



CAGE Code 81205

Foreign Object Debris/Foreign Object Damage (FOD) Prevention Requirements for Boeing Suppliers

DOCUMENT NUMBER:

D6-85622

RELEASE/REVISION:

NEW

RELEASE/REVISION DATE:

May 21, 2015

CONTENT OWNER:

Supplier Quality Integration Team (SQIT) (66-C6-1E33)

Export Controlled by ECCN: 9E991 Date: 05/15/15

All revisions to this document must be approved by the content owner before release.

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D6-85622

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Document Information

| | |
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| Original Release Date May 21, 2015 | Contract or CDRL Number (if required) NA |
| Limitations | |

Authorization for Release

| | | | |
|-------------------|--|----------------------------------|-----------------------------|
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Abstract

A Foreign Object Debris/Damage (FOD) Prevention Program is essential to reduce the risk of foreign objects (FO). This document identifies the minimum requirements that Boeing suppliers shall include in their FOD Prevention Program.

1. Purpose/Scope

This document defines supplier requirements for FOD prevention necessary to reduce the risk of Foreign Objects, Foreign Object Debris, and Foreign Object Damage to Boeing products. These requirements satisfy the Quality Management System (QMS) requirements of AS/EN/JISQ 9100 and The Boeing Company.

For Boeing contracts requiring Defense Contract Management Agency (DCMA) INST 8210.1 “Contractor’s Flight and Ground Operations”, the applicable sections addressing FOD and tool management shall apply. Additional FOD prevention requirements may be applicable on Boeing contracts for Department of Defense, NASA or other customers.

2. Applicability

This document is applicable to all suppliers when contractually required by The Boeing Company. The supplier shall flow down the requirements of this document (D6-85622) to their sub tier suppliers, as required based on a risk assessment (see section 3.1).

3. FOD Prevention Program Implementation

3.1 FOD Risk Assessment

The supplier shall perform a documented risk assessment for the impact of FOD to product(s) that they provide to The Boeing Company.

NOTE: See Supply Chain Management Handbook (SCMH) FOD Program Robustness Assessment Tool for further guidance.

The risk assessment shall have documented results that at a minimum include the following:

- Product /process family characteristics.
- Product/process family sensitivity to FOD.
- Foreign object (FO) detectability.

The supplier shall implement, manage, and execute an effective FOD prevention program based on the results of the risk assessment. Program requirements shall be progressively more stringent based on the risk level defined.

3.2 Management Commitment

Top management shall ensure implementation of the FOD Prevention Program and continually work to improve its effectiveness. Top management shall:

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- Establish a FOD Prevention Program Leader that has sufficient authority, resources, and organizational freedom to implement FOD prevention measures and guide policy.
 - Establish a culture where FOD prevention is every employee's responsibility.

NOTE: Supplier may designate individuals with multiple roles/responsibilities.

3.3 FOD Prevention Leader

The supplier shall have a designated FOD Prevention Leader, responsible for the development, implementation, and sustainment of processes and procedures to prevent FOD.

The FOD Prevention Leader shall have the authority and freedom to identify and implement FOD prevention measures and achieve continuous improvement.

The FOD Prevention Leader responsibilities shall include:

- Chair and maintain a FOD Prevention Committee.
- Document expectations and program goals.
- Ensure the establishment of area designations and requirements for FOD prevention.
- Ensure risk assessment is performed, documented and adequately addresses minimum requirements for impact of FOD to product(s).
- Ensure effective communication of all FOD prevention procedures, requirements, and processes to management and applicable personnel.
- Establish FOD Prevention Program performance measures.
- Provide visibility of FOD prevention activities, area performance measures, and program status.
- Assist in Root Cause Corrective Action (RCCA) of FOD incidents.
- Ensure FOD prevention training is developed and adequately outlines program requirements.

3.4 FOD Prevention Committee

The supplier shall establish a FOD Prevention Committee to assist the FOD Prevention Leader. The FOD Prevention Committee responsibilities shall include:

- Meet on a scheduled basis.
- Review FOD Prevention Program performance and ensure timely and effective RCCA.
- Establish FOD prevention training and awareness goals and objectives.
- Review and communicate FOD Prevention Program initiatives.

3.5 Managers/Leaders

Managers shall commit to the FOD Prevention Program and continually work to improve its effectiveness. Manager's responsibilities shall include:

- Assign FOD prevention focal(s) with sufficient authority and organizational freedom to identify and implement FOD prevention measures.
- Identify and communicate FOD area designations to personnel.
- Implement and manage FOD prevention processes as part of daily operations.
- Assign, monitor, and track FOD prevention training.
- Conduct, document, and report FOD process assessments.
- Report, document, and investigate all FOD Incidents and lost items.
- Implement corrective action to prevent FOD incident reoccurrences.
- Report FOD prevention performance measures and communicate to personnel and FOD Prevention leader.

