MIL-STD-171D
29 February 1980
SUPERSEDING
MIL-STD-171C(MR)
7 November 1972

MILITARY STANDARD

FINISHING OF METAL AND WOOD SURFACES

DEPARTMENT OF DEFENSE

Washington, DC 20301

Finishing of Metal and Wood Surfaces

MIL-STD-171D

1. This Military Standard is approved for use by all Departments and Agencies of the Department of Defense.

2. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Director, Army Materials and Mechanics Research Center, ATTN: DRXMR-LS, Watertown, Massachusetts 02172, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FOREWORD

The purpose of this standard is to establish minimum requirements for finishing, and otherwise treating, metal and wood surfaces, and to serve as a general guide to the selection of suitable finishing materials, procedures, and systems. It covers both organic (paint, varnish, and the like) and inorganic (metal plate, phosphatized metal, and the like) coatings. Specialized systems peculiar to individual agencies are covered by drawings, specifications and standards published by those organizations and supplement this standard. For example, MIL-STD-194 covers painting and other finishing of fire-control materiel. Finish system code numbers in the tables shall not be changed in future revisions of this standard, inasmuch as those code numbers should be referenced on drawings, in contracts and in end item specifications. Where a system in a previous edition of MIL-STD-171 has been deleted from the revision, the system to be used as a substitute is noted in the tables.

For convenience in referencing, all procedures, whether they merely clean a surface, deposit a film, or perform some other desirable function, are cataloged as "finishes".

As an example of how to use this standard, assume a part is to be finished with chromated zinc plate 0.001 inch (25 μm) thick. Turning to table II, Inorganic Finishes, Plating, we find the designation for this finish to be 1.9.2.1. Hence, the instructions on the drawing would be:

Finish 1.9.2.1 of MIL-STD-171.

In this particular case, it is unnecessary to mention any preliminary steps such as cleaning, because QQ-Z-325, Zinc Plating (Electrodeposited), referenced in finish 1.9.2.1, provides for this step in these words "It (the basis metal) shall be subjected to such cleaning, pickling, and plating procedures as are necessary to yield deposits as hereinafter specified".

Again, assume the hood of a truck is to be finished with olive drab lustreless lacquer. According to table XIII, this finish is system 20.4. Assume the preparation for painting to be phosphating (finish 5.1.1). The primer would be one conforming to MIL-P-11414 or TT-P-664. The finishing coat would be a lacquer conforming to MIL-L-11195. Hence the instructions on the drawing would be:

Finish 5.1.1 plus 20.4 of MIL-STD-171, Olive Drab No. 34087.

If circumstances make it desirable that parts of an assembly be primed separately and be given final coats after assembly, the instructions might be:

Finish 5.1.1 plus 20.4 of MIL-STD-171, Olive Drab No. 34087
primed before assembly.

The subject matter of this standard is arranged in sections as prescribed in MIL-STD-962 as follows:

1. Scope; 2. Referenced Documents; 3. Definitions; 4. General Requirements; 5. Detail Requirements; and an additional section 6. Inspection.

Section 6 on inspection presumes that the paints have been laboratory tested against the appropriate products specification prior to application. However, inspection to assure that the painting operations are carried out properly is as important as the quality of the paint itself. For example, inspection of surface preparation prior to painting is of major importance. An excellent paint on an improperly prepared surface may fail prematurely. Again, the thickmess of a paint coat has a direct bearing on its durability. Thus, the correct thickness of the dry film of "wash primer" (DOD-P-15328) as given in this standard is very important. In addition to these two factors, proper mixing and thinning of the paint, suitable weather at time of painting, uniform application, suitable drying time between coats, and proper handling of painted surfaces, must be carefully observed. Admittedly this type of inspection requires sound judgment derived from long experience.

Compliance with this standard will promote uniformity in the painting and other finishing of military equipment, and will lessen the chances of error and confusion in times of emergency. The net result should be improved protection of military materiel from deterioration.

APPENDIX

TABLES

1. SCOPE

1.1 SCOPE. This standard is to establish general requirements and to serve as a general guide to the selection of suitable materials, procedures, and systems for cleaning, plating, painting and the otherwise finishing of metal and wood surfaces.

1.2 SELECTION OF FINISHING SYSTEM. Unless otherwise specified the responsibility for selecting the cleaning method, surface treatment, metal coating, paint system or other finish shall rest with the activity responsible for the end item. The finishing system should be selected from those listed in this document and shall be referenced on drawings, contracts, and item specifications. Finish numbers should be preceded by the word "finish" to avoid posible confusion with paragraph numbers, for example, "finish 5.1.1 plus 20.4". This does not preclude the acceptance of a proven commercial finish selected by the manufacturer, supplier, or contractor and concurred in by the procuring activity. Additional information relative to protective finishes and their selection may be found in MIL-HDBK-132 and the Appendix of this document.

1.3 CONFLICTS. In the event of conflict between the requirement of this standard and those of specifications or drawings, the requirements of drawings shall have first preference, those of specifications next, and those of this standard last.

2. REFERENCED DOCUMENTS

2.1 REFERENCED DOCUMENTS. The following specifications and standards of the issue in effect on date of invitation for bids or request for proposal form a part of the standard to the extent specified herein.

SPECIFICATIONS

FEDERAL

O-I-501	- Inhibitors, Pickling (for Use with Sulfuric Acid)
O-T-634	- Trichloroethylene, Technical
P-C-436	- Cleaning Compound, Alkali, Boiling Vat (Soak) or Hydrosteam
QQ-C-320	- Chromium Plating (Electrodeposited)
QQ-N-290	- Nickel Plating (Electrodeposited)
QQ-P-35	- Passivation Treatments for Corrosion Resisting Steel
QQ-P-416	- Plating, Cadmium (Electrodeposited)
QQ-S-365	- Silver Plating, Electrodeposited; General Requirements for
QQ-Z-325	- Zinc Coating, Electrodeposited, Requirements for
TT-C-490	- Cleaning Methods and Pretreatment of Ferrous Surfaces for Organic Coatings
TT-C-494	- Coating Compound, Bituminous, Solvent Type, Acid Resistant
TT-C-520	- Coating, Underbody (for motor vehicles)
TT-E-485	- Enamel, Semi-Gloss, Rust-Inhibiting
TT-E-489	- Enamel, Alkyd, Gloss (for Exterior and Interior Surfaces)
TT-E-515	- Enamel, Alkyd, Lustreless, Quick-Drying
TT-E-516	- Enamel, Lustreless, Quick-Drying, Styrenated Alkyd Type
TT-E-522	- Enamel, Phenolic, Lustreless, Outside
TT-E-527	- Enamel, Alkyd, Lustreless
TT-E-529	- Enamel, Alkyd, Semi-Gloss
TT-E-1593	- Enamel, Silicone Alkyd Copolymer Gloss
TT-F-325	- Filler, Engraving, Stamped Marking
TT-P-336	- Filler, Wood, Paste
TT-L-20	- Lacquer, Camouflage
TT-L-58	- Lacquer, Spraying, Clear and Pigmented (General Use)
TT-L-190	- Linseed Oil, Boiled, (for Use in Organic Coatings)
TT-L-215	- Linseed Oil, Raw (for Use in Organic Coatings)
TT-P-28	- Paint, Aluminum, Heat Resisting
TT-P-320	- Pigment, Aluminum; Powder and Paste, for Paint
TT-P-636	- Primer Coating; Synthetic, Wood and Ferrous Metal
TT-P-659	- Primer Surfacer; Synthetic, Tints and White (for Metal and Wood Surfaces
TT-P-662	- Primer Surfacer, Sanding, Lacquer and Enamel Type
TT-P-664	- Primer Coating, Synthetic, Rust-Inhibiting, Lacquer Resisting
TT-P-1757	- Primer Coating, Zinc Chromate, Low-Moisture-Sensitivity

TT-S-300 - Shellac, Cut
TT-V-51 - Varnish; Asphalt
TT-V-119 - Varnish, Spar, Phenolic Resin
TT-V-121 - Varnish, Spar, Water-Resisting
TT-W--571 - Wood Preservative; Recommended Treating Practice
TT-W-572 - Wood Preservative, Water-Repellent
VV-L-800 - Lubricating Oil, General Purpose, Preservative (Water Displacing, Low Temperature)

