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MILITARY STANDARD

ABRASIVE BLASTING

AMSC N/A

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1. SCOPE

1.1 Scope. This standard covers the process and materials required for the abrasive blasting of aircraft and missiles components.

1.2 Process description. Abrasive blast cleaning consists of the forceful application of abrasive particles against the surface of metal parts.

1.3 Abrasive blast uses. Typical uses include:

- a. Corrosion removal
- b. Conditioning of surfaces, for subsequent finishing
- c. Removal of coatings, scale or dry soils

## 2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specification. Unless otherwise specified, the following specifications of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this standard to the extent specified herein.

## SPECIFICATIONS

## Federal

TT-C-490                      Cleaning Methods and Pretreatment of Ferrous Surfaces for Organic Coatings

## Military

MIL-S-5002 71007      Surface Treatments and Inorganic Coating for Metal Surfaces of Weapons Systems  
 MIL-G-5634              Grain, Abrasive, Soft, for Carbon Removal  
 MIL-G-9954 80005      Glass Beads, for Cleaning and Peening  
 MIL-S-17726              Sand, Sandblast  
 MIL-A-21380              Abrasive Materials, for Blasting  
 MIL-P-85891 88019      Plastic Media, for Removal of Organic Coatings

2.1.2 Other Government documents. The following other Government documents form a part of this standard to the extent specified herein.

## Air Force Occupational Safety and Health (AFOSH) Standards

AFOSH 161-1              Respiratory Protection Program  
 AFOSH 161-2              Industrial Ventilation

(Copies of specifications, standards, handbooks, drawings, and publications required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Order of precedence. In the event of a conflict between the text of this standard and references cited herein, the text of this standard shall take 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 Equipment and materials.

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

4.6.1.1 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.

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

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

4.6.1.4 Ventilation and personal protective equipment. Ventilation and personal protective equipment requirements shall be in accordance with Air Force Occupational Safety and Health (AFOSH) Standards 161-1 and 161-2.

4.6.2 Reclaimed materials. The use of reclaimed materials shall be encouraged to the maximum extent possible. Materials used in abrasive blasting are as follows:

4.6.2.1 Silicone oxide. Silicone oxide (sand) meeting the requirements of MIL-S-17726.

4.6.2.2 Aluminum oxide. Aluminum oxide shall be a natural dry corundum and completely free from soluble salts, metallic particles or scale, dust, silt, or other contaminants.

4.6.2.3 Abrasive grit. Abrasive grit meeting the requirements of MIL-G-5634.

4.6.2.4 Abrasive material. Abrasive material meeting the requirements of MIL-A-21380.

4.6.2.5 Glass beads. Glass beads meeting the requirements of MIL-G-9954.

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

4.6.2.7 Reclaimed materials. The use of the reclaimed materials shall be encouraged to the maximum for paint removal.

## 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 4.2.
- b. Mask as required (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 glass beads. Broken beads are abrasive and accelerate the removal of base metal during blast cleaning.
- b. The nozzle should be held at an angle close to perpendicular with the surface being cleaned.
- c. The nozzle should be held 7.62 to 30.48 centimeters (cm) (3 to 12 inchs) from the surface.
- d. The recommended air pressures are:

Ferrous Alloys -  $2.8 \times 10^5$  to  $4.2 \times 10^5$  PA  
40 to 60 pound force per square inch (psi)

- Aluminum Alloys -  $2.1 \times 10^5$  to  $3.5 \times 10^5$  PA (30 to 50 psi)
- Magnesium Alloys -  $6.9 \times 10^4$  to  $2.8 \times 10^5$  (10 to 40 psi)
- Titanium Alloys -  $2.8 \times 10^5$  to  $4.2 \times 10^5$  PA (40 to 60 psi)

5.6 Abrasive grit blasting. (MIL-G-5634)

- a. The nozzle should be held at an angle close to perpendicular with the surface being cleaned.
- b. The nozzle shall be held 8 to 31 cm (3 to 12 in) from the surface.
- c. The blast pressure should not exceed  $6.2 \times 10^5$  PA (90 psi).

5.7 Silicon and aluminum oxide blasting.

WARNING

Avoid excessive inhalation of abrasive dust. Provide ventilation as required, see AFOSH Standards 161-1 and 161-2.

- 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 31 cm (3 to 12 inches) from the surface.
- c. The air pressure should not exceed  $6.2 \times 10^5$  PA (90 psi).

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 and other composite materials or on metals having a thickness of less than 0.064 inches without the authorization of the responsible engineering activity.

WARNING

Consult with equipment and media manufactures 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 partical 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 31 cm to 62 cm (12 to 24 in) for media having Barcol hardness of 34 to 42 and 56 to 77 cm (18 to 30in) for media having Barcol hardness of 54 to 72 cm.
- d. Pressure should be between  $2.8 \times 10^5$  to  $4.2 \times 10^5$  (40 to 60 psi) at the blast nozzle for media having a Barcol hardness of 34 to 42 and less than  $4.2 \times 10^5$  (40 psi) at the nozzle for media having a Barcol hardness of 54 to 72.

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. Parts 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 recleaned 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

6.1 Subject term (keyword) listing.

- a. Abrasive blasting
- b. Abrasive material
- c. Aluminum oxide

- d. Corrosion
- e. Glass beads
- f. Plastic beads
- g. Silicone oxide
- h. Surface defects

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