DCMA NSEO MANUFACTURING PROCESS REVIEW (MPR) CHECKLIST #32

VARNISH IMPREGNATION AND WINDING

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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:**

* Incorrect or incorrectly assembled parts will allow product not to perform to specification and lead to premature failure.
* Visual and finish inspections can be subjective, therefore objective acceptance criteria is important and should be used when performing these inspections.
* Foreign material trapped in crevices can cause accelerated local corrosion, and may be released later in life, potentially causing problems.
* Detrimental materials (halogens, sulfur, phosphorus, mercury, and other low melting point metals) can cause embrittlement, pitting, corrosion, cracking, or other product detriment.
* Operational/Functional testing failures of mechanical and/or electrical products due to improper testing sequences, times, pressures, etc. not being adhered to as per contract requirements.
* Subcontractors not performing required tests on product delivered to Prime Contractor
* Subcontractor mechanical and/or chemical certifications incorrect or missing
* Foreign material and tools have been left in hardware
* Transformer windings (coils) not to drawing
* Materials not to drawing/procedures (epoxies, resins, insulating resins)
* Coils not fully submerged
* Final dip coat not applied or applied incorrectly
* If trickle impregnation, is continuous stream applied at a controlled rate?
* Verify the type of impregnation. Heat-curing, two part poly resins or epoxy resins. Is the resin dissolved properly?
* Is the method of orientation of the item being impregnated correct? (Vertical, horizontal, etc.)
* Is the temperature (curing process) of the impregnation process correct?
* Verify the resistance testing is per the requirements.

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

1. Are the personnel performing the manufacturing, testing and quality assurance functions of the appropriate skill/experience level and/or properly trained/certified to appropriate assembly, cleaning, functional testing and inspection and testing operations to produce conforming product? ***What are the requirements?***

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1. Record all processing operations observed (include type and specification, where applicable). Did you verify QA/QC proficiency in measuring/test performance? Record names and tests or measurements witnessed, and equipment used.

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1. What type of training/certification is required? Are training records available (review sample), and are they accurate and complete? Is anyone’s certification expired and are they still working in the process?

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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 system in place for remedial training when errors occur?

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**B. MATERIALS**:

1. Is traceability maintained from the material to the material certification test report and other required Objective Quality Evidence (OQE)? Is traceability maintained through all process operations, including any subcontracted operations, to the finished components?

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1. Are material traceability codes permanently applied to the material and/or raw materials annotated on test reports? Do the raw materials comply with contract/specification and/or supplier-imposed technical requirements, including the prohibition of reclaimed material, as may be required? ***What were the materials reviewed?***

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1. Verify that the coils have the required materials applied in order to achieve the required mechanical strength and prevent wires from rubbing against each other due to vibration. This is particularly important where the coils enter the stator or rotor. This will eventually wear the insulating coating causing a short circuit.

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1. Are there controls to ensure conforming material is consistently used in the process? Was the material's integrity compromised by further processes and/or practices? ***If so, how?***

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1. Does the contractor perform receipt inspection on vendor supplied materials? What records are available? Are the materials in accordance with the drawing/procedures? (epoxies, resins, insultating resins)

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**C. MACHINERY**:

1. Is **manufacturing equipment** (tooling, fixtures, jigs, temperature controllers, ammeters, voltmeters, etc.) adequate to produce/assess conforming supplies in compliance with contractual specifications and drawing(s)? *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. Is **inspection and testing equipment** of the required adequacy, accuracy, precision, and range to assure supplies 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. Are adequate cleaning facilities available and in use? Pertaining to the applicable cleaning process, is flushing media, solvents, water, air, monitored and controlled so as not to introduce contamination to the product? Are wiping and cleaning cloths for parts checked for grease, oil, etc., of the proper authorized and/or specified material?

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1. Are suppliers of subcontractors cleaning procedures approved, if applicable?

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1. Does equipment (to include fixtures, jigs, and software [ATE]), requiring qualification or certification approval, have contractual approval for use? *For software, was the correct software in use? What program(s) and revision level(s)/date(s) was in use?*

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1. Is Government owned equipment adequately protected/maintained in accordance with a documented process?

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

1. Does the supplier have a documented and established inspection system, and are procedures available to personnel? Record QA/QC Manual Number and Date Approved. Does the contractor have written procedures that implement material control requirements?*If applicable, list the Reference Approval Number.*

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1. Are final inspection and applicable test methodologies current and adequate to produce supplies conforming to contract requirements? (Are work instructions, final inspection and applicable test procedures, travelers, etc. being used current, adequate, clear, concise and up to date (latest revision)? ***What documents (identifying number & rev) were reviewed?***

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1. Do the supplier’s procedures state final inspection and applicable test frequencies, inspection methods and accept/reject criteria and is it clearly documented, available and understood by personnel? Are they following these documents? ***What documents (identifying number & rev) were reviewed?***

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1. Has material/product, which has been through the final inspection and applicable test process, been positively controlled, traceable and identified to indicate its inspection status (e.g. individual operation sign-off/inspection stamping/accepted or rejected)? Is the supplier auditing this process?

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1. Is the final product adequately identified with the proper documentation and certifications to provide clear material traceability throughout the products’ processing and does the product match the documentation at time of packaging and shipment?

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1. Are there adequate methods of segregating accepted and rejected material in use? (e.g. Are materials awaiting inspection identified and segregated from materials which have been accepted or rejected?) **Describe**.

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1. Are precautions in place to prevent damage and/or contamination to product during and in between final inspection and applicable test operations? Is adequate care and protection taken to prevent damage during transport of supplies within the facility?

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

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

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1. Does the supplier observe ESD practices, if applicable? Are these procedures adequate? Record procedure numbers/revisions reviewed, when applicable.

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1. For products going through a required cleaning process, are the products properly segregated and bagged in an area clean of dirt and debris, as per procedures?

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1. Are chemicals stored in an area separate from the final inspection area? Are chemicals segregated from one another in the storage area? Is there adequate ventilation in the areas?

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1. Is the temperature (curing process) of the impregnation process correct?

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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.***

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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: |  |

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| 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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