
TITLE
**Foreign Object Damage/Debris Prevention,
Handling, Storage, Packaging, Preservation and Delivery**
WARNING

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1. PURPOSE & SCOPE

This specification defines requirements for Foreign Object Damage/Debris Prevention, Handling, Storage, Packaging, Preservation and Delivery of product, material, or services supplied to a UTC member company. It supplements but does not replace other UTC Business Entity requirements.

2. APPLICATION

- 2.1 Supplier quality requirements are defined and agreed upon by the following business entities as members of the ASQR Common Specification Team herein referred to as "member".

Aftermarket Operations	AO
Hamilton Sundstrand	HS
Pratt & Whitney	PW
Pratt & Whitney Canada	PWC
Sikorsky Aircraft	SAC

- 2.2 This specification applies to suppliers and their subcontractors who furnish product, material, or services (as a manufacturer or maintenance provider) to any of the above members as a contract requirement regardless of the supplier's industry, regulatory accreditation, or certification status.

3 DEFINITIONS

- 3.1 **Foreign Object Damage (FOD):** Any damage attributed to a foreign object that can be expressed in physical or economic terms which may or may not degrade the product's required safety and/or performance characteristics.
- 3.2 **Foreign Object (FO):** A substance or article alien to the product that could potentially cause FOD.
- 3.3 **Unrestricted Hardware:** Low value, high usage material, issued in bulk quantities and excluded from processing in a Materials Requirements Planning (MRP) system.
- 3.4 **5S:** A method for improving workplace organization using visual controls (i.e., Sort, Straighten, Shine, Standardize, Sustain) resulting in a positive impact on FOD prevention, productivity and Environmental Health and Safety (EH&S).

4. REQUIREMENTS

4.1 FOD Prevention:

4.1.1 The UTC requirements for FOD prevention are based on the National Aerospace Standard (NAS) 412, Foreign Object Damage/Foreign Object Debris Prevention, which establishes a baseline FOD prevention policy/procedure. NAS 412 supports the quality management system standard, AS/EN/JISQ 9100/9110/9120 which requires suppliers carry out a program for the prevention, detection, and removal of foreign objects from its products.

4.1.2 FOD Prevention Program attributes are implemented at different levels of complexity based on risk/sensitivity of the product/services provided by any source. Suppliers shall implement a FOD Prevention Program having the suitable level of FOD prevention for their individual products/services.

Note: *The IAQG – Supply Chain Management Handbook (SCMH) provides assessment tools, descriptions, and training material for FOD Program control attributes.*

4.1.3 The minimum requirements of a FOD Prevention Program for all product/service suppliers shall include:

- a. A FOD training program shall be in place to increase employee awareness on causes and effects of FOD, promote active involvement through specific techniques and emphasize good work habits through work discipline. FOD training is required for all employees and contractors (internal and external) as applicable and shall be on going, (i.e., initial and periodic) to maintain employee awareness.

Training shall include (but is not limited to) the following topics:

- Causes and effects of FOD
- Protection of product
- General housekeeping program and formal 5-S practices
- Clean as you go principles
- Tool control/accountability
- Unrestricted hardware control/accountability
- Consumable control/accountability



- b. A documented procedure for material handling and part protection to eliminate potential FO/FOD and handling hazards that includes:
 - Risk identification for sensitive parts, assemblies, surfaces, areas, etc.
 - Risk identification related to packaging, handling, shipping and storage processes.
 - Evaluation and controls for risk mitigation specific to cleaning, protection, and care processes.
 - Defined process sequencing that allows for proper contamination prevention, cleaning, and detection on parts and containers at appropriate process points.
 - Defined methods to protect parts where contact with other elements may be detrimental to the part (e.g., columbium, titanium, magnesium, etc.).
 - c. A general housekeeping program and formal 5-S practices that includes:
 - Area cleaning in accordance with 5-S principals (i.e., assembly, test, manufacturing, warehouse, and operational support areas).
 - Periodic cleaning/sweeping floors, work-surfaces and any other pertinent surfaces.
 - Maintaining critical process areas free of open food and beverages.
 - Areas having clear signage indicating requirements.
 - d. A FOD reporting and investigation process shall be in place and define how to:
 - Report and investigate FOD occurrences and include the use of common root-cause analysis tools as part of the record.
 - Advise personnel of how to react in the event of a FOD incident, (e.g. do not disturb evidence, cease operation, immediately notify supervision, begin investigation, etc.).
 - Ensure effectiveness of corrective/preventive actions taken to preclude recurrence.
- 4.1.4 Additional FOD Program requirements may be mandated by the UTC member depending on the FOD risk criticality of product, (i.e. product / commodity type, manufacturing, assembly, and repair processes involved, etc.).
- 4.1.5 Suppliers with design control or repair development capability shall ensure the design applies considerations for FOD prevention, resistance to damage, and that designs are not conducive to debris entrapment to any extent possible.
- 4.1.5.1 Methods are to include documentation and implementation of a process that reflects emphasis on the reduction of risk and potential elimination of FOD hazards as basic design criteria.



