Process Specification for Eddy Current Inspection

Engineering Directorate

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Reviewed and Prepared by:	Signature on File Ajay Koshti Materials and Processes Branch/ES4	01/07/2020 Date
Reviewed and Prepared by	Signature on File David Stanley Materials and Processes Branch/ES4	01/07/2020 Date
Reviewed and Prepared by	Signature on File Norman Ruffino Materials and Processes Branch/ES4	01/07/2020 Date
Reviewed and Prepared by	Signature on File Miles Skow Materials and Processes Branch/ES4	01/07/2020 Date
Approved by:	Signature on File Brian Mayeaux Materials and Processes Branch/ES4	01/21/2020 Date

REVISIONS		
VERSION	**CHANGES**	**DATE**
--	Original version	12/01/2000
A	Reviewed document per QMS requirements. Updated division name, organization codes, and document numbers.	04/22/2004
B	Added new NOE calibration notch classes and NOE standards. Added applicability to inspection of bolts. Defined standard NOE and special NOE in terms of calibration notch size and crack detectability	05/01/2008
C	Added "array probes or wide area coverage probes" in para 2.1. Added source-detector probes in para. 5.5.1.2. Added explanation on crack detectability size in paragraph 5.5.4.5.	9/30/2010
D	Added SNT-TC-1A to paragraph 4.0. Revised paragraph 8.0 for uniformity across all NOE PRCs.	6/29/2011
E	Added NASA-STD-50098 requirements and edited for clarity.	12/16/2019

1.0 SCOPE

This process specification establishes the minimum requirements for eddy current inspection of flat surfaces, fastener holes, threaded fasteners and seamless and welded tubular products made from nonmagnetic alloys such as aluminum and stainless steel.

2.0 APPLICABILITY

This specification is primarily applicable to in-process, final, and in-service eddy current inspections to detect surface and near surface cracks and crack-like flaws that are more or less normal to the inspection surface. However, usage is not limited to those applications.

2.1 FLAT SURFACES AND UNIFORM SECTION CORNERS

This specification is applicable to the inspection of relatively flat surfaces and uniform cross section edges and corners with a surface finish of 125 µin Ra or better. This process shall be used for directed inspections of critical or damaged areas. It shall not be used for global inspection of areas greater than 2 sq. ft. unless automated scanning equipment, array probes or wide area coverage probes are used.

2.2 FASTENER HOLES

This specification is applicable to the inspection of open fastener holes with an interior surface finish of 125 µin. Ra or better using a rotating probe hole scanner or a manual bolt hole probe.

2.3 THREADED FASTENERS

This specification is applicable to the inspection of fastener thread roots, shank surfaces, shank neck down regions, and the fillet radius under the bolt head with a surface finish of 125 µin. Ra or better and fillet radius of 1/32 in. or greater.

2.4 TUBULAR PRODUCTS

This specification is applicable to the inspection of both seamless and welded tubular products using either an encircling or probe coil technique. The use of ID probe techniques is not covered. This specification covers the inspection of tubular products ranging in diameter from 0.125 to 5 in. with wall thicknesses ranging from 0.005 to 0.250 in.

3.0 USAGE

This specification shall be invoked by an inspection callout on the engineering drawing or by a reference in a Process Specification, Task Performance Sheet, Discrepancy Report/Material Review Record, or other appropriate work authorizing document. The

engineering drawing or referencing document shall identify the specific part features or areas that require inspection. A typical eddy current inspection callout would be:

EDDY CURRENT INSPECT ALL HOLES PER NASA/JSC PRC-6509 TO STANDARD LEVEL NOE.

When fracture control requirements necessitate Special Nondestructive Evaluation (NOE) of a fracture critical component, the requirement for Special NDE shall appear in the inspection callout and the specific inspection procedure and inspector shall be qualified in accordance with Section 6.0. A typical Special NDE eddy current inspection callout would be:

EDDY CURRENT INSPECT AREA SHOWN PER NASA/JSC PRC-6509 TO SPECIAL LEVEL NDE. SPECIAL NDE CERTIFICATION REQUIRED.

3.1 INSPECTION SEQUENCE

The stage in the manufacturing process where inspection is performed should be specified on the engineering drawing or in the referencing document.

3.2 ACCEPTANCE CRITERIA

Any indication greater than 50 percent of the peak response from the reference notch shall be cause for rejection. For fracture critical parts, any indication greater than 50 percent of the reference notch response shall be reported to, and receive disposition by, the proper engineering authority.

