DCMA NSEO MANUFACTURING PROCESS SURVEILLANCE (MPS) CHECKLIST #23

HEAT TREAT

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  | | --- | --- | | **SUPPLIER & CAGE:** |  | |  |  | | **LOCATION:** |  | |  |  |   **Program Type:**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | 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:**   |  | | --- | |  |   **Supplier Procedure Number(s), Title(s) & Revision Level(s)/Date(s):**   |  | | --- | |  |  |  |  |  | | --- | --- | --- | | Surveillance Performed By: |  | | |  |  | | | Date(s) of Surveillance: |  | | | Contract Number(s): | |  | |  | |  | | Part Number(s)/Serial number(s)/NSN: | |  | |  | |  | | Part Nomenclature(s): | |  | |  | |  | | Supplier Personnel Contacted and Titles: | |  | |  | |  | | Drawing Number & Revision: | |  | |  |  |  |

**Process Concerns and Guidance:**

* As-cast or as-wrought materials typically do not have appropriate properties for engineering service. Heat treatment at specific times and temperatures must be prescribed to induce metallurgical reactions (e.g., phase transformations) which provide suitable mechanical properties, physical properties, relief of residual stresses, and/or corrosion resistance.
* Numerous parts are often heat treated simultaneously. Control of the heat treating process, including control of furnaces, furnace instrumentation, and thermocouples must be sufficient to ensure uniform heat treatment of all heat treated parts.
* Poor quenching practices, lack of furnace uniformity, and use of incorrect temperatures, holding times, and/or furnace atmospheres has resulted in parts which fail to meet specified properties (or unacceptable property variations within a part).
* Inadequate cleanliness control of parts to be heat treated, or heat treatment fixtures, has led to detrimental material concerns.
* Incomplete or missing documentation of heat treatment such as furnace charts has resulted in delays due to uncertainty regarding the condition of the material.
* Failure to maintain material traceability and positive identification throughout the heat treat process has resulted in delays due to uncertainty regarding the condition of the material.

**QARs should use the “BASIS OF DETERMINATION” column to document the objective quality evidence and/or clarify the rationale used to support their decision. (e.g. direct observation, documents verified etc.)**

S = Satisfactory U = Unsatisfactory

|  |  |  |  |
| --- | --- | --- | --- |
| **SURVEILLANCE QUESTIONS** | **S** | **U** | **BASIS OF DETERMINATION** |
| 1. Is the material/product controlled and traceable throughout the process being audited? |  |  |  |
| 1. Are procedures available to the personnel performing the task with clear acceptance criteria? |  |  |  |
| 1. Is the documentation clear, readable, and does it match with the material being processed? |  |  |  |
| 1. Do training records exist, and are they current with proper certifications? |  |  |  |
| 1. Is the area where the work is being performed clean and free from dirt and debris? |  |  |  |
| 1. Are the gauges, tools, and instruments being used within the acceptable ranges and have current calibration records? |  |  |  |
| 1. Is all non-conforming material segregated, controlled, traceable and procedures exist for disposition of the non-conforming material? |  |  |  |
| 1. Do procedures exist to document requirements and results of time, temperature and cooling? |  |  |  |
| 1. Are these time-temperature profiles being properly documented and traceable to the material heat/lot number? |  |  |  |
| 1. If heat treat is sub-contracted, is there evidence the Supplier has performed an audit of their capabilities and is capable of performing the process per the contract requirements? |  |  |  |
| 1. Is the product protected from damage and contamination throughout the heat treat process? |  |  |  |
| 1. Do the procedures contain parameters which meet applicable specifications (e.g. MIL-H-6875, MIL-STD-1684) for time and temperature? |  |  |  |
| 1. During the heat treat, are personnel cognizant of parameters (time, temperature, cooling method) required by the heat treat procedure and work instructions? |  |  |  |
| 1. Is the temperature correct? Is the correct cooling method/medium used? |  |  |  |
| 1. After heat treat, does the material meet the required mechanical properties (Rockwell, Brinell hardness, tensile and yield strengths etc)? |  |  |  |
| Other observations: |  |  |  |
|  |  |  |  |
|  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Overall MPS Results:** | **SATISFACTORY** |  | **UNSATISFACTORY** |  |

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

**FOLLOW-UP ACTION REQUIRED?**

|  |
| --- |
|  |

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

|  |
| --- |
|  |