) Are records available for traceability of area amplitude Block to NIST.	YES	NO	N/A
D1.4	Are maintained records of transducer evaluations available? (5.2.5)	YES	NO	
	(a) Are all transducers serialized?	YES	NO	
	(b) Are beam profiles made for all immersion transducers?	YES	NO	
D1.5	Are inspection records kept on file? (5.5.3)	YES	NO	
D1.6	Do records show which instrument, transducer combination is used on each part?	YES	NO	
D1.7	Are records available and up-to-date on the following:			
	(a) Are preventative maintenance checks made on equipment?	YES	NO	
	(b) Are preventative maintenance checks current?	YES	NO	
	(c) Is equipment certified to appropriate specification?	YES	NO	
D1.8	When parts are serialized, are the serial numbers recorded on all shop paperwork and inspection records?	YES	NO	
D1.9	Do work instructions indicate correct procedure references?	YES	NO	
D2.	<u>METHOD:</u>			
D2.1	Is the couplant (water) free of visible air bubbles and other foreign materials which could interfere with the ultrasonic tests? (5.1.1.1)	YES	NO	
	(a) Is corrosion inhibiting agent added?	YES	NO	
	Mfgr: _____ NAME _____			
	(b) Is wetting agent added? (If Required.)	YES	NO	
	Mfgr: _____ NAME _____			
	(c) Is the filtering system adequate?	YES	NO	N/A

D2.2 Do written procedures include: (4.3)

- | | | | |
|--|-----|----|-----|
| (a) Set-up and calibration? | YES | NO | |
| (b) Entry angle of beam? | YES | NO | |
| (c) Scanning operation (speed, index, directions, etc.)? | YES | NO | N/A |
| (d) Technique for evaluating indications? | YES | NO | |
| (e) Is it adequate? | YES | NO | |
| (f) Attenuation/area amplitude checks? | YES | NO | |
| (g) Level III approval? | YES | NO | |

D2.3 Are reference standards representative of the material and part configuration being tested? (5.1.2)

YES NO

D2.4 If through transmission is employed, are transducers properly aligned?

YES NO N/A

(a) Are templates used?

YES NO N/A

D2.5 Are amplitude/distance response curves plotted for all transducer and instrument combinations, (DAC)?

YES NO

D3. CONTROLS:

D3.1 Are applicable detailed procedures and techniques and/or scan plans available to inspectors in inspection area?

YES NO

D3.2 Do some customers require approval on test standards for the parts to be inspected?

YES NO

D3.3 Is there a procedure in place for obtaining customer approval (If Required)?

YES NO N/A

D3.4 Are standards available of the correct material for the material to be inspected?

YES NO

D3.5 Are all standards and/or drawings of standards clearly identified as to material type, hole or notch size, angle and depth of hole?

YES NO

D3.6 Are system performance checks being performed prior to and immediately after each inspection, after any change in instrument settings or modules, and at 2 hour intervals during continuous operation? (5.5.2)

YES NO

Other _____

- D3.7 Are audible alarms and/or recorders being used along with visual monitoring of ultrasonic unit when inspecting plate, bar, forged billets, or materials with regular shapes and parallel surfaces? (5.2.3) YES NO
- D3.8 Are all parts dried and coated with corrosion protective material per customer requirements, before they are stacked, nested or placed in contact with one another in any way? (5.4.17) YES NO N/A
- D3.9 Are visual inspection and surface preparation adequate prior to inspection for compatible ultrasonic practice? (5.4.7) YES NO
- D3.10 Is calibration on ultrasonic inspection units current? (Enclosure I) YES NO
- (a) Are stickers affixed indicating same? YES NO
- D3.11 Are controls available to assure that material being tested has an adequate surface condition? YES NO

D4. EQUIPMENT/FACILITIES:

D4.1 Instruments:

(a) Complete Enclosure I Equipment List

(b) Is the processor's test system equipped with the following:

Recorder?	YES	NO
Automatic Marking?	YES	NO
Tachometer?	YES	NO
Gating System?	YES	NO
Water System Filter and/or deaerating system?	YES	NO

(c) Testing System is capable of auto or manual operation _____

(d) Processor utilizes the following methods

Contact _____	Squirter _____
Immersion _____	Bubbler _____

(e) Capabilities

"A" Scan _____	Pulse Echo _____
"B" Scan _____	Resonance _____
"C" Scan _____	Thru-Transmission _____