4.0 REFERENCES

The following specifications, standards, and handbooks form a part of this document to the extent specified herein. All documents listed are assumed to be the current revision unless a specific revision is listed. In case of conflict between this specification and the technical requirements cited in other referenced documents, the requirements of this document take precedence.

ASTM E 1742	Standard Practice for Radiographic Examination.
NASA-STD-5009	Nondestructive Evaluation Requirements for Fracture Critical Metallic Components.
NAS 410	NAS Certification & Qualification of Nondestructive Test Personnel.
SNT-TC-1A	Personnel Qualification and Certification in Nondestructive Testing.

NASA-STD-5019	Fracture Control Requirements for Spaceflight Hardware.
PRC-5010	Process Specification for Pickling, Etching, and Descaling of Metals.
SAE ARP4402	Eddy Current Inspection of Open Fastener Holes in Aluminum Aircraft Structure.
SAE AS4787	Eddy Current Inspection of Circular Holes in Nonferrous Metallic Aircraft Engine Hardware.
SNT-TC-1A	Personnel Qualification and Certification in Nondestructive Testing.

The following references were used to develop this process specification:

SOP-007.1	Preparation and Revision of Process Specifications (PRC's).
JSC 8500	Preparation and Revision of Process Specifications.
SAE ARP K99-AA	Eddy Current Surface Crack Detection in Aerospace Structures (Draft document prepared by SAE AMS Committee K, Nondestructive Methods and Processes).

5.0 PROCESS REQUIREMENTS

5.1 GENERAL

Eddy current inspection of flat surfaces and threaded fasteners shall be performed in accordance with this specification. Fastener holes in aluminum parts shall be inspected in accordance with SAE ARP4402 and in other alloys in accordance with SAE AS4787 except as modified by this specification. Inspection of tubular products shall be performed in accordance with ASTM E 426 except as modified by this specification.

5.2 WRITTEN PROCEDURES

A written inspection procedure shall be used for inspection of each part. The procedure shall meet the requirements of this specification and shall ensure the consistency and reproducibility of the inspection at the required sensitivity level. General procedures covering a variety of different parts may be used provided they meet the requirements of this specification and clearly apply to the parts to be inspected. When general procedures are used, a written part specific technique shall be prepared. Each procedure and technique shall be approved by a Level Ill inspector or by a cognizant NDE engineer.

At a minimum, the part specific procedure or the general procedure and part specific technique shall include the following:

- The applicable part name and number
- A description of the part, area of the part, or hole configuration to be inspected
- The alloy type and conductivity
- The potential defect location and orientation, if known
- The applicable eddy current instrument, probes, and fixturing equipment including the manufacturer and model numbers
- The applicable calibration standard and its conductivity
- The test frequency
- Part cleaning and preparation instructions
- Equipment setup, calibration, and operation procedures
- Scan plan indicating areas covered by the inspection and any limitations
- Procedure for evaluation of questionable indications

A copy of the inspection procedure shall be provided to the customer upon request.

5.3 SCAN PLAN

Unless otherwise specified in the engineering drawing or in the referencing document, scan plans shall be designed to detect discontinuities in all credible orientations. The scan plan should document the expected crack directions, probe orientations, scan directions, scan index, effective probe width, scan overlap, probe holders and scanning aids.

5.3.1 ASSUMED CRACK ORIENTATIONS

When the direction of principal stress is known, cracks are assumed to be oriented normal to the stress direction. The scanning direction shall be within ±45 degrees of the principal stress direction with a scan index width of no more than one-half of the effective probe or field diameter. Moreover, the effective probe or field diameter should not exceed the target crack length by more than 50%.

For external corners, cracks are assumed to be oriented normal to the corner. For internal corners, cracks are assumed to be oriented both parallel and normal to the corner.

For threaded fasteners, cracks at the thread root are assumed to be oriented in the helical/circumferential direction. For the shank, cracks are assumed to be oriented in both

the axial and circumferential directions. Cracks in neck down areas and in the radius between the fastener head and the shank are assumed to be oriented in the circumferential direction. Thread terminations on the shank side cannot be inspected unless a relief zone is provided.

For fastener holes, cracks are assumed to be oriented axially.

5.4 REPORTS

An inspection report shall be prepared for each part or group of parts. The report shall indicate compliance with this specification, reference the appropriate written procedure and include the names of personnel performing the inspection. The report shall identify each part by part number and serial number and indicate whether each part was accepted or rejected. The report shall include a description of the inspection coverage and any limitations. The locations and estimated sizes of all reportable flaws shall be noted in the inspection report. Inspection reports shall be retained as a permanent quality record and a copy provided to the responsible design authority.