3.6 FOD Prevention Focals

The supplier shall assign FOD prevention focals for each designated area. FOD prevention focals responsibilities shall include:

- Assist in the communication of FOD prevention processes and requirements to area personnel.
- Assist in RCCA of area FOD incidents.
- Participate in FOD prevention assessments.

4. FOD Prevention Program Execution

4.1 Area Designation

The supplier shall designate area(s) to meet the requirements of FOD Critical, FOD Control, FOD Awareness, or General Housekeeping based on risk assessment results (see section 3.1).

NOTE: The supplier may use different terminology for designated areas(s).

Area(s) without product(s) or area(s) without the potential to migrate FOD to areas with products do not need to be designated.

The supplier shall have a defined process to authorize changes or modifications to existing FOD designated areas.

The supplier shall clearly identify designated area(s) using one or more of the following methods:

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- Signs.
 - Maps.
 - Floor markings.
 - Barriers.
 - Defined through other documentation.

NOTE: See Glossary and SCMH Foreign Object Damage/Debris (FOD) Prevention for further guidance.

4.2 FOD Prevention Training and Awareness

The supplier shall implement FOD prevention training and awareness that addresses FOD Prevention program requirements. Prior to accessing FOD designated areas, personnel require initial and refresher training at defined intervals based on FOD risk assessment.

Escorted personnel will require at a minimum a “FOD Awareness” briefing, prior to accessing designated areas.

The supplier shall maintain records of FOD prevention training.

NOTE: See SCMH Foreign Object Debris/Foreign Object Damage (FOD) Prevention Training Program for further guidance.

4.3 Clean-As-You-Go

The supplier shall implement “Clean-As-You-Go” processes to mitigate FOD migration during operations. Clean as you go responsibilities shall consist of:

- Cleaning the immediate area of the product when work cannot continue.
- Cleaning the immediate area of the product after work is completed and prior to inspection.
- Cleaning the immediate area of the product after task is completed, prior to inspection, at the end of each shift, and/or when work operations are suspended.

4.4 Housekeeping

The supplier shall define and implement cleanliness process to prevent FO migration (e.g. manufacturing, maintenance, inspection, test, development, transportation, shipping/receiving, storage).

NOTE: See SCMH FOD Foreign Object Damage/Debris (FOD) Prevention for further guidance.

4.5 Management of Consumables, Expendables, and Hardware

The supplier shall define and implement a process for the effective control, storage, use/consumption, and disposal of consumables, expendables, and hardware to prevent the risk of these items being left within the product as FOD.

NOTE: See SCMH FOD Foreign Object Damage/Debris (FOD) Prevention for further guidance.

4.6 Tool Management

The supplier shall define and implement processes(s) for effective tool management that accounts for and controls tools, tooling, and production aids based on the FOD risk assessment results (see section 3.1).

Effective tool management responsibilities shall include:

- Storage.
- Accountability and control.
- Maintenance/serviceability.
- Search and recovery efforts for missing tools, production aids, and/or items.
- Initiation of non-conformance if tool, production aids, and/or items are suspected to be entrapped or lost on product.

For Boeing Supplier Tooling requirements please see D950-11059-1 BDS Seller Special Tooling Requirements and/or D33200 Boeing Supplier's Tooling.

4.7 Material Handling and Packaging

The supplier shall define and implement a process for adequate storage, handling, and transportation of materials and components. The process shall include measures for protection against contamination or physical/functional damage throughout the product/process life cycle, from time of receipt until the finished product is delivered.

4.8 Identification and Reporting

The supplier shall have a process to identify and document:

- FOD incidents that results in product nonconformance.
- FOD nonconformance.
- Lost tool, production aid, and/or items.

When lost tool(s), production aid(s), and/ or item(s) are suspected on delivered product, the supplier shall report in accordance with Notice of Escapement (NoE) requirements.

Reporting shall be directed at a minimum to:

- Responsible area manager and applicable FOD prevention focal(s).
- FOD Prevention Leader.
- Affected personnel.

5. FOD Prevention Program Management

The supplier's QMS shall include effectiveness of the FOD prevention program as part of their Management Review process.

5.1 FOD Process Assessments

The supplier shall perform process assessments to measure the effectiveness of the FOD Prevention Program. Assessment results shall be documented and reviewed for continuous improvement opportunities.

5.2 FOD Prevention Program Performance Measures

Suppliers shall develop and maintain FOD Prevention Program performance measures to ensure program effectiveness. Performance measures shall:

- Include baseline, targets, and progress to established goals.
- Be prominently posted/displayed for visibility.
- Be made available to Boeing upon request.

