DCMA NSEO MANUFACTURING PROCESS REVIEW (MPR) CHECKLIST #03MT

MAGNETIC PARTICLE TESTING

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| **SUPPLIER & CAGE:** |  |
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| **LOCATION:** |  |
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| **PROCESS REVIEWED:** |  |

**Program Type:**

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|  | Level I/SUSBAFE (LI/SS) |  | Navy Propulsion Program (NPP) |  | Deep Submergence Systems/Scope of Certification Program (DSS-SOC) |
|  | Nuclear Plant Material (NPM) |  | Naval Nuclear Propulsion Program (NNPP) |  | Aircraft Launch & Recovery Equipment (ALRE) |
|  | Fly By Wire Ships Control Systems (FBWSCS) |  | Ships Critical Safety Items (SCSIs) |  | Other: |

**Contractual Requirement(s) for this Process:**

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**Supplier Procedure Number(s), Title(s) & Revision Level(s)/Date(s):**

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| **Process Reviewed By:** |  |
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| **Date(s) of Review:** |  |
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**Process Concerns and Guidance:**

* Improper Surface Preparation: It is critical that Magnetic Particle inspections be performed on surfaces that meet technical and procedural requirements. Improper surface conditions can mask defects or cause non-relevant or false indications.
* Inspection Coverage Problems: Insufficient coverage of the full area of interest, inspections beyond the specification’s allowable limits for coil, prod and yoke inspections, and insufficient magnetic field overlap to ensure full magnetic field coverage of inspection areas The inspection surface as offered in the final surface condition for acceptance has been inadequate.
* Acceptance Criteria: Acceptance criteria can vary depending on whether the product will be 100 percent volumetrically inspected using another NDT method. QAR must be cognizant of all NDT inspections to be performed that may affect acceptance criteria. Inspection procedure and Acceptance criteria should be available to inspector at workstation
* Inadequate Process Controls: In fluorescent magnetic particle testing, the particles in solution will gradually become depleted with use or may become contaminated with extraneous material. Suppliers must test the solution, normally daily when in use, to determine that there is an adequate level of particles in the solution and contamination level is not excessive.
* Inadequate Technique: There have been instances of poor technique observed which have resulted in invalid and questionable results due to inadequate pre-cleaning, inadequate visible or fluorescent lighting in the inspection area, inspecting beyond the limits of the coil, inspections performed on rough surfaces and inspections performed in only one direction or with inadequate magnetic field.
* Dry technique: Insufficient application of particles, excessive removal of particles and lighting on the test surface.
* Wet technique: Concentration and application of suspension of particles and the intensity of ultraviolet light at the test surface.
* Process Control testing not being performed as required
* Inaccessible areas on parts not adequately masked to preclude loss of cleanliness
* Amperage not within the procedure/specification range
* De-magnetization not being performed as required

**Governing Specifications**:

* NAVSEA 250-1500-1
* MIL-STD-2132
* T9074-AS-GIB-010/271

**Additional Oversight Checklists**

Addendums to this MPR checklist are available to use for a more in-depth process review. If used, the completed Addendum(s) are to be uploaded to the SAP Database in PDREP with the base checklist.

* 03 MPR-MPS - Addendum 1 – NDT Qualification, Certification and Oversight

**General Instructions for Performing Magnetic Particle Testing Process Reviews:**

Navy Supplier contracts may invoke various, governing NDT specifications. This checklist may not include all of the requirements of all of the possible specifications that may be called out in a Navy contract and is, therefore, offered as guidance. It is incumbent upon the QAR to review the governing specifications imposed on the supplier being audited and adjust this checklist accordingly. Additional checklists regarding Mil-STD, ASTM, and personnel certification specifications can be found in the NSEO NDT Toolbox.

Use this over-arching checklist in tandem with the additional, specific checklists. (Example: an audit of an NDT lab for magnetic particle may require the use of this checklist, the NAVSEA-250-1500 checklist, the SNT-TC-1a checklist and possibly numerous MIL-STD and/or ASTM checklists.)

**A**. **MANPOWER:**

1. Is there a Written Practice for the control and administration of NDT personnel training, examination, certification and oversight approved by the Level III Examiner? (Addendum 1 available if needed)

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1. Are the personnel performing the inspection and testing functions of the appropriate skill/experience level and/or properly trained/certified to perform the required inspections/tests? ***What are the requirements?***

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1. Record all operations observed (include type and specification, where applicable) and the corresponding inspectors’ names. Are any personnel certifications expired and are they still working in the process? (NAV03-9)

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1. Are all NDT personnel, including the examiner, recertified by examination at a minimum interval as required by specification? (NAV03-3)

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1. Are adequate records available to administer personnel qualification (e.g. name, evidence of examination given, grade, re-certification dates, signature of examiner)? (NAV03-4)

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1. Do records include evidence of performance of applicable NDT during the last 9 months or performance of required surveillance and technical performance evaluations as applicable to maintain qualification? (NAV03-5) ***What are the requirements?***

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1. Are vision test records available? Do vision test records note corrective aids (glasses) when applicable? Do these records indicate a J1 Jaeger test or equivalent brightness discrimination on an annual basis, when applicable? (NAV03-6A/B/7)

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1. Are the credentials of the training/certification official in accordance with specification requirements? ***What are the requirements?***

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1. Is there a corrective action system or remedial training plan in place for when inspector errors occur and is there evidence that it is followed?