5.5 EQUIPMENT

Instrument/probe combinations shall be capable of meeting the calibration requirements of Section 5.7. During inspection operations equipment shall be located at least 10 ft. from any items that generate a large magnetic field, such as motors, generators, and transformers.

5.5.1 INSTRUMENTS

Instruments shall be equipped with impedance plane or time base signal display. Instruments shall be capable of operating between 100 kHz and 6.0 MHz. However, instruments may be operated at other frequencies if the requirements of Section 5.7 are met. Instruments shall be equipped with an audible and/or visual alarm system. For other than battery-powered instruments, a voltage regulator shall be used if instrument internal voltage regulators are not adequate to prevent a signal variation of 20% or more.

5.5.2 PROBES

The recommended frequency range for aluminum alloys is 100 - 500 kHz and 800 kHz - 3.5 MHz for lnconel, CRES, and titanium alloys.

Probes should be marked with their operating frequency range. The recommended maximum coil diameter is 0.125 inch for single coil and array probes used for detection of surface flaws. The impedance of probes and adapters shall match the instrument being used. Probes may have an absolute, differential, or source-detector coil arrangement and may be shielded or unshielded. Differential and source-detector probes shall be oriented appropriately with respect to the expected crack direction during scanning. Probes shall not give interfering responses from handling pressure or manipulation and meet the noise

ratio requirements in Section 5.7.4.

Effective scanning requires a uniform material form factor and lift-off throughout the scan area. For manual scans probe guides such as non-metallic rulers or stencils should be used to ensure uniformity of the material form factor and scan indexing. Moreover, probe collars or edge/corner probes should be used when possible to reduce lift-off effects. When inspecting for cracks in concave surfaces, the probe tip shall be convex and shall nest in the radius with less than
0.005 in. lift-off.

Non-conductive tape may be applied over the probe tip to protect the probe coil and part from wear. If tape is used, calibration shall be performed after initial application and anytime it is replaced. Use of tape shall not violate the noise ratio requirements.

5.5.3 SCANNERS

Automated scanning systems may be used to obtain controlled lift-off and indexing between scans. If an automated scanner is used, the calibration procedure shall include scanning of the reference standard to verify that the appropriate sensitivity level and noise ratio requirements are achieved. Hand scanning may employ encoder or time scan for data acquisition. Any tape applied to the probe should be periodically checked for wear and replaced if necessary.

5.5.4 RECORDING DEVICES

Data recording devices, when used, shall be compatible with the instrument and capable of generating a permanent record or copy of the signal response.

5.5.5 REFERENCE STANDARDS

5.5.5.1 CONDUCTIVITY

For parts with a conductivity less than 10% IACS, the reference standard conductivity shall be within ±2% IACS of the part conductivity with a minimum reference standard conductivity of 0.8% IACS. For parts with a conductivity of 10% IACS or greater, the reference standard conductivity shall be within ±15% of the part conductivity. When the part has a coating, a shim or coating with the same conductivity (±5% IACS) and thickness (+0.003"/-0.000") as the part coating shall be placed on the reference standard during instrument calibration.

5.5.5.2 EDM NOTCHES

Reference standards shall contain one or more of the EDM notches specified in Table 1. Other EDM notches may be used provided the peak vertical notch response is less than or equal to the peak vertical response from the largest acceptable fatigue crack.

Table 1: EDM Notch Dimensions (Inches)

Primary Notches						Alternative Notches					
Semi-Circular Surface Notches				Radial Corner Notches		Rectangular Long Notches (Length >0.75)			Rectangular Through Notches at the Edge of 0.1 Thick Sheet or Plate		
Class	Length	Depth	Width	Radius	Width	Designation	Depth	Width	Designation	Depth	Width
A0	0.015 ±0.002	0.007 ±0.001	≤ 0.004	0.010 ±0.001	≤ 0.004		.	.	.		
A1	0.020 ±0.002	0.010 ±0.001	≤ 0.004	0.014 ±0.001	≤ 0.004	L1	0.001 - 0.002	≤ **Depth**	T1	0.001 - 0.002	≤ **Depth**
A2	0.025 ±0.002	0.012 ±0.001	≤ 0.004	0.017 ±0.001	≤ 0.004	L2	0.002 - 0.003	≤ Depth	T2	0.003 - 0.004	≤ Depth
A3	0.030 ±0.002	0.015 ±0.002	≤ 0.004	0.021 ±0.002	≤ 0.004	L3	0.003 - 0.004	≤ Depth	T3	0.004 - 0.005	≤ Depth
A4	0.040 ±0.002	0.020 ±0.002	≤ 0.004	0.028 ±0.002	≤ 0.004	L4	0.005 - 0.006	≤ 0.004	T4	0.008 - 0.007	≤ 0.004
A5	0.050 ±0.002	0.025 ±0.002	≤ 0.004	0.035 ±0.002	≤ 0.004	L5	0.008 - 0.010	≤ 0.004	T5	0.009 - 0.011	≤ 0.004
A6	0.060 ±0.002	0.030 ±0.002	≤ 0.004	0.042 ±0.002	≤ 0.004	LS	0.011 -0.013	≤ 0.004	T6	0.013 - 0.015	≤ 0.004
A7	0.070 ±0.002	0.035 ±0.002	≤ 0.004	0.049 ±0.002	≤ 0.004	L7	0.015 - 0.017	≤ 0.004	T7	0.018 -• 0.020	≤ 0.004