MILITARY

MIL-P-116 - Preservation, Methods of
MIL-T-152 - Treatment, Moisture and Fungus-Resistant of Communications, Electronic and Associated Electrical Equipment
MIL-V-173 - Varnish, Moisture and Fungus Resistant (for the Treatment of Communications, Electronic, and Associated Electrical Equipment)
MIL-C-450 - Coating Compound, Bituminous, Solvent Type, Black (for Ammunition)
MIL-E-480 - Enamel, Baking, Phenol- or Urea-Formaldehyde
MIL-F-495 - Finish, Chemical, Black, for Copper Alloys
MIL-J-2829 - Joint Sealing Packing
MIL-R-3043 - Resin Coating, Permanent (for Internal Engine Parts)
MIL-M-3171 - Magnesium Alloy, Processes for Corrosion Protection of
MIL-W-3688 - Wax Emulsion (Rust Inhibiting)
MIL-L-3891 - Luminescent Material and Equipment (Nonradioactive)
MIL-C-4556 - Coating Kit, Epoxy, for Interior of Steel Fuel Tanks
MIL-W-5044 - Walkway Coating and Matting, Nonslip, Aircraft
MIL-C-5541 - Chemical Films for Aluminum and Aluminum Alloys
MIL-E-5558 - Enamel, Wrinkle-Finish, for Aircraft Use
MIL-P-7962 - Primer Coating, Cellulose Nitrate Modified Alkyd Type Corrosion Inhibiting, Fast Drying, (for Spray Application over Pretreatment Coating)
MIL-C-8507 - Coating, Wash Primer, Pretreatment (for Metals); Application of
MIL-A-8625 - Anodic Coatings, for Aluminum and Aluminum Alloys
MIL-S-8802 - Sealing Compound, Temperature-Resistant, Integral Fuel Tanks and Fuel Cell Cavities, High Adhesion
MIL-C-8837 - Coating, Cadmium (Vacuum Deposited)
MIL-M-10578 - Metal Conditioner and Rust Remover (Phosphoric Acid Base)
MIL-T-10727 - Tin Plating; Electrodeposited or Hot-Dipped, for Ferrous and Non-Ferrous Metals
MIL-S-11030 - Sealing Compound, Non-Curing, Polysulfide Base
MIL-L-11195 - Lacquer, Lustreless, Hot Spray
MIL-P-11414 - Primer; Lacquer, Rust-Inhibiting
MIL-C-11796 - Corrosion Preventive Compound, Petrolatum, Hot Application
MIL-L-12277 - Lacquer; Automotive, Hot Spray

MIL-P-12742 - Primer Coating, Phenolic (Water Immersible)
MIL-T-12879 - Treatments, Chemical, Prepaint and Corrosion Inhibitive for Zinc Surfaces
MIL-F-13088 - Finish, Protective, Tung, (Chinawood) Oil Base
MIL-L-13762 - Lead Alloy Coating, Hot Dip (for Iron and Steel Parts)
MIL-L-13808 - Lead Plating (Electrodeposited)
MIL-I-13857 - Impregnation of Metal Castings
MIL-C-13924 - Coating, Oxide, Black, for Ferrous Metals
MIL-F-14072 - Finishes for Ground Electronic Equipment
MIL-P-14458 - Paint, Rubber, Red Fuming Nitric Acid Resistant
MIL-C-14460 - Corrosion Removing Compound Sodium Hydroxide Base; for Electrolytic or Immersion Application
MIL-P-14538 - Plating, Black Chromium (Electrodeposited)
MIL-C-14550 - Copper Plating (Electrodeposited)
MIL-P-14553 - Primer Coating, Dipping, Automotive
DOD-P-15328 - Primer (Wash) Pretreatment, Blue (Formula No. 117B) for Metals
MIL-P-15930 - Primer Coating, Shipboard, Vinyl-Zinc Chromate (Formula No. 120 - for Hot Spray)
MIL-C-16173 - Corrosion Preventative Compound, Solvent Cutback, Cold Application
DOD-P-16232 - Phosphate Coatings, Heavy Manganese or Zinc Base (for Ferrous Metals)
MIL-E-16400 - Electronic Equipment, Naval Ship and Shore: General Inspection
MIL-F-18264 - Finishes, Organic, Aircraft, Application and Control of
MIL-P-18317 - Plating, Black Nickel (Electrodeposited) on Brass, Bronze, or Steel
MIL-L-19538 - Lacquer, Acrylic Nitrocellulose, Camouflage (for Aircraft Use)
MIL-C-20218 - Chromium Plating, Electro-Deposited, Porous
MIL-P-22332 - Paint, Priming, Exterior and Interior (for Ammunition)
MIL-P-22636 - Primer Coating, for Red Fuming Nitric Acid Resistant Paint
MIL-C-22750 - Coating, Epoxy Polyamide
MIL-D-23003 - Deck Covering Compound, Nonslip, Lightweight
MIL-T-23142 - Tape, Pressure Sensitive Adhesuve, for Dissimilar Metal Separation
MIL-C-23217 - Coating, Aluminum, Vacuum Deposited
MIL-P-23236 - Paint Coating Systems, Steel Ship Tank, Fuel and Salt Water Ballast
MIL-P-23377 - Primer Coating, Epoxy Polyamide, Chemical and Solvent Resistant
MIL-L-25142 - Luminescent Material, Fluorescent
MIL-C-26074 - Coating, Nickel-Phosphorous, Electroless Nickel, Requirements for
MIL-P-38336 - Primer Coating, Inorganic, Zinc Dust Pigmented, Self-Curing for Steel Surfaces

MIL-A-40147 - Aluminum Coating (Hot-Dip) for Ferrous Parts
MIL-M-45202 - Magnesium Alloys, Anodic Treatment of
MIL-G-45204 - Gold Plating (Electrodeposited)
MIL-P-45209 - Palladium Plating, Electrodeposited
MIL-L-46010 - Lubricant, Solid Film, Heat Cured, Corrosion Inhibiting
MIL-I-46058 - Insulating Compound, Electrical (for Coating Printed Circuit Assemblies)
MIL-R-46085 - Rhodium Plating, Electrodeposited
MIL-E-46096 - Enamel, Lustreless, Quick Drying, Styrenated Alkyd Type, Solar Heat Reflecting, Olive Drab
MIL-P-46105 - Primer Coating, Weld-Through, Zinc Rich
MIL-E-46117 - Enamel, Alkyd, Lustreless, Solar Heat Reflecting, Olive Drab
MIL-C-46127 - Coating, Gray, Undercoat (Solar Heat Reflecting)
MIL-E-46136 - Enamel, Semi-Gloss, Alkyd, Solar Heat Reflecting Olive Drab
MIL-L-46138 - Lacquer, Lustreless, Acrylic-Nitrocellulose, Solar Heat Reflecting, Olive Drab
MIL-E-46139 - Enamel, Semi-Gloss, Rust Inhibiting, Solar Heat Reflecting, Olive Drab
MIL-L-46142 - Lacquer, Lustreless Solar Heat Reflecting
MIL-L-46147 - Lubricant, Solid Film, Air Cured (Corrosion Inhibiting)
MIL-C-46156 - Corrosion Removing Compound, Sodium Hydroxide Base, for Immersion Application
MIL-L-46159 - Lacquer, Acrylic, Low Reflective
MIL-C-46168 - Coating, Aliphatic Polyurethane, Chemical Agent Resistant
MIL-P-52024 - Paint, Fire Retardant, Olive Drab (for Wooden Crates)
MIL-L-52043 - Lacquer, Semigloss, Cellulose Nitrate
MIL-P-52192 - Primer Coating, Epoxy
MIL-E-52227 - Enamel, Semi-Gloss, Quick Drying
MIL-E-52798 - Enamel, Alkyd, Camouflage
MIL-E-52835 - Enamel, Modified Alkyd, Camouflage, Lustreless
MIL-E-52891 - Enamel, Lusterless, Zinc Phosphate, Styrenated Alkyd Type
MIL-L-52909 - Lacquer, Acrylic, Camouflage, Lusterless
MIL-L-52926 - Lacquer, Camouflage, Lusterless, Hot Spray, Forest Green
MIL-E-52929 - Enamel, Alkyd, Camouflage, Flash Dry
MIL-N-55392 - Nickel-Carbon, Porous, Electrodeposited, for Camouflage
MIL-T-81533 - Trichloroethane, 1,1,1 (Methylchloroform) Inhibited Vapor Degreasing
MIL-C-81562 - Coating, Cadmium and Zinc (Mechanically Deposited)
MIL-S-81733 - Sealing and Coating Compound, Corrosion Inhibitive

STANDARDS

FEDERAL

Fed. Test Method Std. No. 141 - Paint, Varnish, Lacquer and Related Materials; Methods of Inspection, Sampling and Testing
Fed. Std. No. 595 - Colors

MILITARY

MIL-STD-276 - Impregnation of Porous Nonferrous Metal Castings
MIL-STD-865 - Brush Plating, Electro Deposition
MIL-STD-962 - Outline of Forms and Instructions for the Preparation of Military Standards and Military Handbooks

HANDBOOKS

MILITARY

MIL-HDBK-132 - Protective Finishes
MIL-HDBK-205 - Phosphatizing and Black Oxide Coating of Ferrous Metals

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the specific procuring agency or as directed by the contracting officer. Both the title and the number or symbol should be mentioned in the request.)

2.2 OTHER PUBLICATIONS. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids shall apply.

ASTM A 153 - Zinc Coating (Hot Dip) on Iron and Steel Hardware

(Copies of ASTM Standards may be obtained from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.)

3. DEFINITIONS

"NOT APPLICABLE"

4. GENERAL REQUIREMENTS

4.1 MATERIALS. All materials used shall conform to the requirements of the applicable specifications. Types, classes, grades, etc., shall be specified by the procuring activity. Materials may be subject at any time to such tests of the pertinent specification as the procuring activity shall prescribe to determine compliance with the applicable specification.

4.1.1 Applicable documents. The specifications and standards referenced in this document shall be the issue in effect on the date of invitation for bids. The finish or system requirement in the tables does not indicate the latest document designation as evidenced by the omission of the revision letter following the document number.