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**B. MATERIALS**:

1. Are materials controlled and traceable throughout the process?

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1. Are certifications for materials used in the process reviewed for acceptance and maintained on file for review?

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1. Do the materials comply with contract/specification and/or supplier-imposed technical requirements? ***What were the materials reviewed?***

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1. Are there controls to ensure conforming material is consistently used in the process?

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1. Are materials traceable and identified, as required, and within shelf life, if applicable? ***(There are shelf lives for chemicals. Check the manufacturer’s certification or the chemical drum for this information)***

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1. Was the material's integrity compromised by further processes and/or practices? ***If so, how?***

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**C. MACHINERY**:

1. Is **inspection and testing equipment** of the required adequacy, accuracy, precision, and range to assure components produced comply with specifications and drawings? *What Items were sampled and were they part of the supplier’s calibration program and within the calibration/check cycle?*

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1. Does equipment, requiring qualification or certification approval, have contractual approval for use?

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1. Identify the NDT equipment available at this facility. Is Government owned equipment adequately protected/maintained in accordance with a documented process?

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1. Are standards, traceable to NIST or is certification document, available to verify the accuracy of the testing equipment?

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1. ***Equipment Calibration* –** Magnetic Particle Inspection examination equipment should be checked for performance and accuracy at the time of purchase and at defined intervals thereafter; whenever malfunction is suspected, when specified by the Cognizant Engineering Organization, or whenever electrical maintenance that might affect equipment accuracy is performed. Governing contract NDT specifications will define these requirements. (NAV03-15) ***What requirements are applicable to this facility? Does the equipment meet these requirements?***

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**D**. **METHODS**:

1. Is the correct NDT procedure readily available and being used by the inspector and approved by the cognizant NDT Level III? Identify procedure number, revision, date, and applicable Approval Number (if applicable). (NAV03-2/8A)

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1. Are work instructions, test procedures, travelers, etc. being used current, adequate, clear, concise and up to date (latest revision) to allow only contractually conforming supplies to be delivered to the Government? ***What documents (identifying number & revision) were reviewed?***

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1. Do records of MT clearly identify the results of the inspections and tests performed and include traceability back to the procedure, lot/heat numbers, instruments used, personnel who performed each inspection, and the joint or piece inspected with number and type of defects, and any repair descriptions? (NAV03-14)

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1. Are MT records completed properly, and are they adequate to meet procedural requirements? Are they maintained to confirm that all required inspection processes were performed? Do they indicate “heat off” date and time, when applicable (24 hour or 7 day MT requirement for HY-80/100 materials)? (NAV03-13) ***Record the number of inspection documents sampled for review.***

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1. Is material/product, which has been through the process, positively controlled, traceable, and have the inspections/tests performed been documented to provide a positive indication of the inspection status of the material (e.g. individual inspected, operation sign-off, inspection stamped/initialed/signed accepted or rejected)?

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1. Are changes to methods (instructions) controlled and distributed adequately and timely to affected personnel?

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1. Is there supplier data available for analysis that can substantiate the effectiveness or ineffectiveness of this process? ***If available, what data was reviewed, and what does the data indicate?***

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**E.** **ENVIRONMENT**:

1. Is the process conducted under controlled environmental conditions as required by contractual and/or supplier-imposed technical requirements? ***What are the environmental conditions and are they monitored (charts, gages, etc., within calibration)?***

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1. Is safety equipment available and in use, if needed? ***What are the safety requirements for this process?***

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1. Is lighting adequate (visible or fluorescent as applicable) per procedure, and does the procedure meet the specification’s technical requirements? (NAV03-11)

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**F. PRODUCT EXAMINATION:**

***The QAR must perform a product examination in order to verify the output of the process being reviewed and document the results below. If at all possible the QAR should witness performance of the inspection/test by supplier personnel to verify competency of supplier personnel.***

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| Date(s) Conducted: |  |
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| Product Examination Performed By: |  |
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| Contract Number(s): |  |
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| Part Number(s)/Serial number(s): |  |
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| Part Nomenclature(s): |  |
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| Supplier Personnel Contacted and Titles: |  |
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| Drawing Number & Revision: |  |
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| Lot Size and Sample Size: |  |

1. Is the inspector properly qualified and performing the NDT in accordance with the correct procedure and meeting all requirements of the applicable NDT specification being performed (proper method/set-up, unidirectional/multidirectional)? (NAV03-8B)

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1. Is the amperage within the procedure range? (NAV03-10)

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1. Are correct accept/reject criteria being applied? (NAV03-12)

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1. Is material being demagnetized, as required by procedure? (NAV03-16)

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1. Does the inspector complete the inspection record properly?

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| Additional PE Characteristics Examined: | # Observations |
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1. Identify the inspection methods (W, I, T, V) used to verify conformance with procedures and standards:

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| **W** |  |  | **I** |  |  | **T** |  |  | **V** |  |

**PE Comments/Concerns**

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| **Overall MPR Results:** | **SATISFACTORY** |  | **UNSATISFACTORY** |  |

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| **Corrective Action Generated?** | **No** |  |  | **Yes** |  |  | **CAR#** |  |

FOLLOW-UP ACTION REQUIRED?

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**SUMMARY/NOTES/COMMENTS/CONCERNS**:

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