Semi-circular surface notches shall be used to establish the required sensitivity level for inspection of relatively flat surfaces, fillet radii, thread roots, and fastener shanks. Radial corner notches shall be used for inspections of external comers. Rectangular through notches shall be used for inspections of edges 0.1 inch thick or less. Rectangular long notches may be selected for use with any surface geometry based on a comparison of the signal response from the long notch to the eddy current response from the applicable semi-circular surface, radial corner, or rectangular through notch.

5.5.5.3 CONFIGURATION

Schematics for typical reference standards are given Figures 1 through 5. The notch dimensions are in accordance with the applicable notch class in Table 1. Air Force 7947479 series general purpose standards may be used for fastener hole inspections. The as-built dimensions, in particular EDM notch dimensions, shall be measured and documented. Reference standards shall be certified when required by the responsible engineering organization.

Table 2 contains a listing of conforming reference standards available through Olympus NDT.

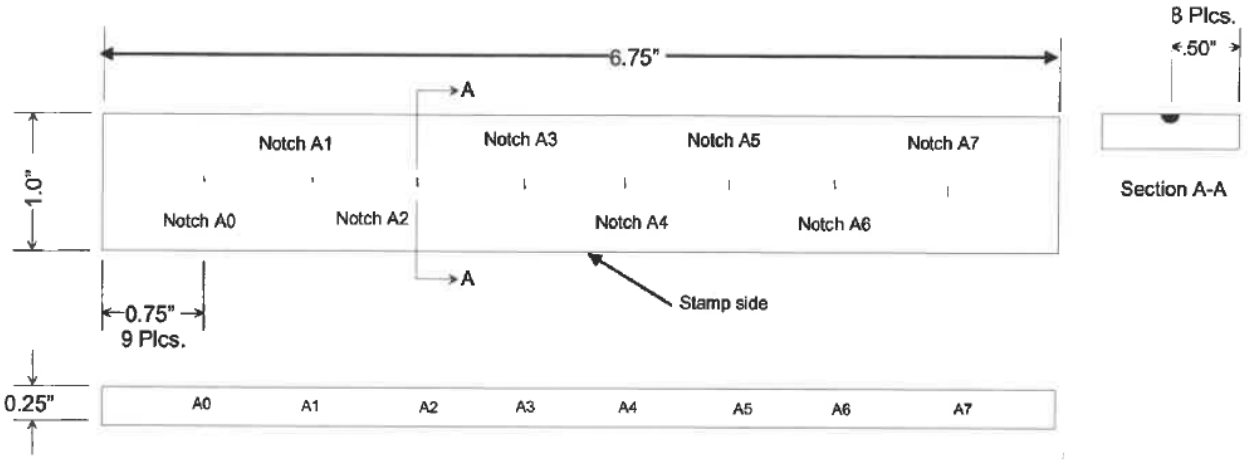

Figure 1: Surface Notch Reference Standard

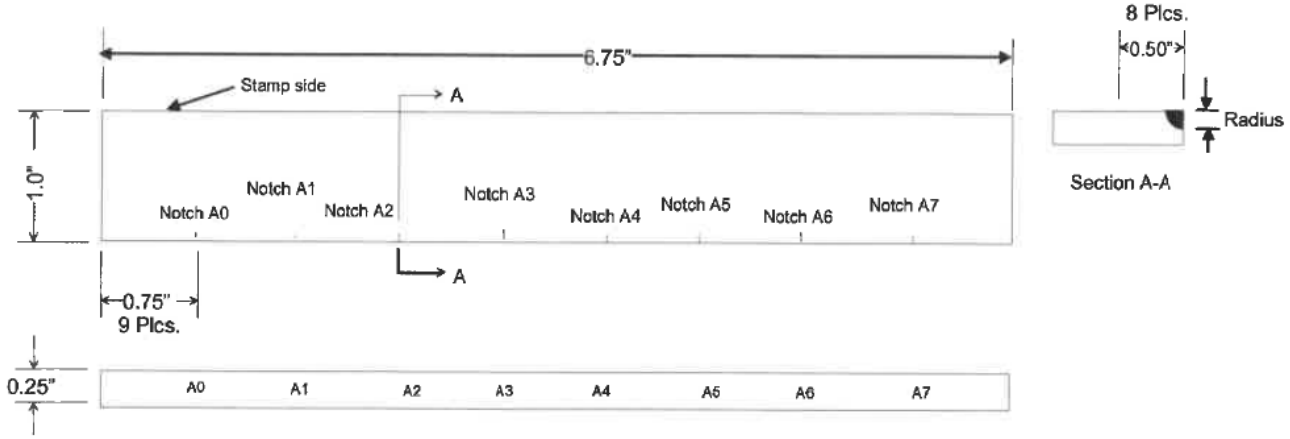

Figure 2: Corner Notch Reference Standard

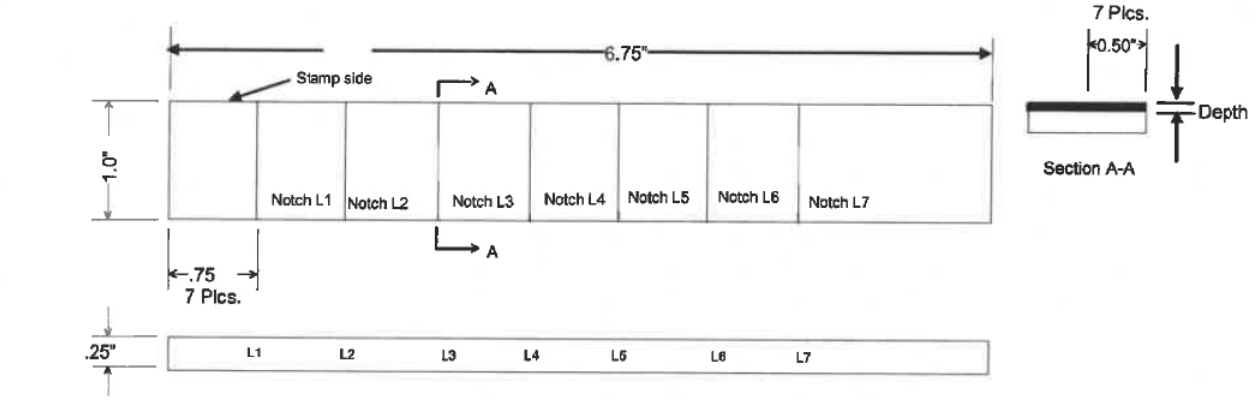

Figure 3: Long Notch Reference Standard.