4.2 SUBSTITUTION FOR SPECIFIED FINISHES, PROCESSES, OR MATERIALS. If, because of special conditions of service or design, the contractor considers that a finish, method, or material, other than that specified herein, is necessary or more suitable, such finish, method, or material may be used upon written approval of the contracting officer. Unless otherwise specified, the contractor shall demonstrate the suitability of the proposed substitute by submission of samples, test specimens, test data or other evidence as required by the procuring activity.

4.3 PREPARATION AND CLEANING OF SURFACES. Before any plating, metal conversion or painting, all surfaces shall be free from soils and corrosion; for example, grease, oil, solder flux, welding flux, weld spatter, sand, rust, scale, and all other contaminants that might interfere with the intimate application of the finish. Cleaning shall be done immediately before the finishing operation, or suitable precautions shall be taken to ensure that the surfaces remain clean until they are to be finished. When a cleaning procedure is not specified by the procuring activity or as a part of the pretreatment specification, the supplier shall use any cleaning procedure which will produce a clean surface and not adversely affect the surface being cleaned, or the subsequently applied coating.

4.3.1 Castings. Porous castings may require sealing to assure that they are leakproof, and to prevent bleeding-out of treating chemicals which would cause staining or corrosion of the metal surface and damage to the finishing system. Impregnation or sealing of castings should be accomplished after complete removal of oils, greases, and other surface contaminants, and after machining. Reference should be made to MIL-STD-276 or MIL-I-13857, as applicable.

4.4 DRAINAGE OF PROCESSING SOLUTIONS FROM PARTS. Where possible finishing and passivation of parts shall be done prior to fabrication. For example, aluminum sheet to be lap-seamed or riveted should be anodized prior to the joining operation. Where this is not possible the finishing and fabrication of items shall be handled in such a way that processing solutions shall not become trapped within any part of the assemblies such as lock seams, lap joints, spot welds, rivets, bolts or other places where processing solutions will remain on the part.

4.5 HOLES AND RECESSES. If a method other than the one specified is necessary in order to attain specified thickness requirements in holes or recesses, such a method may be used upon written approval of the procuring activity. The contractor shall demonstrate that his method or methods produce the required results.

4.6 RIVETS, LOCK BOLTS, BLIND RIVETS AND THREADED FASTENERS. Rivets, lock bolts, blind rivets, and threaded fasteners shall be assembled using wet, unthinned zinc chromate primer conforming to TT-P-1757. Both the fastener and the holes shall be coated with wet unthinned primer or encapsulated primer. If the fasteners are dissimilar to and can result in a direct contact with magnesium, a washer of 5052 aluminum alloy with a minimum overlap of one-eighth to one-fourth inch shall be used in addition to TT-P-1757 primer. Other sealing compounds (MIL-S-11030, MIL-S-8802 and MIL-S-81733) and antiseize compounds shall be used as a substitute for TT-P-1757 when approved by the procuring activity.

4.7 COMPATIBILITY OF DISSIMILAR METAL COUPLINGS. The finishing of metals to be placed in intimate contact when assembled presents a special problem, since dissimilar metal contact results in electrolytic couples which promote corrosion through galvanic action. Table I lists metals and alloys by galvanic potential. To provide corrosion resistance intermetallic couples should be selected so that there is 0.25 volts or less potential between the two metals or alloys. The proper selection of metals in the design of equipment will result in fewer intermetallic contact problems caused by corrosion at the contact points. For additional information see table I of MIL-E-16400.

4.7.1 Reduction of corrosion at intermetallic contact points. Couples of metals selected as in 4.7 shall be painted in accordance with 5.2.4.2 as a minimum requirement. When base metals intended for intermetallic contact form couples exceeding those permitted in 4.7 they shall be plated with those metals which will reduce the potential difference or they shall be suitably insulated with vinyl tape, a nonconducting finish such as zinc chromate primer or other suitable means as specified. Where magnesium is one of the metals of dissimilar metal faying surfaces, the metal shall be separated by use of a vinyl or polyester barrier material (tape) or sealing compound such as MIL-T-23142, MIL-S-11030, MIL-S-8802 or MIL-S-81733.

TABLE I. Galvanic potentials of metals in sea water

	Potential (V) - Relative to saturated calomel electrode @ 25 C
ANODIC END (Less noble, reactive)	
	Volts
Magnesium	-1.80
Magnesium alloys	-1.60
Zinc	-1.10
Zinc - hot dip, galvanized steel	-1.05
Aluminum - cast, other than silicon type	-0.95
Cadmium - plated and chromated	-0.80
Aluminum - wrought, other than copper type	-0.75
Aluminum - cast, silicon type	-0.75
Iron - wrought carbon or low alloy steels gray or malleable cast iron	-0.70
Aluminum - wrought, copper type	-0.60
Steel, stainless - 13% chromium, active	-0.55
Lead - solid or plated, high lead alloys	-0.55
Steel, stainless - 18% chromium, 8% nickel	-0.50
Tin - plate, terneplate, tin-lead solders	-0.50
Chromium - plated	-0.45
Steel, stainless - 13% chromium, passive	-0.45
Brass - yellow, naval, cartridge, muntz metal	-0.40
Brass - red, gilding	-0.35
Copper - solid or plated	-0.30
Nickel - solid or plated, passive	-0.30
Monel	-0.30
Steel, stainless - 18% chromium, 8% nickel, passive	-0.20
Silver, solder	-0.20
Steel, stainless - 18% chromium, 12% nickel 3% molybdenum, passive	-0.20
Titanium, commercial	-0.15
Hastelloy C	-0.10
Silver - solid or plate, high silver alloys	0.0
Rhodium	+0.20
Graphite	+0.25
Gold - solid or plated, high gold alloys	+0.25
Platinum - wrought, high platinum alloys	+0.25
CATHODIC END (More noble, unreactive)	

4.8 ORGANIC VAPOR, ACID OR ALKALINE ENVIRONMENT. Unpainted parts of cadmium or zinc base alloys or metal parts plated with cadmium or zinc shall not be used in unventilated assemblies where phenolic or other organic vapors emanating from insulating varnishes, encapsulating compounds or uncured plastic material may contact them. Cadmium and zinc or platings of these metals shall not be used where parts are in contact with acid, unsymmetrical dimethylhydrazine, ammonia or vapors thereof.

4.9 SURFACES NOT TO BE PAINTED. Certain surfaces do not require paint for protection, on others paint interferes with their functions. The following are examples of surfaces that should be masked or otherwise protected during painting:

(a) Machined surfaces that move with respect to each other, such as threads, slides, bearing contacts and gear teeth.

(b) Electrical parts, such as contacts, relays, bearings, insulators, sockets, plugs, connectors, and terminals. This does not preclude the use of MIL-V-173 varnish or conformal coating in accordance with application requirements of MIL-T-152.

(c) Plastic and rubber parts such as insulators, mounts, spacers, windshields, etc.

(d) Lubrication fittings, cups, holes, etc.

4.10 DRESSING OPERATIONS. Filing, sanding or other dressing operations shall not be done on a part or assembly after it has been finished, except as permitted by drawings, other specifications, the contract or by written approval of the contracting officer. Where filing or the like is permitted, the affected area shall be refinished in accordance with the finish specified for the part.

4.11 USE OF STEEL WOOL. Steel wool shall not be used in lieu of emery or garnet abrasives to clean aluminum or magnesium alloy surfaces unless adequate precautions are taken to remove steel contaminants.

4.12 WELDING, SOLDERING, AND BRAZING. Unless otherwise specified, welding, soldering and brazing shall not be permitted on an assembly after it has been finished with organic coatings. This restriction does not apply if the finish is MIL-P-46105, Primer Coating; Weld-Through, Zinc Rich, finish 24.1.

5. DETAIL REQUIREMENTS

5.1 INORGANIC FINISHES

5.1.1 Metallic coatings. The basis metal shall be substantially free from flaws or defects that will be detrimental to the appearance or performance of the deposited metal. The surface shall be cleaned and coated as required by the detail specification, drawing or contract. The procuring activity shall select the desired finish from those shown in table II, and shall reference it on drawings, in contracts or in item specifications by the number shown in the table. Unless otherwise specified, steel parts having an ultimate strength of 220,000 psi (1517 MPa) or higher (Rockwell C-40 or above, hardness) shall not be electroplated without specific approval of the procuring activity. These parts may be either vacuum coated with cadmium in accordance with MIL-C-8837 or mechanically coated with cadmium or zinc in accordance with MIL-C-81562. The plated coatings listed in table II are applied by the usual or conventional plating techniques. Where in-place plating touch-up, build-up, or repair of metallic parts or surfaces are necessary brush plating techniques may be used. Reference should be made to MIL-STD-865.

5.1.1.1 Stress relief of ferrous alloy. Unless otherwise specified after forming and hardening, and prior to cleaning and plating, objectionable residual stress in ferrous alloy parts having a hardness greater than Rockwell C-40 shall be relieved by suitable heat treatment. The temperature shall be such that maximum relief is given without hardness being reduced to less than the specified minimum. Stress relief is not necessary where it has been demonstrated that plating has no harmful effect on the plated part. When prestressed wire springs are to be plated, they shall be stress relieved immediately after winding.

