

## Product Assurance Requirements

This document is applicable to “FORMOSAT-9 Antenna Panel Deployment Mechanism Procurement”. The contractor shall follow the requirements to control the activities during the design, fabrication, assembly, test and package of the procurement.

Since the GSE (Ground Support Equipment) is non-flight parts, the requirement of “Parts, Materials and Processes” in the following chapter 1 could be referenced for GSE.

### 1. Parts, Materials and Processes

- 1.1 Materials and processes selection will be based on heritage, vacuum stability, processing requirements, cured properties, and potential for contaminant generation.
- 1.2 Suitability of materials and processes should be established by heritage design in similar applications/ environments or by test and analysis.
- 1.3 A Declared Material List (DML) and a Declared Process List (DPL) consisting of materials and processes shall be established. The DML & DPL shall be issued as a minimum at CDR (as designed) and at flight hardware delivery (as built). The DML & DPL will be updated as program progress and maintained control.
- 1.4 Materials will preferably be selected from a valid Materials List of a recognized authority (e.g. ESA, NASA, or MIL) or from previously flown space hardware.
- 1.5 Outgassing rates of materials shall be less than 1.0% of TML (Total Mass Loss) and 0.10% of CVCM (Collected Volatile Condensable Materials). Exception up to TML < 5% are allowable for hygroscopic materials like CFRP (Carbon Fiber Reinforced Plastic) or thermal foil.
- 1.6 Materials and/or processes that are known to generate particulate debris shall be avoided to the maximum extent possible. The manufacture of harnesses will be scrutinized to ensure that harnesses are properly cleaned prior to assembly, and that chafing will be avoided by using protective sleeves.
- 1.7 Life limited materials will be avoided wherever possible. Potential limited life items that are planned for use in flight hardware will be identified in the material list (including maintenance/replacement requirements).
- 1.8 Materials exposed to free space, in particular facing flight direction will be compatible with ATOX (atomic oxygen environment). ATOX sensitive materials like silver, or CFRP will be avoided or adequately protected (plated/coated).

- 1.9 Perishable materials such as sealants, adhesives, and potting compounds that deteriorate with age or exposure are identified on the container by the date that the useful life of the materials was initiated (zero time) and the date at which the useful life will be expended.
- 1.10 Prohibited materials identified by recognized space authority (e.g. ESA, NASA, or MIL) will not be used externally or internally to the Satellite. Any deviation when required will be handled in MRB (Material Review Board) for disposition. If contract requirements are violated for those purchased items and “Use As Is” is accepted by program MRB, then a RFD (Request for Deviation) or RFW (Request for Waiver) will be required for CCB disposition.
- 1.11 Inorganic materials (including mechanical hardware) used for structural and load-bearing applications will meet the criteria for acceptance specified in MSFC-SPEC-522 and MIL-STD-889.
- 1.12 All exposed inorganic materials will have a specified approved surface treatment such that no bare metal surface is exposed.
- 1.13 Unless protected against galvanic corrosion, dissimilar metals will not be used in contact with each other. The use of dissimilar metals will be controlled in accordance with MIL-STD-889.
- 1.14 WORKMANSHIP: shall refer to NASA-STD-8739.1 and NASA-STD-8739.4A as guidance
- 1.15 Combustible materials that can generate toxic products of combustion shall not be used.
- 1.16 Material strength and other mechanical and physical properties shall be selected from industry standard handbooks or manufactures guaranteed data.
- 1.17 Strength allowable and other properties used shall be appropriate to the loading condition, design environment, and stress state for the unit in accordance with standard design criteria.

## **2. Environmental and Equipment Control**

- 2.1 Environmental conditions such as temperature, humidity, and particulate contamination should be appropriately controlled for parts handling, packaging, and storage. The temperature should be maintained between 18°C and 30°C and the relative humidity should not exceed 70%.
- 2.2 The environmental cleanliness level of handling, assembly, integration, testing and transportation preparation should be 100K or better.

2.3 All the support and test equipment should be calibrated periodically.

### **3. Manufacture and Assembly Procedure**

The manufacture and assembly processes will be accomplished in accordance with the procedures and process controls that ensure the quality and traceability required for the mission. These procedures and process controls will be documented for all processes, operations, inspections, and tests.

### **4. Nonconformance Report (NCR)**

Any noncompliant issue shall be recorded, and the contractor shall provide appropriate assistance to close the noncompliant issue. For any requirements incompliance, a Nonconformance Report (NCR) shall be issued to TASA, and the NCR contents shall include the description, disposition, root cause, and resolution.

### **5. Packaging and Shipping Control**

- 5.1 The parts must be handled carefully to avoid scratches, collisions, drops, etc. Personnel should wear clean gloves when touching the parts to avoid contamination or damage.
- 5.2 Cleaning and inspection should be completed before packaging to ensure that the surface cleanliness meets the visual cleanliness level.
- 5.3 Parts are recommended to be double bagged and with desiccant to guarantee dry conditions below 70% humidity.
- 5.4 Items should be packaged fixedly in the shipping box. The sponge, foam or other packaging material should be used as needed.
- 5.5 The container must be attached with the Shock Watch or Shock Sensor to monitor the transportation process.