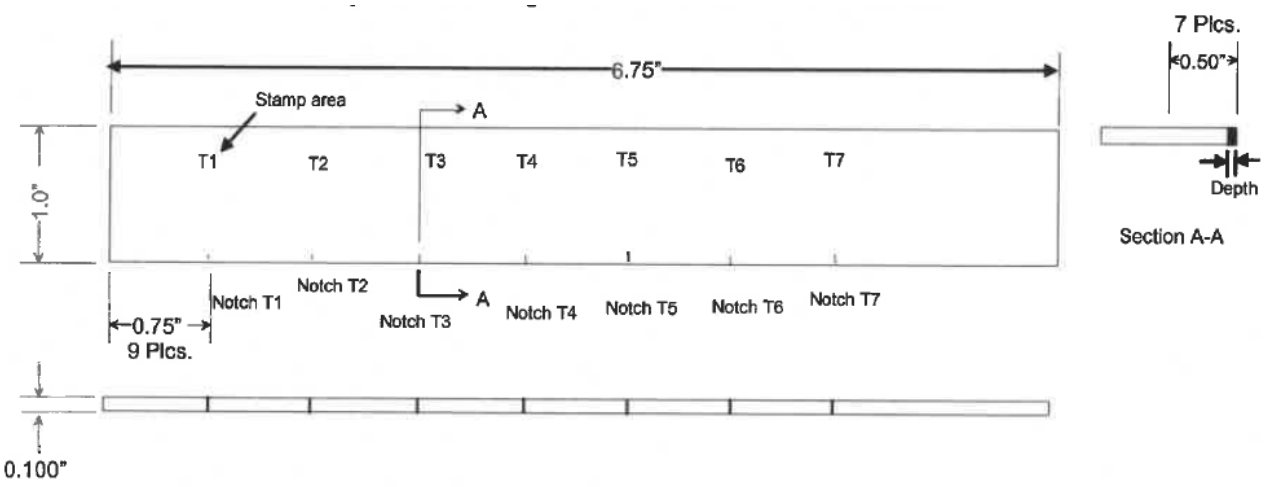

Figure 4: Through Notch Reference Standard

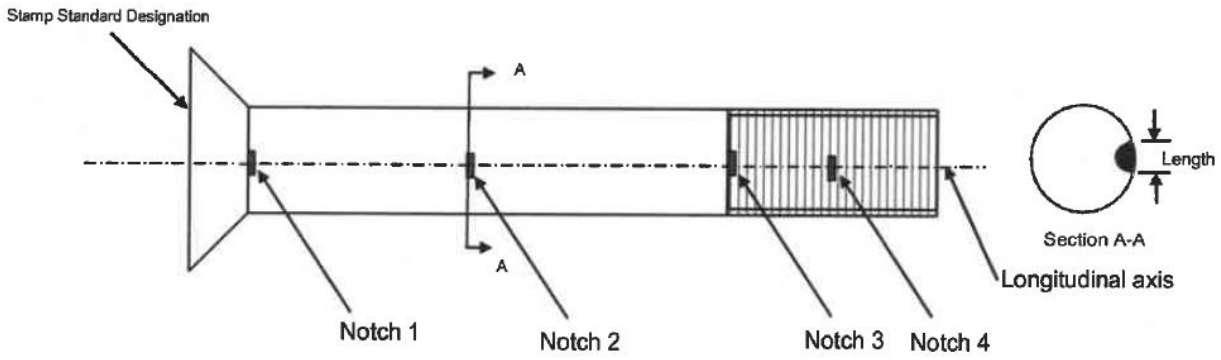

Figure 5: Threaded Fastner Reference Standard (Notch 4 and 4 at Thread Root)

Table 2: Applicable Eddy Current Crack Detection Standards

Part#	Material	Description
7947479-6AL4V-10	6AL-4V Titanium	Air Force General Purpose Eddy Current Standard
7947479-304-10	304 Stainless Steel	Air Force General Purpose Eddy Current Standard
7947479-7075T6-10	7075-T6 Aluminum	Air Force General Purpose Eddy Current Standard
NEC-6365-2024T8	2024-T3 Alum, 30.08% IACS	Surface Notch Standard
NEC-6365-2024T8	2024-T8 Alum, 40.4% IACS	Surface Notch Standard
NEC-6366-2024T8	2024-T8 Alum, 40.37% IACS	Corner Notch Standard
NEC-6366-2024T3	2024-T3 Alum, 29.65% IACS	Corner Notch Standard
NEC-6367-2024T8	2024-T8 Alum, 40.64% IACS	Long Notch standard
NEC-6367-2024T3	2024-T3 Alum, 29.55% IACS	Long Notch standard
NEC-6368-2024T3	2024-T3 Alum, 29.92% IACS	Thru Notch standard
NEC-6368-2024 T8	2024-T8 Alum, 39.98% IACS	Thru Notch standard
NEC-6365-718	Inconel 718, 1.43 %IACS	Surface Notch standard
NEC-6365-304	CRES 304, 2.52 %IACS	Surface Notch standard
NEC-6365-6Al-4V	6Al-4V, 1.05 %!ACS	Surface Notch standard
NEC-6367-718	Inconel 718, 1.44 %IACS	Long Notch standard
NEC-6367-304	CRES 304, 2.45 %IACS	Long Notch standard
NEC-6367-6Al-4V	6Al-4V, 1.04 %IACS	Long Notch standard
NEC-6366-718	Inconel 718, 1.43 %!ACS	Corner Notch standard
NEC-6366-304	CRES 304, 2.52 %!ACS	Corner Notch standard
NEC-6366-6Al-4V	6Al-4V, 1.04 %IACS	Corner Notch standard
NEC-6368-718	Inconel 718, 1.26 %IACS	Through Notch standard
NEC-6368-304	CRES 304, 1.83 %IACS	Through Notch standard
NEC-6368-6Al-4V	6Al-4V, 0.98 %IACS	Through Notch standard

5.6 PART PREPARATION

Dirt, grease, and/or loose paint shall be cleaned from the inspection surface. If necessary, determine the thickness of any coating with a coating thickness gage. A similar type and thickness shim or coating shall be placed over the reference standard for calibration (refer to Section 5.5.5.1).