5.1.1.2 Embrittlement relief. All steel parts having a hardness of Rockwell C-40 and higher shall be baked at 375 $\pm$ 25 F (191 $\pm$ 14 C) for three hours or more as soon after plating as practicable. Plated springs or other parts subject to flexure shall not be flexed prior to the baking operations. If the plated part (such as cadmium or zinc plate) is to be given a supplementary surface conversion treatment, such as chromate or phosphate, it should be treated to relieve hydrogen embrittlement before applying the conversion treatment, which could be rendered ineffective by baking.

TABLE II. Inorganic finishes, metallic coatings

Finish No.	Requirements
*1.1	Cadmium coatings
*1.1.1	Plating, QQ-P-416, type I, without supplementary treatment
1.1.1.1	Class 1, 0.0005 inch (13 µm) thick
1.1.1.2	Class 2, 0.0003 inch (7.6 µm) thick
1.1.1.3	Class 3, 0.0002 inch (5.1 µm) thick
*1.1.2	Plating, QQ-P-416, type II, with supplementary chromate treatment; normal color; not bleached or clear (see 5.1.3.3)
1.1.2.1	Class 1, 0.0005 inch (13 µm) thick
1.1.2.2	Class 2, 0.0003 inch 7.6 µm) thick
1.1.2.3	Class 3, 0.0002 inch (5.1 µm) thick
*1.1.3	Plating, QQ-P-416, type III, with supplementary phosphate treatment (see 5.1.3.3)
1.1.3.1	Class 1, 0.0005 inch (13 µm) thick
1.1.3.2	Class 2, 0.0003 inch (7.6 µm) thick
1.1.3.3	Class 3, 0.0002 inch (5.1 µm) thick
*1.1.4	Cadmium coating (vacuum deposited), MIL-C-8837, type I, without supplementary treatment
1.1.4.1	Class 1, 0.0005 inch (13 µm) thick
1.1.4.2	Class 2, 0.0003 inch (7.6 µm) thick
1.1.4.3	Class 3, 0.0002 inch (5.1 µm) thick
*1.1.5	Cadmium coating (vacuum deposited), MIL-C-8837, type II, with supplementary chromate treatment, normal color, not bleached or clear (see 5.1.3.3)
1.1.5.1	Class 1, 0.0005 inch (13 µm) thick
1.1.5.2	Class 2, 0.0003 inch (7.6 µm) thick
1.1.5.3	Class 3, 0.0002 inch (5.1 µm) thick
*1.1.6	Cadmium coating (vacuum deposited), MIL-C-8837, type III, with supplementary phosphate treatment (see 5.1.3.3)
1.1.6.1	Class 1, 0.0005 inch (13 µm) thick
1.1.6.2	Class 2, 0.0003 inch (7.6 µm) thick
1.1.6.3	Class 3, 0.0002 inch (5.1 µm) thick
1.1.7	Cadmium coating, mechanically deposited, MIL-C-81562, thickness and supplementary treatment as specified
*1.2	Chromium coatings
*1.2.1	Decorative plating, QQ-C-320, class 1
1.2.1.1	Type I, bright
1.2.1.2	Type II, satin
*1.2.2	Engineering plating, QQ-C-320, class 2; thickness and undercoating, if necessary, as specified
1.2.2.1	Class 2a
1.2.2.2	Class 2b
1.2.2.3	Class 2c
1.2.2.4	Class 2d
1.2.2.5	Class 2e

TABLE II. Inorganic finishes, metallic coatings - Continued

Finish No.	Requirements
1.2.3	Gray, MIL-N-55392
1.2.4	Black, MIL-P-14538
1.2.5	Porous chromium plating, MIL-C-20218
*1.3	Lead coatings
*1.3.1	Electrodeposited lead, MIL-L-13808, type I, without preliminary copper coatings
1.3.1.1	Class 1, 0.001 inch (25 µm) thick
1.3.1.2	Class 2, 0.0005 inch (13 µm) thick
1.3.1.3	Class 3, 0.00025 inch (6.4 µm) thick
1.3.1.4	0.0015 inch (38 µm) thick
*1.3.2	Electrodeposited lead, MIL-L-13808, type II, with preliminary copper plating 0.000015 inch (0.38 µm) thick
1.3.2.1	Class 1, 0.001 inch (25 µm) thick
1.3.2.2	Class 2, 0.0005 inch (13 µm) thick
1.3.2.3	Class 3, 0.00025 inch (6.4 µm) thick
1.3.2.4	0.0015 inch (38 µm) thick
*1.3.3	Hot dip lead coating, MIL-L-13762
1.3.3.1	Type I (low tin content)
1.3.3.2	Type II (medium tin content)
1.3.3.3	Type III (high tin content)
*1.4	Nickel coatings
1.4.1	Decorative plating, QQ-N-290, class 1; bright or dull finish as specified on drawing
1.4.1.1	Grade C, 0.0010 inch (25 µm) thick
1.4.1.2	Grade E, 0.0006 unch (15 µm) thick
1.4.1.3	Grade F, 0.0004 inch (10 µm) thick
1.4.1.4	Grade G, 0.0002 inch (5 µm) thick
1.4.1.5	Use finish 1.4.1.2 (grade E)
1.4.1.6	Use finish 1.4.1.3 (grade F)
1.4.1.7	Use finish 1.4.1.4 (graee G)
1.4.1.8	Use finish 1.4.1.2 (grade E)
1.4.1.9	Use finish 1.4.1.3 (grade F)
1.4.1.10	Use finish 1.4.1.3 (grade F)
1.4.1.11	Grade A, 0.0016 inch (40 µm) thick
1.4.1.12	Grade B, 0.0012 inch (30 µm) thick
1.4.1.13	Grade D, 0.0008 inch (20 µm) thick
1.4.2	Engineering plating, QQ-N-290, class 2, thichness as specified.
*1.4.3	Electroless nickel coating, MIL-C-26074
1.4.3.1	Class 1, as coated, no subsequent heat treatment
1.4.3.2	Class 2, steel, copper, nickel, cobalt, titanium-based alloys, and any basis metal not adversely affected by heating as specified for improved hardness

TABLE II. Inorganic finishes, metallic coatings - Continued

Finish No.	Requirements
1.4.3.3	Class 3, aluminum alloys non-heat-treatable, and beryllium alloys processed to improve adhesion of the nickel deposit
1.4.3.4	Class 4, aluminum alloys, heat-treatable, process to improve adhesion of the nickel deposit
1.4.4	Black nickel coating, MIL-P-18317 (undercoat as specified)
1.5	Use finish 1.2.4
1.6	Use finish 1.4.4
*1.7	Silver coating, QQ-S-365
1.7.1	Type I, grade B, matte
1.7.2	Type II, grade B, semibright
1.7.3	Type III, grade B, bright
1.7.4	Type I, grade A (supplementary treatment), matte
1.7.5	Type II, grade A (supplementary treatment), semibright
1.7.6	Type III, grade A (supplementary treatment), bright
*1.8	Tin coatings
1.8.1	Electrodeposited, MIL-T-10727, type I, thickness as specified
1.8.2	Hot-dipped, MIL-T-10727, type II, thickness as specified
*1.9	Zinc coatings
*1.9.1	Electrodeposited zinc, QQ-Z-325, type I, without supplementary treatment
1.9.1.1	Class 1, 0.0010 inch (25 μm) thick
1.9.1.2	Class 2, 0.0005 inch (13 μm) thick
1.9.1.3	Class 3, 0.0002 inch (5.1 μm) thick
*1.9.2	Electrodeposited zinc, QQ-Z-325, type II with supplementary chromate treatment; normal color; not bleached or clear (see 5.1.3.3)
1.9.2.1	Class 1, 0.0010 inch (25 μm) thick
1.9.2.2	Class 2, 0.0005 inch (13 μm) thick
1.9.2.3	Class 3, 0.0002 inch (5.1 μm) thick
*1.9.3	Electrodeposited zinc, QQ-Z-325, type III, with supplementary phosphate treatment (see 5.1.3.3)
1.9.3.1	Class 1, 0.0010 inch (25 μm) thick
1.9.3.2	Class 2, 0.0005 inch (13 μm) thick
1.9.3.3	Class 3, 0.0002 inch (5.1 μm) thick
*1.9.4	Zinc, hot-dip galvanizing, ASTM A153 (for hardware)
1.9.4.1	With chromate treatment, finish 6.1.1.2
1.9.4.2	With phosphate treatment, finish 6.1.1.1
*1.9.5	Zinc coating, mechanically deposited, MIL-C-81562, thickness and supplementary treatment, as specified
*1.10	Copper coating, electrodeposited, MIL-C-14550
1.10.1	Class 1, 0.0010 inch (25 μm) thick
1.10.2	Class 2, 0.0005 inch (13 μm) thick
1.10.3	Class 3, 0.0002 inch (5.1 μm) thick
1.10.4	Class 4, 0.0001 inch (2.5 μm) thick

