METRIC

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SUPERSEDES
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8 June 1989

DEPARTMENT OF DEFENSE
STANDARD PRACTICE

# ABRASIVE BLASTING

This document is inactive for new design.

AMSC: N/A

AREA: MFFP

# FOREWORD

1. This Military Standard is approved for use by 309MXSG/MXRL, Department of the Air Force and is available for use by all departments and agencies of the Department of Defense.

2. This standard provides guidance for the Air Force repair process, acquisition, and manufacture of parts and/or spare parts on the landing gear of all military aircraft.

3. Beneficial comments, recommendations, additions, deletions, clarifications, etc. and any data that may improve this document should be sent to: 309MXSG/MXRIL, Hill AFB, UT 84056-2609 or e-mailed to: 309MXSG/MXRL@hill.af.mil. Since contact information can change, verification of currency of this address information through ASSIST Online database at http://assist.daps.dla.mil.

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# 1. SCOPE

1.1 Scope. This standard covers the process and materials required for the abrasive blasting of military aircraft parts and missile components. Abrasive blast cleaning consists of forceful application of abrasive particles against the surface of metal parts.

1.2 Abrasive blast use. Typical uses include but limited to:

a. Corrosion removal.

b. Conditioning of surfaces for subsequent finishing.

c. Removal of coatings, scale or dry soils.

# 2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 4 and 5 of this standard. This section does not include documents cited in other sections of this standard or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of the documents cited in sections 4 and 5 of this standard, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, handbooks, and commercial item description. The following specifications, standards, handbooks, and commercial item descriptions form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATIONS

| | |
|---|---|
| MIL-S-5002 (Inactive) | Surface Treatments and Inorganic, Coating for |
| MIL-PRF-9954 | Glass Beads, Cleaning and Peening for |
| MIL-P-85891 | Plastic Media, Removal of Organic Coatings |

(Copies of these documents are available online at http://assist.daps.dla.mil or from Standardization Document Order Desk, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

FEDERAL SPECIFICATIONS

| | |
|---|---|
| TT-C-490 | Chemical Conversion Coatings of Pre-treatments for Ferrous Surfaces (Base for Organic Coatings) |

COMMERICAL ITEM DESCRIPTIONS

| | |
|---|---|
| A-A-1722 | Grain, Abrasive (Soft Blasting) |
| A-A-59316 | Abrasive Materials, Blasting for |

(Copies of these documents are available online at http://assist.daps.dla.mil or from Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

CODE OF FEDERAL REGULATIONS (CFR)

| | |
|---|---|
| 29 CFR 1910 | Toxic and Hazardous Substances |

(Copies of this document are available online at www.access.gpo.gov/nara/cfr or from the Superintendent of Documents, U.S. Printing Office, North Capitol & “H” Streets, N.W., Washington D.C. 20402-0002.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. DEFINITIONS (Not applicable)

4. GENERAL REQUIREMENTS

4.1 Abrasive blasting. Aircraft components will not be abrasive blasted unless specifically authorized by applicable drawings or their process specifications.

4.2 Cleaning. Parts to be abrasive blasted shall be free of grease and oil. Cleaning shall be in accordance with MIL-S-5002 or TT-C-490.

4.3 Surface defects. Significant surface defects are not to be removed by abrasive blasting. These defects should be removed as specified or authorized by the applicable engineering department.

4.4 Blasting method. When blasting, the discharge flow shall be as smooth and continuous as possible to prevent uneven erosion of surfaces. Caution shall be exercised to avoid excessive blasting of surfaces to avoid warpage and pitting of material. Blasting time shall be no longer than is necessary to clean the surface.

4.5 Corrosion. Blast cleaning exposes uncontaminated metal to the environment. Parts shall only be blasted immediately preceding the painting or plating

operations so that corrosion will not occur between the blasting and the finishing operations.

4.6 Materials and equipment.

4.6.1 Materials. Materials used for abrasive blasting are as follows:

a. Silicone oxide. Silicone oxide (sand) meets the requirements of A-A-59316, Type II.

b. Aluminum oxide. Aluminum oxide shall be natural dry corundum meets the requirements of A-A-59316, Type I and completely free from soluble salts, metallic particles or scale, dust, silt or other contaminates.

c. Garnet. Abrasive media meets the requirements of A-A-59316, Type IV.

d. Abrasive grit. Abrasive grit meets the requirements of A-A-1722.

e. Abrasive material. Abrasive material meets the requirements of A-A-59316.

f. Glass beads. Glass beads meets the requirements of MIL-G-9954.

g. Plastic media. Plastic media meets the requirements of MIL-P-85891. The plastic media covered by this specification is intended as an abrasive blasting material for paint removal.

h. Reclaimed materials. The use of reclaimed materials shall be encouraged to the maximum extent possible.

NOTE: Materials per A-A-59316 shall not be restricted to the Grades listed in the specification.

4.6.2 Equipment. Equipment requirements for abrasive blasting shall be as follows:

a. Size and type. The equipment shall be of adequate size and type for the work required. The equipment shall allow the operator close control over the intensity and direction of blast.

b. Dust removal. The equipment shall remove the dust formed during blasting and shall insure that the dust does not cause atmospheric contamination.

c. Classification. The equipment shall include a screening or classification process to remove undersize or broken abrasive particles, corrosion particles, and paint and metal particles.

d. Ventilation and personal protective equipment. Ventilation and personal protective equipment requirements shall be in accordance with OSHA CRS 1910.