Standard performance measures may include:

- Inspection/audit results.
- FOD nonconformance/incident reports.
- Process assessment results.
- Lost or found tool, production aids, and/or item reports.

Glossary

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| Clean-As-You-Go | A set of Foreign Object Debris/Damage (FOD) mitigation processes used to eliminate FOD or the migration of FOD that may potentially cause damage or become entrapped within the product. |
| Consumables | Supplies provided to workers (e.g., issued apparel, safety glasses, glue, paint, sealant, rags, sandpaper, brushes, applicators), and/or items that are expected to be consumed or destroyed during the course of work performed. Material Consumables are items that are generally thrown away after each use (e.g., paper towels, ear plugs, gloves, respirator cartridges, acid brushes, cotton swabs, abrasives, tape, safety wire, sanding discs, sealant, knife blades, and electrical extraction tools). |
| Expendables | Commodities or items used during the manufacturing process that after extended usage or reconditioning become non-functional (e.g., plastic knives, apex tips, insertion/removal tools, clecos, clamps, rivet sets, drill bits, reamers; end mills, counter sinks, counter bore, and some safety supplies). |
| Foreign Object | A substance, debris, or article that is alien to a product, assembly, or system that could cause foreign object damage. |
| Foreign Object Damage | Any damage attributed to a foreign object that may be expressed in physical or economic terms, which may or may not degrade the product's required safety and/or performance characteristics. |
| Foreign Object Debris (FOD) | A substance, debris or article that has invaded a product, assembly, or system, and would potentially cause damage. |
| Foreign Object Debris/Damage (FOD) Incident | The occurrence of a foreign object that has caused damage, impairment, or restriction to the operation or service life of a product, major assembly, component, or system. |

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| Foreign Object Debris (FOD) Non-Conformance | The discovery of foreign object debris during product or FOD process verifications. |
| FOD Critical | FOD Critical Area (High Risk to Product): Area(s) with a product(s) that must be isolated from exposure to Foreign Object Debris due to the potential for migration, entrapment, damage and/or failure to critical Safety of Flight (SOF) aspects of the product or product systems |
| FOD Control | FOD Control Area (Moderate Risk to Product): Area(s) with a Product(s) that must have limited exposure to Foreign Object Debris due to the potential for migration, entrapment or damage to non-critical areas of the product or product systems |
| FOD Awareness | FOD Awareness Area(s) (Low Risk to Product): Area(s) with a product(s) that limit exposure of Foreign Object Debris through the application of FOD prevention processes and final verification will ensure that no FOD or product damage will be passed on to the customer. |
| General Housekeeping | General Housekeeping Area(s): Area(s) in which application of housekeeping will ensure FOD will not contaminate the product or migrate to production areas. Sweeping and/or vacuuming to ensure all work areas are kept clean, orderly, and free of potential FOD. |
| Hardware | Parts and/or pan stock (e.g., nuts, rivets, washers, screws, bolts, spacers, cotter keys, wire terminals, wire splices). |
| Items | Hardware, Consumables, and Expendables. |
| Product | Any contract deliverable if subjected to foreign objects may cause delays, rework, or damage expressed in risk to safety (personal or product), economic, or regulatory compliance. |
| Production aids | Shop Aids, tooling, tooling details, tooling fixtures, and tooling assemblies, and non-flight hardware. |

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| Process assessments | Documented, internal review verifying process compliance. |
| Tools | The term “tool” refers to those items used during manufacturing, inspection, test, and flight operations. Examples include drill motors, torque wrenches, nut setters, screwdrivers, awls, combination wrenches, bucking bars, etc. |
| Tooling | All jigs, dies, fixtures, molds, patterns, and other equipment and manufacturing aids. |

Acronyms

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| BCA | Boeing Commercial Airplanes |
| BDS | Boeing Defense, Space & Security |
| DCMA | Defense Contract Management Agency |
| FO | Foreign Object |
| FOD | Foreign Object Debris or Foreign Object Damage |
| NoE | Notice of Escapement |
| QMS | Quality Management System |
| RCCA | Root Cause Corrective Action |
| SCMH | Supply Chain Management Handbook |
| SOF | Safety of Flight |

References

AS9100, Quality Management Systems – Requirements for Aviation, Space and Defense Organizations.

(DCMA) DCMA INST 8210.1 “Contractor’s Flight and Ground Operations” is a Defense contract Management Agency policy published through the DCMA. Copy of this policy is available through the DCMA web-site:

<http://www.dcma.mil/policy/>

Related Writing

IAQG/SCMH Section 3.4 is published through the International Aerospace Quality Group (IAQG). Copy of this handbook is available through the IAQG web-site: <http://www.sae.org/iaqg/handbook/scmhtermsfuse.htm>