TABLE II. Inorganic finishes, metallic coatings - Continued

Finish No.	Requirements
*1.11	Gold coating, electrodeposited, MIL-G-45204
*1.11.1	Type I, 99.7 percent gold, minimum; hardness shall be specified
1.11.1.1	Class 1, 0.00005 inch (1.3 um) thick, minimum
1.11.1.2	Class 2, 0.00010 inch (2.5 um) thick, minimum
1.11.1.3	Class 3, 0.00020 inch (5.1 um) thick, minimum
1.11.1.4	Class 4, 0.00030 inch (7.6 um) thick, minimum
1.11.1.5	Class 5, 0.00050 inch (13 um) thick, minimum
1.11.1.6	Class 6, 0.00150 inch (38 um) thick, minimum
1.11.1.7	Class 0, 0.00003 inch (0.76 µm) thick, minimum
1.11.1.8	Class 00, 0.00002 inch (0.51 µm) thick, minimum
*1.11.2	Type II, 99.0 percent gold, minimum; hardness shall be specified
1.11.2.1	Class 1, 0.00005 inch (1.3 um) thick, minimum
1.11.2.2	Class 2, 0.00010 inch (2.5 um) thick, minimum
1.11.2.3	Class 3, 0.00020 inch (5.1 um) thick, minimum
1.11.2.4	Class 4, 0.00030 inch (7.6 um) thick, minimum
1.11.2.5	Class 5, 0.00050 inch (13 um) thick, minimum
1.11.2.6	Class 6, 0.00150 inch (38 um) thick, minimum
1.11.2.7	Class 0, 0.00003 inch (0.76 um) thick, minimum
1.11.2.8	Class 00, 0.00002 inch (0.51 um) thick, minimu
*1.11.3	Type III, 99.9 percent gold, minimum
1.11.3.1	Class 1, 0.00005 inch (1.3 um) thick, minimum
1.11.3.2	Class 2, 0.00010 inch (2.5 um) thick, minimum
1.11.3.3	Class 3, 0.00020 inch (5.1 um) thick, minimum
1.11.3.4	Class 4, 0.00030 inch (7.6 mm) thick, minimum
1.11.3.5	Class 5, 0.00050 inch (13 um) thick, minimum
1.11.3.6	Class 6, 0.00150 inch (38 um) thick, minimum
1.11.3.7	Class 0, 0.00003 inch (0.76 um) thick, minimum
1.11.3.8	Class 00, 0.00002 inch (0.5 um) thick, minimum
*1.12	Aluminum coating
1.12.1	Hot-dip aluminum, MIL-A-40147
1.12.2	Vacuum deposited aluminum, MIL-C-23217
*1.13	Palladium coating
1.13.1	Electrodeposited palladium, MIL-P-45209, thickness as specified
*1.14	Rhodium coating
*1.14.1	Electrodeposited rhodium, MIL-R-46085
1.14.1.1	Class 1, 0.000002 inch (0.05 um) thick
1.14.1.2	Class 2, 0.000010 inch (0.25 um) thick
1.14.1.3	Class 3, 0.000020 inch (0.51 um) thick
1.14.1.4	Class 4, 0.000100 inch (2.5 um) thick
1.14.1.5	Class 5, 0.000250 inch (6.4 um) thick

*General finish requirement headings shall not be specified. The specific finish number(s) only shall be specified. See page iii for the proper method of specifying finishes.

5.1.2 Black oxide finishes. The basis metal shall be substantially free from flaws or defects that will be detrimental to the appearance or performance of the finish. The surface shall be cleaned and chemically finished as required by the detail specification, drawing or contract. The procuring activity shall select the desired finish from those shown in table III, and shall reference it on drawings, in contracts or in item specifications by the number shown in the table.

TABLE III. Inorganic finishes, black oxide

Finish No.	Requirements
3.1	Discontinued
3.2	Black oxide for copper alloys, MIL-F-495
*3.3	Black oxide for iron and steel, MIL-C-13924
3.3.1	Class 1, alkaline oxidizing process (for wrought iron, plain carbon, low alloy steels).
3.3.1.1	Class 1 with MIL-C-16173 supplementary oil treatment
3.3.2	Class 2, alkaline-chromate oxidizing process
3.3.2.1	Class 2 with MIL-C-16173 supplemementary oil treatment
3.3.3	Class 3, fused salt oxidizing process
3.3.3.1	Class 3 with MIL-C-16173 supplementary oil treatment
3.3.4	Class 4, alkaline oxidizing process

*General finish requirement headings shall not be specified. The specific finish number(s) only shall be specified. See page iii for the proper method of specifying finishes.

TABLE IV. Cleaning methods[1/]

Finish No.	Requirements
4.1	Abrasive blasting
4.2	Hot alkaline cleaning
4.3	Solvent cleaning (immersion or spray)
4.4	Phosphoric acid cleaning (alcoholic, detergent or solvent type with detergent) MIL-C-10578
4.5	Use finish 4.4
4.6	Emulsion cleaning
4.7	Alkaline derusting (MIL-C-46156 or MIL-C-14460)
*4.8	Acid pickling
4.8.1	Sulfuric acid pickling. Immerse the part in a solution consisting of 5 volumes of sulfuric acid (66 Baume or 1.84 Sp Gr), 95 volumes of water, and nonfoaming liquid inhibitor, O-I-501, type B, class A, as directed by manufacturer of inhibitor, at a temperature of 170 - 180 F (77 - 82 C). After removal of scale (indicated by a uniform gray color), remove part from solution, allow to drain, and then rinse in fresh circulating water at 170 - 180 F (77 - 82 C). Immerse for 2 to 5 minutes in solution of 1 ounce (28 g) of sodium dichromate and 3/4 ounce (21 g) of phosphoric acid (75% grade) per gallon (3.8 l) of water, at 190 to 205 F (88 - 96 C). Discard rinsing bath when combined sulfuric acid and iron sulfate reaches 2 grams per gallon. After surfaces are thoroughly dry, treat and/or paint as soon as possible. (Note: Where the steel parts will be used under stress cleaning by acid pickling is not recommended because of hydrogen embrittlement. Acid pickling is also not recommended prior to phosphating.
4.8.2	Acid pickling - other methods as specified in detail on drawing or in contract
4.9	Hot alkaline cleaning, nonetching, for nonferrous (and ferrous) metals. Use P-C-436 material in accordance with specification
4.10	Vapor degreasing, using solvent conforming to O-T-634, type II or MIL-T-81533

*General finish requirement headings shall not be specified. The specific finish number(s) only shall be specified. See page iii for the proper method of specifying finishes.

1/Additional details on cleaning methods and procedures may be found in MIL-HDBK-132, MIL-HDBK-205, MIL-P-116, and TT-C-490.

5.1.3 Metal treatments, other than metal deposition or black oxide.

5.1.3.1 Steel, noncorrosion-resistant. Prior to being painted, surfaces of noncorrosion-resistant steel (and iron) shall be cleaned and, unless otherwise specified, shall be pretreated. The cleaning shall leave the surface substantially free from oil, grease, dirt, scale, rust, and other foreign matter. Mechanical cleaning (finish 4.1) shall be used only where contamination from the process will not harm the surface being cleaned or any adjacent ones. The procuring activity shall select the method of cleaning from table IV (only if the pretreatment specification does not contain a cleaning requirement) and shall reference it on drawings, in contracts, or in item specifications by the number shown in the table. Porous castings may require sealing to assure that they are leakproof and would be required to prevent bleeding-out of treating chemical which would cause staining or corrosion of the metal surface and damage to the finishing system. Impregnation or sealing should be accomplished after preparation as in 4.3.1.

5.1.3.1.1 Surface treatments for noncorrosion resistant steel. Immediately after cleaning, solvents and moisture, if any, shall be completely removed. Unless otherwise specified in the contract or order, the contractor may select the method of removal. Unless otherwise specified, the surfaces shall receive one of the treatments listed in table V immediately after removal of solvents and moisture. Unless otherwise specified, high strength steel parts (Rockwell C48 or higher) shall not be cleaned, phosphated, pickled or wash primed (finish 5.2) with acid containing materials without the specific approval of the procuring activity. The procuring activity shall select the treatment and shall reference it on drawings, in contracts or in item specifications by the number shown in the table.

5.1.3.2 Steel corrosion-resisting. Surfaces of corrosion resisting steel shall be thoroughly cleaned and treated by one or more of the finishes listed in table V. The procuring activity shall select the finish and shall reference it on drawings, in contracts, or in item specifications by the number shown in the tables.