5. DETAILED REQUIREMENTS

5.1 Masking. Sections or areas of a part that are not to be abrasive blasted shall be masked off. Threaded holes and blind holes in parts shall be protected from abrasive deposits and physical damage by the insertion of appropriate bolts, plugs, or rubber stoppers.

5.2 Distortion and warpage. Blasted parts shall show no evidence of distortion or warpage. Use care in blast cleaning to avoid excessive local blasting. Use fine abrasive and low air pressure on thin or low strength sections.

5.3 Compressed air. The compressed air used for blowing off dust or drying parts for dry abrasive blasting shall be essentially free from moisture, oil and solid particles. The air shall be filtered at the point of use or be supplied by facilities designed to deliver clean air. Clean and replace the filters or maintain the equipment as necessary to meet these requirements.

5.4 Process flow. (Typical)

a. Clean in accordance with paragraph 4.2.

b. Mask as required, paragraph 5.1.

c. Clean by abrasive blasting.

d. Clean with air as required.

e. Continue processing as soon as possible.

5.5 Glass bead blasting.

a. Precision cleaning requires spherical blast beads. Broken beads are abrasive and accelerated the removal of base metal during blast cleaning.

b. The nozzle should be held at an angle close to perpendicular with surface being cleaned.

c. The nozzle should be held 8 to 30 centimeters (cm) (3 to 12 inches) from the surface.

d. The recommended air pressures are:

| | |
|---|---|
| Ferrous Alloys | $2.8 \times 10^8$ to $4.2 \times 10^8$ PA (40 to 60 pound force per square inch (psi) |
| Aluminum Alloys | $2.1 \times 10^8$ to $3.5 \times 10^8$ PA (30 to 50 psi) |

| | |
|---|---|
| Magnesium Alloys | $6.9 \times 10^4$ to $2.8 \times 10^8$ (10 to 40 psi) |
| Titanium Alloys | $2.8 \times 10^8$ to $4.2 \times 10^8$ (40 to 60 psi) |

5.7 Silicon and aluminum oxide blasting.

**WARNING**

**Avoid excessive inhalation of abrasive dust. Provide ventilation as required. (See: OSHA CRS 1910)**

a. The nozzle should be held at an angle close to perpendicular with the surface being cleaned.

b. The nozzle shall be held at 8 to 31cm (3 to 12 inches) from the surface.

c. The air pressure should not exceed $6.2 \times 10^8$Pa (90psi).

5.8 Plastic media blasting. Plastic media blasting is a good system for organic coating removal from metal surfaces.

**WARNING**

**Plastic media blasting should not be used on fiberglass or other composite materials or on metals having a thickness of less than 0.064 inches without the authorization of the responsible engineering authority.**

**WARNING**

**Consult with equipment and media manufacturers on operational safety requirements as an example: Titanium and steel alloys will spark when blasted with plastic media.**

a. Use media conforming to the requirements of MIL-P-85891. Media should have a particule size of US screen 20 to 40 mesh. Media having a high density particle contamination level greater than 0.02 percent by weight should not be used.

b. The nozzle should be held at an angle close to perpendicular with the surface being cleaned.

c. The blast nozzle should be held at 31cm to 62cm (12 to 24 inches) for media having Barcol hardness of 34 to 42 and 56 to 77cm (18 to 30 inches) for media having Barcol hardness of 54 to 72cm.

d. Pressure should be between $2.8 \times 10^8$ to $4.2 \times 10^8$ (40 to 60 psi) at the blast nozzle for media having a Barcol hardness of 34 to 42 and less than $4.2 \times 10^8$ (40 psi) at the nozzle for media having a Barcol hardness of 54 to 72cm.

5.9 Quality control.

5.9.1 Quality control responsibility. The responsible quality control department shall enforce the requirements of this standard. Inspection to meet the requirements shall be performed with such frequency as deemed necessary by the quality control department to assure compliance with the standard.

5.9.2 Requirements. After abrasive cleaning the following requirements shall be satisfied:

a. Materials shall be free of scale, paint, and corrosion products.

b. Materials shall be free of dust, silt, powder, and other contamination.

c. Part shall be free of warpage, distortion, and excessive material removal.

5.9.3 Rejected parts. Parts rejected due to warpage, distortion or excessive material removal shall be referred to a material review board for further action. Parts rejected because of insufficient blast cleaning shall be re-cleaned in accordance with this standard.

5.9.4 Drawing requirements. Drawing requirements for surface finishes shall be met after the blast cleaning operation. When authorized by drawing or other applicable document, light machining or grinding methods may be used to produce the required surface finish after blasting.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful but is not mandatory.)

6.1 Intended use. This standard provides guidance on the processes and procedures for abrasive blasting of landing gear components for all military aircraft. It may be used for other abrasive blast operations with approval of the cognizant engineering organization.

6.2 Subject term (key word) listing.

Abrasive blasting
Abrasive material
Aluminum oxide
Corrosion
Glass beads
Plastic media
Silicone oxide
Surface defects

6.3 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

CONCLUDING MATERIALS

Custodian:
Air Force – 70

Preparing Activity:
Air Force – 70

Project: MFFP – 0731

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, verification of the currency of the information above using the ASSIST Online database at: http://assist.daps.dla.mil.