- 4.1.5.2 Product designs or repair instructions shall reflect adequate consideration to:
- a. Identify and eliminate FO entrapment areas.
 - b. Identify and seal areas through which FO can migrate.
 - c. Utilize adequate connectors, filtering devices, and protective covers over critical mechanical, electrical, hydraulic, and pneumatic components to prevent FO entry.
 - d. Install special access panels, ports, etc., for inspection and removal of FO that could potentially cause damage.
 - e. Install devices to divert migrating FO from critical mechanisms/components to special access areas for removal.
 - f. Utilize fasteners with positive locking mechanisms in areas where high vibration levels are expected, or where separation of the fastened item could result in potential damage.
 - g. Utilize blind fasteners in critical areas (i.e., fuel cells) that are not prone to leaving debris upon extraction.
 - h. Utilize fasteners with self-retaining features capable of withstanding flight loads to secure high usage access panels.
 - i. Eliminate nonessential components built into equipment (e.g., nameplates that can separate under dynamic loads, etc.).
- 4.2 Storage controls shall include:
- a. Facilities, as necessary, provide isolation/protection to material pending use or shipment.
 - b. Periodic assessment of the condition of material in stock.
 - c. "First in - First out" issuance of materials subject to degradation.
 - d. Shelf life control applied to processing material, as required.
- 4.3 Preservation and Packaging controls shall include:
- a. Preservation of material during processing, fabricating, assembly and testing, through shipment of end items.
 - b. Regular preservation fluid checks for contamination and maintained free from FO via filtering or replacement of preservatives.
 - c. Visual inspections prior to final preservation to ensure parts are free from contaminants, debris, foreign material, finger marks and stains. When required, a bore scope examination shall be carried out to ensure freedom from machining chips and debris for internal passages that cannot be inspected visually.
 - d. Prevention of oil system contamination from silicone-based lubricants.
 - e. External cleaning when there is evidence of external contamination.

Note: *Preservation and Packaging controls continued on next page.*



- f. Packing material does not induce contamination to parts and assemblies.
 - g. Prohibited packing material is not used. This includes, but is not limited to:
 - Newsprint
 - Loose packing material small enough to block internal passages, holes and crevices or parts
 - Glue bearing material
 - h. Packing methods consider weight, physical configuration, and method of shipment to preclude damage to parts.
 - i. For UTC Member drawings that do not include special preservation instructions:
 - Castings made of low alloy steel, plain carbon steel, ductile iron or martensitic stainless steel shall be preserved prior to shipping using oil per MIL-L-2104 or equivalent.
 - Magnesium alloy castings may be preserved prior to shipping using UTC member approved preservation oil instead of AMS 2475 pickle when called for. Contact the appropriate UTC member, if necessary.
 - Overhaul and repair material shall be preserved in accordance with the applicable approved technical data.
 - j. Optical systems, electrical components or assemblies containing cadmium, lead, zinc or magnesium are not protected with Vapor Corrosion Inhibitor (VCI) treated materials.
 - k. Protection against corrosion and damage during transit or storage and state the duration of effectiveness of such preservation and packaging, as required by applicable regulatory agency.
- 4.4 Shipping:
- 4.4.1 Complete packing slip/shipping label per instructions shall be provided on the Purchase Order (P.O.). Information shall include:
- Packing slip number
 - Supplier name
 - P.O. number
 - Line item number (if applicable)
 - "Ship to" address
 - P/N nomenclature
 - S/N where applicable
 - First lot shipped when applicable
 - First Article Inspection applies when applicable
 - Reference to any non-conformance documents
 - Country of Origin

4.4.2 ASQR-01 Manufacturing Suppliers

When UTC members approved NDT sources are used, suppliers that are not on self-release or controlled by a Supplier Quality Assurance Representative (SQAR) shall list the member approved NDT source on the packing slip.

4.5 Electrostatic Discharge (ESD) Control:

4.5.1 Where applicable, institute adequate procedures and controls to prevent damage to electronic equipment and components which are sensitive to ESD.

4.5.2 Provisions shall be made for protection of electronic and electrical material which is sensitive to electronic discharge (ESD), per MIL-STD-1686 or for overhaul and repair applicable approved technical data.

4.5.3 ESD control requirements apply where equipment containing ESD sensitive parts are used during the process of fabrication, calibration, testing or packaging of the end item, whether or not the end item is ESD sensitive.

5 RECORDS

Completed Quality records generated electronically or on paper shall be retained per the requirements of ASQR-01 or ASQR-02.

6 REFERENCES

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| 6.1 | AS/EN/JISQ 9100 | Quality Management Systems – Requirements for Aviation, Space and Defense Organizations |
| 6.2 | AS/EN/JISQ 9110 | Quality Management Systems – Requirements for Aviation Maintenance Organizations |
| 6.3 | AS/EN/JISQ 9120 | Quality Management Systems – Requirements for Aviation, Space and Defense Distributors |
| 6.4 | ASQR-01 | Aerospace Supplier Quality Requirements |
| 6.5 | ASQR-02 | Aerospace Supplier Quality System Requirements For Maintenance Organizations |
| 6.6 | AMS 2475 | Protective Treatments Magnesium Alloys |
| 6.7 | MIL-STD-1686 | Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices) |
| 6.8 | MIL-L-2104 | Lubricating Oil, Internal Combustion Engine, Combat/Tactical |
| 6.9 | NAS 412 | Foreign Object Damage/Foreign object debris (FOD) Prevention |
| 6.10 | SCMH | IAQG – Supply Chain Management Handbook (SCMH) |



7 NATURE OF CHANGE

The procedure has been completely revised. Major changes include the following:

- Added definitions/terms associated with Foreign Object Damage/Debris Prevention
- Expanded paragraph 4.1 to clarify FOD/FO Program minimum requirements
- Added references related to FOD/FO program guidelines/tools

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