5.7 CALIBRATION

5.7.1 GENERAL

Inspection equipment shall be calibrated against the appropriate reference standard and EDM notch as specified in Sections 5.5.5 and 5.7.3. Evaluation of flaw indications shall be accomplished using a signal versus EDM notch size curve obtained on the reference standard notches.

5.7.2 CALIBRATION INTERVAL

Calibration shall be performed at the beginning and end of each inspection operation and at least every four hours in between. Calibration shall also be performed if equipment is changed or replaced. If the response from the reference standard notch has changed by more than 5% of full scale from the original calibration, perform one of the following:

1. If the notch response is greater than that obtained during the original calibration, recalibrate and re-inspect any part which was rejected since the last calibration.

2. If the notch response is less than that obtained during the original calibration, recalibrate and re-inspect all parts inspected since the last calibration.

5.7.3 SENSITIVITY LEVELS AND NOTCH CLASSES

The required sensitivity level is achieved by use of the appropriate EDM notch for calibration and by meeting the other requirements of this specification. The primary EDM notches in Table 1 are classified from AO to A7 in order of increasing size. Therefore, calibration using an A3 notch results in a higher sensitivity level than using an A4 notch. The alternative long notches (L1 to L7) and through notches (T1 to T7) are similarly designated in order of increasing size.

The calibration notch class for a given sensitivity level shall be selected in accordance with Table 3. When Standard or Special NOE sensitivity levels are not applicable or when the Special NOE crack size is other than that indicated in Table 3, the calibration notch class shall be selected based on a comparison of eddy current responses from fatigue cracks of the relevant size and geometry and EDM notches of the relevant geometry. An EDM notch producing a response less than or equal to the response from the relevant fatigue crack shall be selected for calibration.

Table 3: Sensitivity and Class of Calibration Notch

Sensitivity Level	Notch Class	Comment
Standard NDE[1]	A3[3]	Default notch class.
Standard NDE[1]	A4	Acceptable if A3 notch does not meet noise ratio requirements.
Standard NDE[1]	AS	Acceptable if A4 notch does not meet noise ratio requirements.
Special NDE[2]	A2	Default notch class.
Special NDE[2]	A3	Acceptable if A2 notch does not meet noise ratio requirements.
Special NDE[2]	A4	Acceptable if A3 notch does not meet noise ratio requirements.

Note 1. Standard NOE surface crack size of 0.100" long x 0.050" deep (or greater) and corner crack size of 0.075" long x 0.075" deep (or greater).

Note 2. Typical Special NOE surface crack size of 0.050" long x 0.025" deep (or greater) and corner crack size of 0.035" long x 0.035" deep (or greater). Special NOE qualification in accordance with Section 6.0 is required.

Note 3. The ratio of crack length to EDM notch length providing the same eddy current amplitude is assumed to be from 1.5 to 2 for Class A3 with an optimum eddy current set-up.

For Standard NOE inspections of fracture critical components, calibration notches shall be no larger than the following:

(1) Rectangular Surface Notch: 0.050 ±0.002 in. long by 0.025 ±0.002 in. deep and ≤ 0.005 in. wide.
(2) Triangular Corner Notch: 0.035 ±0.002 in. long by 0.035 ±0.002 in. deep by ≤ 0.005 in. wide.
(3) Rectangular Through Edge Notch (part thickness s 0.1 in.): ≤ 0.1 in. long by 0.010 ±0.001 in. deep by ≤ 0.005 in wide.

5.7.4 NOISE RATIO

Inspection sensitivities for scanning and evaluation are different. However, the reject level setting is the same during part scanning and indication evaluation. The reject level is set to 50% of the maximized vertical response from the calibration notch. The ratio of the reject level to the observed noise, called the threshold to noise ratio (TNR), shall be visually assessed during calibration, scanning and evaluation. During calibration on the reference notch the TNR ratio shall be 3:1 or greater. During part scanning, the TNR ratio shall be 2:1 or greater. Noise is measured as maximum of peak responses from a non-indication area or background outside indication area {~99 percentile noise).

For Standard NOE inspections of fracture critical components, noise levels on the

component shall be less than 25 percent of the reference notch response and the influence of coatings and lift-off variations on the reliability of the inspection shall be evaluated for application-specific suitability and documented in the NOE Summary Report.

5.7.5 SCANNING

Reference standards shall be scanned at the same speed as the component with the probe scanning over the reference notch in the same relative direction as the expected crack in the component. If the expected crack direction is not known, scans shall be performed in two orthogonal directions or the calibration notch shall be scanned in the most unfavorable direction with respect to peak response when establishing the reject level. Whenever possible, 4 to 6 dB vertical gain shall added during component scans without changing the reject level. However, indications shall be optimized and evaluated at the calibration gain. If an alarm is used, the alarm level should be less than or equal to the reject level.