D4.2	Are voltage regulators/surge protectors used to control fluctuations? (5.2.4)	YES	NO	
D4.3	Are handling fixtures, turntables, etc., adequate for parts being processed?	YES	NO	
D4.4	Are curved surface shoes and standards available for contact inspection? (5.3.1.2)	YES	NO	
D4.5	Does manipulating equipment provide for measurable angular control of search units in degrees? (5.2.9)	YES	NO	
D4.6	Are immersion tanks of sufficient size to permit proper placement of parts with relationship to search unit? (5.2.8)	YES	NO	N/A
D4.7	Is scanning and indexing equipment adequate to ensure complete coverage of part? (5.2.9)	YES	NO	N/A
D4.8	Does the facility have C-scan recording capability?	YES	NO	
D4.9	Is scanning equipment controlled and maintained to preclude backlash, wobble, etc.?	YES	NO	N/A
D4.10	Is round bar inspection equipment available?	YES	NO	
	(a) Is rotating device synchronized with scan motion?	YES	NO	
D4.11	If required, are facilities available for drying parts after inspection?	YES	NO	N/A
D4.12	Are adequate materials handling systems available?	YES	NO	
	Forklifts _____			
	Overhead _____ Y/N Capacity _____ pounds			
D4.13	Does facility possess standard reference blocks? (5.1.2)	YES	NO	
	(a) Complete Enclosure II			
D4.14	Is storage area of reference standards adequate?	YES	NO	
D4.15	Is there evidence of mishandling of reference standards, (corrosion, pitting, etc.,)?	YES	NO	
D4.16	Transducers (5.2.5)			
	(a) Complete enclosure III transducer list.			
	(b) Are transducers stored in a protected area?	YES	NO	

D5. PROCESS:

- D5.1 Do inspectors follow the planning and other procedures? YES NO
- D5.2 Are the surfaces of parts to be inspected free from scale, dirt, oil, or other contaminants that would interfere with the inspection operations? (5.4.7) YES NO
- D5.3 Is the surface roughness of the parts to be inspected adequate for the level of inspection to be performed? (5.4.6) YES NO
- D5.4 When indications are located, are they evaluated individually to determine maximum response? (5.4.16) YES NO
- D5.5 Are gates, alarms and recorders properly used? YES NO
- D5.6 Is water adequately circulated and filtered? YES NO N/A

D6. COMPLIANCE:

Select parts at random from current production to determine compliance with these requirements. These parts should be selected to represent a variety of customer requirements and several different types of processing equipment if more than one ultrasonic line is in use at this facility. Investigate the purchase order specifications to identify any unique acceptance, process control, or procedure requirements applicable to these parts. Witness the facility's ability to perform inspection of these parts in accordance with the requirements.

NOTE: If no parts are available during the survey, this demonstration may be waived provided another NDT method is successfully demonstrated and a system is in place to accomplish the remainder of this compliance section.

<u>Part Description</u>	<u>Customer</u>	<u>Specification</u>	<u>Compliance</u>	
_____	_____	_____	YES	NO
_____	_____	_____	YES	NO
_____	_____	_____	YES	NO

D6.1 Customer Specifications: (4.1)

- (a) Is the facility using the appropriate specification and revision as required by the purchase order? YES NO
- (b) Are the unique requirements appropriately made available to the ultrasonic inspectors? YES NO

D7.1 NDT Facility: Please critique and comment on the survey form and survey procedure. Specific examples to illustrate your concerns and opinions would be appreciated. Your comments may be submitted anonymously, if you so desire. Send response to:

Operations Manager
NADCAP Technical Division
PRI
400 Commonwealth Drive
Warrendale, PA 15096-0001

D7.2 Survey Observations: Surveyor - Use this page to furnish additional information or data, when required.

SAENORM.COM : Click to view the full PDF of as7100_1

ULTRASONIC SURVEY
(Enclosure #1)

LIST OF EQUIPMENT

D1. INSTRUMENTATION:

	<u>Manufacturer</u>	<u>Model</u>	<u>Type</u>	<u>Calibration Due Date</u>
(a)				
(b)				
(c)				
(d)				
(e)				
(f)				

D2. IMMERSION TANKS:

	<u>Length</u>	<u>Width</u>	<u>Depth</u>
(a)			
(b)			
(c)			
(d)			
(e)			

D3. BRIDGES:

	<u>Manufacturer</u>	<u>Model</u>	<u>Type</u>	<u>Axis of Movement X, Y, Z</u>
(a)				
(b)				
(c)				
(d)				
(e)				

D4. RECORDERS:

	<u>Manufacturer</u>	<u>Model</u>	<u>Type</u>	<u>Paper Width</u>
(a)				
(b)				
(c)				
(d)				
(e)				

ULTRASONIC SURVEY
(Enclosure #1)
(Continued)D5. TURNTABLE:DiameterRun Out To BridgeFlatness To BridgePerpendicularity
To Search Tube

D6. MANIPULATOR:Number of AxisAccuracy

D7. TUBE/BAR TRANSPORT EQUIPMENT:ManufacturerModel

(a)

(b)

SAENORM.COM : Click to view the full PDF of as7100-1