TABLE V. Surface treatments and finishes for iron and steel (including corrosion-resisting steel ores)

Finish No.	Requirements
	Finishes for iron and low-alloy steels
*5.1	Light phosphate paint base coatings
5.1.1	Zinc phosphate base, TT-C-490, type I
5.1.2	Iron phosphate base, TT-C-490, type II or IV
5.2	Pretreatment coating, TT-C-490, type III (wash primer)
*5.3	Heavy phosphate coatings
*5.3.1	Manganese phosphate base, DOD-P-16232, type M
5.3.1.1	Class 1, with MIL-C-16173, grade 3 supplementary oil treatment (275 to 400 milligrams of MIL-C-16173, grade 3 (dry) per square foot)
5.3.1.2	Class 1, with VV-L-800 supplementary oil treatment
5.3.1.3	Class 3, with no supplementary treatment
*5.3.2	Zinc phosphate base, DOD-P-16232, type Z
5.3.2.1	Class 1, with MIL-C-16173, grade 3 supplementary oil treatment (275 to 400 milligrams of MIL-C-16173, grade 3 (dry) per square foot)
5.3.2.2	Class 1, with VV-L-800 supplementary oil treatment
5.3.2.3	Class 3, with no supplementary treatment
5.3.2.4	Class 4, supplementary treated by sealing with inorganic salt, and subsequently dyed or treated as specified
5.3.3	Specify finish 5.3.2.1, 5.3.2.2, or 5.3.2.3 as applicable
5.3.4	Use finish 5.3.2.4
	Finishes for corrosion-resisting steels
*5.4	Corrosion-resisting steel not to be painted
5.4.1	Clean and passivate, QQ-P-35
5.4.2	Discontinued: Use Finish 541
*5.5	Corrosion-resisting steel to be painted
5.5.1	Cleaning, passivation, and pretreatment coating Clean and passivate, QQ-P-35 Surfaces to be painted shall be treated with a wash primer conforming to DOD-P-15328

*General finish requirement headings shall not be specified. The specific finish number(s) only shall be specified. See page iii for the proper method of specifying finishes.

5.1.3.3 Zinc and cadmium. Surfaces of zinc and cadmium shall be cleaned by degreasing (finish 4.10) or as otherwise specified. Prior to being painted, any surfaces without the supplementary treatments described in table II under finishes 1.1 or 1.9 shall be given one or more of the surface treatments in table VI. The procuring activity shall select the cleaning method (unless cleaning is specified in the pretreatment specification) and the finish shall be referenced on drawings, in contracts or in item specifications by the numbers shown in the tables.

TABLE VI. Surface treatments for zinc and cadmium

Finish No.	Requirements
*6.1	Phosphate and chromate treatments, MIL-T-12879
*6.1.1	Type I, prepaint treatment
6.1.1.1	Class 1, phosphate
6.1.1.2	Class 2, chromate
6.1.2	Type II, chromate final finish
6.2	Use Finish 5.1.1, light zinc phosphate coating
6.3	Use Finish 5.2, pretreatment coating
*6.4	Phosphoric acid conditioner, MIL-M-10578
6.4.1	Type I. wash-off
6.4.2	Type II, wipe-off

*General finish requirement headings shall not be specified. The specific finish number(s) only shall be specified. See page iii for the proper method of specifying finishes.

5.1.3.4 Aluminum and aluminum alloy. Surfaces of aluminum or aluminum alloy shall be cleaned by vapor-degreasing (finish 4.10), nonetching alkaline cleaner (finish 4.9), or as otherwise specified. They shall then be given immediately one or more of the treatments specified in table VII. The procuring activity shall select the cleaning method (unless cleaning is covered in the treatment specifications of table VII) and the treatment, and shall reference them on drawings, in contracts, or in item specifications by the numbers shown in the tables.

TABLE VII. Surface treatments and finishes for aluminum

Finish No.	Requirements
*7.1	Anodic film, chromic-acid, MIL-A-8625, type I
7.1.1	Class 1, nondyed
7.1.2	Class 2, dyed, color to be specified
*7.2	Anodic film, sulfuric acid, MIL-A-8625, type II
7.2.1	Class 1, nondyed
7.2.2	Class 2, dyed, color to be specified
*7.3	Chemical film, chromate, MIL-C-5541
7.3.1	Class 1A, for maximum protection against corrosion, painted or unpainted
7.3.2	Discontinued: Use finish 7.3.1
7.3.3	Class 3, for protection against corrosion where low electrical resistance is required
7.4	Use finish 5.2, pretreatment coating
*7.5	Hard anodic coating, MIL-A-8625, type III, thickness 0.002 ± 0.0002 inch (50.8 ± 5 um) unless otherwise specified.
7.5.1	Class 1, nondyed
7.5.2	Class 2, dyed, color to be specified
7.6 thru 7.9	Discontinued: Use finish 7.5

*General finish requirement headings shall not be specified. The specific finish number(s) only shall be specified. See page iii for the proper method of specifying finishes.

5.1.3.5 Magnesum alloy. Surfaces of magnesium alloy shall be cleaned by vapor degreasing (finish 4.10), nonetching alkaline cleaner (finish 4.9), or as otherwise specified. They shall then be immediately given one or more of the treatments specified in table VIII. Finish 8.1.2 is very corrosion resistant but is a hard, brittle coating and subject to chipping, cracking or spalling, therefore is recommended only for rigid parts. The procuring activity shall select the finish and shall reference it on drawings, in contracts, or in item specifications by the number shown in the table. Finish 8.6 is used for touch-up applications or where dimensional tolerance must be maintained.

TABLE VIII. Surface treatments for magnesium alloy

Finish No.	Requirements
*8.1	Anodic treatments, MIL-M-45202
8.1.1	Type I, class C, light coating
*8.1.2	Type II, heavy coating
8.1.2.1	Class A, grade 3
8.1.2.2	Class D
8.2	Chrome pickle, MIL-M-3171, type I
8.3	Discontinued: Use finish 8.4
8.4	Dichromate treatment, MIL-M-3171, type III
8.5	Galvanic anodizing, MIL-M-3171, type IV
8.6	Chromic acid brush-on treatment, MIL-M-3171, type VI
8.7	Pretreatment coating, DOD-P-15328 with 50 percent of specified phosphoric acid
8.8	Fluoride anodizing process plus corrosion preventive treatment (for castings), MIL-M-3171, type VII
8.9	Chromate treatment, MIL-M-3171, type VIII

*General finish requirement headings shall not be specified. The specific finish number(s) only shall be specified. See page iii for the proper method of specifying finishes.

5.1.3.6 Copper and copper alloy. Surfaces of copper, brass, and bronze shall be cleaned by vapor-degreasing (finish 4.10), or as otherwise specified. Surfaces that are to be painted shall be acid-etched (finish 4.4) or sandblasted (finish 4.1) just prior to being painted. The thickness of metal removed by blasting should not exceed 0.005 inch (130 um). The procuring activity shall reference the amount on drawings. The procuring activity shall select the method of cleaning (unless cleaning is covered in the treatment specifications of table IX) and treatment, and shall reference them on drawings, in contracts, or in item specifications by numbers shown in tables IV and IX. None of the primers listed in paragraph 5.2.2 should be applied directly over the acid-etched copper without first listing the pretreatment primer conforming to DOD-P-15328.

TABLE IX. Surface treatments for copper and copper alloys

Finish No.	Requirements
9.1	Phosphoric acid conditioner, use finish 6.4
9.2	Abrasive blasting, use finish 4.1
9.3	Black oxide, use finish 3.2

5.1.3.7 Ternplate. Surfaces of terneplate shall be cleaned by vapor degreasing (finish 4.10), or as otherwise specified. Surfaces that are to be painted shall then be given one of the treatments described in table X. The procuring activity shall select the method of cleaning (unless cleaning is covered in the pretreatment specification of table X) and the treatment, and shall reference them on drawings, in contracts, or in item specifications by the numbers shown in the tables.

TABLE X. Surface treatments for terneplate

Finish No.	Requirements
10.1	Discontinued: Data to be specified on drawings or in the contract
10.2	Discontinued: Data to be specified on drawings or in the contract
10.3	Pretreatment coating, use finish 5.2
10.4	Discontinued: Data to be specified on drawings or in the contract

5.1.3.8 Tin. Surfaces of tin plate that are to be painted shall be cleaned by vapor degreasing (finish 4.10), or as otherwise specified. Hot-dip tin plate needs no other pretreatment. Tin plate, electrodeposited from an alkaline stannate bath shall be treated according to finish 11.2. The procuring activity shall reference the method of cleaning and the pretreatment on drawings, in contracts or in item specification by the numbers shown in tables IV and XI.

TABLE XI. Surface treatments for tin plate

Finish No.	Requirements
11.1	Discontinued: Specify cleaning by finish number in table IV
11.2	Acid etch. Immerse for 5 minutes in hot [160 - 180 F (71 - 82 C)] aqueous solution maintained at pH 2 to pH 3 by the addition of a solution containing equal parts by weight of phosphoric acid and chromic acid.
11.3	Pretreatment coating, use finish 5.2

5.1.3.9 Titanium and titanium alloy. Surfaces of titanium and titanium alloy shall be cleaned by vapor degreasing (finish 4.10), or as otherwise specified. Surfaces that are to be painted shall then be sandblasted (finish 4.1). When sandblasting is not feasible, the clean surface shall receive finish 5.2, pretreatment coating. The procuring activity shall select the method of cleaning and the pretreatment, and shall reference them on drawings, in contracts, or in item specifications by the numbers shown in tables IV and XII.

TABLE XII. Surface treatments for titanium and titanium alloy

Finish No.	Requirements
12.1	Abrasive blasting, use finish 4.1
12.2	Pretreatment coating, use finish 5.2

5.2 ORGANIC FINISHES

5.2.1 General painting requirements. Painting shall be done in clean, dry, well-ventilated spaces. It is preferred that the air temperature be between 60 and 90 F (16 and 32 C) and the relative humidity not over 65 percent. Painting should not be done when the temperature is below 50 F (10 C) or when the humidity is above 85 percent. Materials shall be thoroughly mixed and there shall be no settling or separation of ingredients during painting.