5.7.5.1 SCAN INDEX

The scan index for both manual and automated scans shall not exceed one-half of the effective probe coil or field diameter. For shielded probes the effective probe coil diameter shall be equal to probe diameter. For unshielded single coil probes, the effective probe coil width shall be based on scans of the calibration notch. The distance between closely spaced parallel scans of the calibration notch that produce indications that are 50 percent of the peak notch response shall be considered the effective probe coil or field diameter. For array probes, the effective probe coil or field width is the distance between the centers of the first and last coils in the array. The minimum overlap between adjacent scans shall be equal to the spacing between two adjacent coils.

5.8 INTERPRETATION OF INDICATIONS

The presence of a potential crack is indicated by a rapid signal response similar in appearance to the reference notch response. Once an indication is detected it shall be evaluated at the calibration gain. The indication should be carefully rescanned to maximize the indication amplitude by finding the most favorable scan direction and location. Compare the maximized response to the maximized calibration notch response. A response amplitude greater than 50% of the calibration notch response indicates the presence of acrack. Indications showing less than 50% of the calibration notch response may indicate a defect condition. The following steps should be taken to evaluate the significance of such indications:

1. Non-conductive coatings may reduce the amplitude of the crack signal. Assess coating thickness and compensate for the coating thickness.

2. Smeared metal on the surface of the part may reduce the amplitude of the crack signal. Etch the part per PRC-5010, section 6.3.2 "Etching for Penetrant Inspection", re-calibrate, and re-inspect.

3. If the defect condition is at an edge, use an edge guide with the slotted reference standard and re-calibrate. Using the edge guide, re-inspect the part.

6.0 SPECIAL NDE QUALIFICATION

Use of Special NDE in accordance with NASA-STD-5009 requires formal demonstration of the capability to detect Cracks at least as small as the critical initial crack size for the specific component to a 90/95 probability of detection level. Each procedure, procedure application, and operator must demonstrate the required capability. Requests for Special NDE qualification shall be directed to the JSC Materials and Processes Branch (ES4).

7.0 DEVIATIONS AND WAIVERS

Any deviations or waivers regarding the use of this process specification shall be requested in writing. This request shall be directed to the JSC Materials and Processes Branch (ES4) with the appropriate justification and rationale. A written response will be provided upon such a request.

8.0 TRAINING AND CERTIFICATION OF PERSONNEL

Personnel performing acceptance inspections of Class I, II, IIIW and GSE hardware shall be qualified and certified, at a minimum, to Level 2 in accordance with NAS 410. Personnel performing acceptance inspections requiring Special NDE shall also be qualified and certified for Special NDE in accordance with NASA-STD-5009 (Section 6.0).

Personnel performing acceptance inspections of Class Ill, STE/D, mockup, and facility hardware shall be qualified and certified in accordance with either NAS
410 or SNT-TC-1A. Personnel making accept/reject decisions shall, at a minimum, be certified to Level 2. Level 3 personnel making accept/reject decisions shall have successfully completed a hands-on practical examination equivalent to the examination required for Level 2. Level 1 personnel may perform acceptance inspections under the direct supervision of a Level 2 but shall not make accept/reject decisions.

Formal qualification and certification is not required for personnel performing engineering evaluation inspections.

9.0 DEFINITIONS

90/95	The point where the 95% lower confidence bound on the Probability of Detection (POD) vs. Crack size curve crosses 90% POD.

Probability of Detection	The point where the 95% lower confidence bound on the (POD) vs. Crack size curve crosses 90% POD.
Compound Comer	A comer formed by intersection of three or more surfaces. Internal comer is concave in shape and external comer is convex in shape.
EDM	Electrical Discharge Machining
Final Inspection	The final inspection performed for the acceptance of the component.
Fracture Critical Component	Classification which assumes that fracture or failure of the component resulting from the occurrence of a crack will result in a catastrophic hazard. Fracture critical components will be identified as such on the engineering drawing.
Indication In-	Evidence of a discontinuity that requires interpretation to determine its significance.
Process In-	Inspections which occur during manufacturing before a component is in final form.
Service	Inspections performed on components that are in use or storage.
NAS	National Aerospace Standard
Noise	Noise is measured as maximum of peak-to-peak amplitude sampled from non-indication area or background outside indication area. Noise sample shall have at least 40 measurements.
SAE	SAE International
Special NDE	A fracture control term denoting nondestructive inspection personnel, procedures, and equipment with a demonstrated capability to reliably (90/95) detect flaws smaller than those normally detected by typical procedures.