Unless otherwise specified, coatings may be applied by any method that will ensure the application of a smooth, uniform, continuous film, free from dried overspray, runs, sags, blisters, orange peel, or other imperfection. Unless otherwise specified, baking of coats of paint shall be done at a temperature of 250 F (121 C) for 45 minutes. Freshly painted materiel shall not be exposed to conditions that will harm the paint. Pretreatment coating DOD-P-15328 (finish 5.2) shall be applied either in accordance with that specification or in accordance with MIL-C-8507. Prior to painting magnesium alloy, first apply one of the finishes 8.1 through 8.6 or 8.9. A surface sealing coating can then be applied. MIL-M-3171 cites a surface coating resin, baking type epoxy sealer.

When this pretreatment coating DOD-P-15328 (finish 5.2) is applied to magnesium alloy, its phosphoric acid content shall be reduced to 50 percent of that specified in DOD-P-15328. Additional data on the application of finishes can be found in MIL-HDBK-132 and MIL-F-18264.

5.2.1.1 Previously painted surfaces. Prior to the application of paint to equipment previously painted, the surfaces shall be thoroughly cleaned. If solvent is used it shall be oil free. All loose paint shall be removed. When it is necessary to remove the old paint it may be done with solvent-type paint remover, or by abrasive blasting (finish 4.1) or other mechanical means. Care shall be used to remove residual remover and solvent from crevices and pockets. Finish 4.1 should be used only where contamination from the process will not harm the surface being cleaned or any adjacent parts. Regardless of the method, no harmful residue shall be left on the surface.

5.2.2 Painting schedule. The first, or priming, coat of paint shall be applied as promptly as possible (preferably on the same day but, in any event, within 24 hours) after the surface has been prepared for painting. This requirement shall apply particularly to metal parts that have received a surface treatment.

Each coat of paint shall be dry before the application of a succeeding coat. For example, under good conditions, 24 hours is sufficient for air-drying paint, such as that conforming to TT-E-485, TT-P-636 or TT-E-529; 15 minutes for lustreless enamel conforming to TT-E-516; 10 minutes for lacquer conforming to MIL-L-11195. In no case shall the time allowed for drying be less than that specified for the recoating or self-lifting test (if specified) in the applicable specification.

5.2.2.1 Unassembled parts. When circumstances make it desirable, primers and intermediate coats may be applied to unassembled parts of an assembly, the final coat being applied after assembly. Prior to application of final coat, all damage to previously applied paint shall be repaired and all soils deposited on the surface during the assembly shall be removed with a cleaner which will not damage the primer or leave an oil deposit.

5.2.3 Film thickness. The thickness of the dry paint film for one coat application shall be as follows:

Specification	Thickness in mils
Pretreatment coating:	
DOD-P-15328	0.4-0.6
Primers:	
TT-E-485	0.8-1.2
TT-P-636	0.8-1.2
TT-P-664	0.8-1.2
TT-P-1757[1/]	0.4-0.6
MIL-P-11414	0.6-0.8
MIL-P-14553	0.4-0.6
MIL-P-15930	0.4-0.6
MIL-P-23377	0.8-1.2
MIL-P-46105	2.0-3.0
MIL-P-52192	0.8-1.2
Other primers (unless otherwise specified)	0.8-1.2
Primer surfacers:	
TT-P-662	0.8-1.2
TT-P-659	0.8-1.2
All top coats, clear or opaque	0.8-1.2

[1/] For nonaircraft or airborne equipment and on ferrous metal surfaces film thickness shall be 0.6-0.8 mils.

Where multiple coats are designated in the tables for finishes the dry film thickness shall be multiplied proportionally. One coat shall be applied by a minimum of one double or cross pass of spray gun. One coat shall not be construed as one pass of the spray gun.

5.2.3.1 Film thickness for camouflage. Where camouflage top coats are used, a minimum of 1.8 mils dry film thickness shall be applied. Normally two spray coats will obtain this minimum film thickness.

5.2.4 Faying surfaces.

5.2.4.1 Wood. Wood in contact with metal shall be painted according to finish 26.3 (table XVIII). The metal surface shall receive two coats of an appropriate primer.

5.2.4.2 Metal. All metallic faying surfaces, whether of similar or dissimilar metals shall receive at least two coats of an appropriate primer except at slip fits as mentioned below. Extra protection for dissimilar metals may be provided with sheet or tape, impregnated with zinc chromate, MIL-J-2829, class 2. After joining is complete and prior to topcoating, fillet seal all joints where moisture could enter from the top or horizontal with sealant MIL-S-8802. At slip fits or press fits, coating with one of the primers listed above, and assembling while wet, affords some protection. However, such treatments cannot take the place of proper sealing and painting of the joints.

5.2.5 Adhesion. All paint finishes shall show good adhesion to substrates and to other paint coatings, as applicable.

5.2.6 Appearance. All paint systems shall have uniform and satisfactory hiding power, color, gloss, and smoothness.

5.2.7 Color. When a paint specification provides for more than one color, the procuring activity shall select the color and reference it on drawings, in contracts or in item specifications by number in Fed. Std. No. 595.

5.2.7.1 Color for Army. Unless otherwise specified, all new material and material undergoing depot overhaul, except aircraft and other items exempted by AR 750-58, shall be painted with a paint system conforming to the Forest Green color in one of the systems shown in table XIII. The system used shall be compatible with and shall provide good adhesion for subsequent coatings of paint conforming to MIL-E-52798. When Forest Green of the paint system conforming to MIL-C-46168 is used, the top coating with other camouflage colors shall be from MIL-C-46168 only. Paints made to the Forest Green requirements must be forwarded by the paint contractor to the following laboratory for approval prior to acceptance: US Army mobility Equipment Research & Development Command, ATTN: DRDME-VO, Fort Belvoir, VA 22060. A minimum of a pint sample from each production lot must be forwarded. For non-camouflage Forest Green; visual color match only; the Forest Green color shall match color #34079 of Fed. Std. No. 595.

5.3 PAINT FINISHES FOR METALS. Tables XIII, XIV and XV list most of the paint finishes for metals necessary for a wide variety of military equipment. An overwhelming percentage of metallic surfaces that are painted are steel (iron), or aluminum and magnesium, and their alloys. Tables XIII through XVI provide specifically for these metals, but the finishes are also suitable for zinc, cadmium, copper, tin, terne and titanium. In many finishes, aluminum and magnesium, and their alloys require special primers (see 5.3.1 and 5.3.2). Special finishes are listed in table XVI. Acid catalyzed primers and topcoats shall not be utilized on high strength steel parts (Rockwell C 48 or higher) without the specific approval of the procuring activity. The procuring activity shall select the finish and shall reference it on drawings, in specifications or in contracts by the number shown in the tables.

5.3.1 Priming paint for aluminum. Primers meeting TT-P-1757, MIL-P-15930 or MIL-P-23377 shall be used in tables XIII, XIV, XV and XVI in lieu of TT-E-485, TT-P-636, TT-P-664, and MIL-P-11414 in priming aluminum. In mixed metal assemblies with aluminum finish 5.2 shall be specified as a pretreatment prior to application of these primers. Primer MIL-P-15930 shall not be used under baking finishes where the baking temperature exceeds 250 F (121 C) or as a primer for a lacquer topcoat. When MIL-P-23377 is used, the contractor shall determine that the topcoat demonstrates adequate compatibility and adhesion to the primer.

5.3.2 Priming paint for magnesium. Two (2) coats of vinyl-zinc chromate primer meeting MIL-P-15930 or one (1) coat of epoxy primer meeting MIL-P-23377 shall be used in tables XIII, XIV, XV, and XVI in lieu of TT-E-485, TT-P-636, TT-P-664 and MIL-P-11414 in priming magnesium. A pretreatment coating meeting DOD-P-15328 (finish 8.7) should be specified as a pretreatment prior to application of primer (except MIL-P-23377). The phosphoric acid for this pretreatment coating is reduced to 50 percent of that required by DOD-P-15328. Primer MIL-P-15930 shall not be used under baking finishes where the baking temperature exceeds 250 F (121 C). Alkyd-zinc chromate primer meeting TT-P-1757 may be substituted for MIL-P-15930 or MIL-P-23377 only when approved by the procuring activity. The use of TT-P-1757 would be dependent upon the top coat that is used. When MIL-P-15930 or particularly MIL-P-23377 is used the contractor shall determine that the topcoat demonstrates adequate adhesion to the primer.

5.3.3 Priming paint for dissimilar metal assemblies. The primer used with dissimilar metal assemblies shall be the primer specified for the anodic or less noble member of the assembly. For example, a component composed of magnesium and steel will require the use of primers for magnesium as specified in 5.3.2.

5.3.4 Number of coats of paint, minimum. The number of coats indicated under remarks in the following tables includes primer (if used), for example, finish 20.4 consists of one (1) coat of primer plus one (1) coat of topcoat. The coating thicknesses shall be as specified in 5.2.3.

5.3.5 Application of camouflage paint. It is essential that Forest Green paint be applied at a minimum dry film thickness of 1.8 mils to achieve color uniformity and optimum camouflage characteristics. Because of the higher degree of transparency of this paint in both the visual and infrared regions of the spectrum, an application of 0.8-1.0 mils dry, which is the normal application for an olive drab paint, would allow both the visual and infrared light to partially penetrate the surface and reflect the substrate or base coating. This would cause both nonuniformity in visual color and poor camouflage properties. Due to the extreme flatness of the paint, the color will vary to a degree, depending upon the texture and type of substrate, plus the orientation of the film and the direction by which the light hits the film. Acceptance of an end item shall not be based specifically on color. It shall be based on whether the paint was approved by the US Army Mobility Equipment Research and Development Command, ATTN: DRDME-VO, Fort Belvoir, VA 22060, and whether application techniques are correct. As specified above, the paint must be applied at least 1.8 mils dry film thickness. A dust coat should be applied first before the two approximate 1 mil dry film thickness coatings are applied. Allow a 15 minute dry time before the second application for solvent flash-off. A single application of 1.8 mils minimum is permissible, provided the paint film is free of imperfections such as runs, sags, or orange peel.

TABLE XIII. Lustreless paint finishes for metal surfaces

Finish No.	First coat	Topcoat(s)	Remarks
20.1		TT-E-516 or MIL-E-52891	One coat finish for projectiles, grenades, etc.
20.2			
20.3	Discontinued	Use finish 20.4 or 20.5	
20.4	MIL-P-11414[1/] or TT-P-664	MIL-L-11195	Two coat lacquer finish for automotive and general use
20.5	TT-P-664[1/] or MIL-P-11414	MIL-E-52891 (for ammunition use)	Two coat lustreless alkyd finish for general use except poor gasoline resistance. Determine where finish is to be used and accordingly substitute finish 20.4, 20.8 or 20.9
20.6	Discontinued	Use finish 20.4 or 20.5	
20.7	Discontinued	Use finish 20.8	
20.8	TT-P-636[1/] or TT-P-664	TT-E-527	Two coat alkyd finish for general use
20.9	TT-P-664[1/]	TT-E-515	Quick drying two coat alkyd finish for general use
20.10	MIL-P-11414[1/] or TT-P-664	TT-P-662 plus MIL-L-11195	Three coat lacquer finish for automotive and general use
20.11	Discontinued	Use finish 20.8	
20.12	Discontinued	Use finish 20.8	
20.13	MIL-P-12742	TT-E-522	Two coat phenolic enamel for parts wholly or partly immersed in water
20.14	Discontinued	Use finish 20.9	
20.15	Discontinued	Use finish 1.9.3.3 plus 20.8	
20.16	Discontinued	Use finish 5.3.1.3 plus 20.8	
20.17	Discontinued	Use finish 5.3.2.3 plus 20.8	
20.18	MIL-P-12742 (2 coats)	TT-E-522	Three coat phenolic enamel for parts wholly or partly immersed in water; also used on wood
20.19	TT-P-636 or TT-E-485[2/ 3/]	MIL-E-52798	General camouflage finish

TABLE XIII. Lustreless paint finishes for metal surfaces - Continued

Finish No.	First coat	Topcoat(s)	Remarks
20.20	TT-P-664 or TT-E-485 3/ 4/	MIL-E-52835	Baking Forest Green
20.21	TT-P-664 3	MIL-L-52909	Acrylic Forest Green
20.22	TT-P-664 or 3/ MIL-P-11414	MIL-L-52926	Hot spray Forest Green
20.23	TT-P-664 3/	MIL-E-52929	Flash dry enamel Forest Green
20.24	MIL-P-52192 5/	MIL-C-46168	Chemical agent resistant camouflage

1/ When these finishes are specified for aluminum or magnesium the primers shall be as specified in paragraph 5.3.1 for aluminum and paragraph 5.3.2 for magnesium.
2/ When using TT-E-485, types II or IV can be used.
3/ For aluminum, TT-P-1757 should be used.
4/ When using TT-E-485, type IV should be used.
5/ For aluminum, MIL-P-23377 should be used.

TABLE XIV. Semigloss paint finishes for metal surfaces

Finish No.	First coat	Topcoat(s)	Remarks
21.1		TT-E-485	One coat finish for ammunition containers, gasoline drums, etc.
21.2	Discontinued	Use finish 21.3	
21.3	TT-P-636[1/] or TT-P-664	TT-E-529	Two coat alkyd finish for general use
21.4	Discontinued	Use finish 21.5	
21.5	TT-E-485[1/] or TT-P-636	TT-E-485	Two coat alkyd finish for general use
21.6	Discontinued	Use finish 21.3	
21.7	MIL-P-52192 (bake)	MIL-E-480 (bake)	Two coat baked finish
21.8	Discontinued	Use finish 21.3 or 21.21	
21.9	TT-P-636[1] or TT-P-664	TT-E-529 (2 coats)	Three coat alkyd finish for general use
21.10	Discontinued	Use finish 21.9	
21.11	MIL-P-11414[1/] or TT-P-664	MIL-L-52043	Two coat lacquer finish for automotive materials
21.12	MIL-P-11414[1/] or TT-P-664	TT-P-662 plus MIL-L-52043	Three coat lacquer finish for automotive materials
21.13	MIL-P-11414[1/] or TT-P-664	MIL-L-52043 (2 coats)	
21.14	Discontinued		Refer to 20.13 or 20.18
21.15	Discontinued		
21.16	Discontinued	Use finish 1.9.3.3 plus 21.5 or 21.3	
21.17	Discontinued	Use finish 1.9.3.3 plus 21.9	
21.18	Discontinued	Use finish 21.12	
21.19	TT-P-1757	TT-E-485 (2 coats)	Three coat finish for general use
21.20	MIL-P-14553 (dip and bake) or TT-P-664 (spray and bake)	TT-E-485 or TT-E-529 (baking type)	Two coat baking finish for automotive equipment
21.21	TT-P-664[1/] or MIL-P-11414	MIL-E-52227	Two coat fast drying alkyd finish for general use

[1/] When these finishes are specified for aluminum or magnesium the primers shall be as specified in paragraph 5.3.1 for aluminum and paragraph 5.3.2 for magnesium.

TABLE XV. Full gloss paint finishes for metal surfaces

Finish No.	First coat	Topcoat(s)	Remarks
22.1	Discontinued	Use finish 22.2	
22.2	TT-P-636[1/] or TT-P-664	TT-E-489	Two coat alkyd finish for general use
22.3	MIL-P-11414[1/] or TT-P-664	MIL-L-12277 (2 coats)	Multiple coat lacquer finishes for automotive use
22.4	MIL-P-11414[1/] or TT-P-664	TT-P-662 plus MIL-L-12277 (2 coats)	Multiple coat lacquer finishes for automotive use
22.5	Discontinued	Use finish 22.4	
22.6	Discontinued	Use finish 24.10	
22.7	Discontinued	Use finish 24.10	
22.8	Discontinued	Use finish 22.2	
22.9	MIL-P-14553 (dip and bake) or TT-P-664 (spray and bake)	TT-E-489 (baking type)	Two coat baking finish
22.10	TT-P-636[1/] or TT-P-664	TT-E-1593	Two coat silicone-alkyd finish for general exterior use. Outstanding gloss and color retention

[1/] When these finishes are specified for aluminum or magnesium the primers shall be as specified in paragraph 5.3.1 for aluminum and paragraph 5.3.2 for magnesium.

TABLE XVI. Special paint finishes for metals

Finish No.	Description of coating	Remarks
23.1	TT-E-485 plus MIL-E-5558, type 1/	Wrinkle finish
23.2	Discontinued: Use finish 23.1	
23.3	Discontinued: Use finish 23.1	
23.4	Discontinued: Use finish 23.1	
23.5	Discontinued: Use finish 23.1	
24.1	MIL-P-46105, 2-3 mil dry film thickness	Weld through primer
24.2	MIL-C-450	Asphalt coating for painting the interior of ammunition items prior to being filled with explosives. Not suitable as prime coat for painting
24.3	TT-C-520, 1/16 inch minimum dry film thickness	Underbody coating for motor vehicles
24.4	MIL-P-22636 (0.2-0.4 mil dry film thickness) plus MIL-P-14458 (2.5-3.0 mil dry film thickness)	Red fuming nitric acid resistant coating
24.5	TT-P-28	Heat resistant aluminum finish for temperatures to 1200 F
24.6	MIL-P-22332	Primer for painting the interior of ammunition items prior to being filled with explosives. It may also be used to prime exterior surfaces
24.7	TT-C-494	Acid resistant asphalt paint for general use
24.8	MIL-C-22750 (1.5 mils min dry film thickness)	Epoxy copcoat resistant to hydraulic fluid spillage
24.9	MIL-P-23377 (2 coats-bake) plus TT-E-529 (2 coats-baking type)	For magnesium or other metals subject to severe exposure
24.10	TT-V-51 (2 coats)	Two coat acid resistant finish for general use
24.11	MIL-P-52192	Primer for rocket motor cases. Will withstand vapor degreasing and provide corrosion resistance
24.12	TT-P-1757 Color Y (2 coats)	For missile use on parts requiring primer only. Apply over pretreatment
24.13	TT-V-119 pigmented with 20 ounces per gallon of TT-P-320, type II, class B, 0.5-0.7 mil dry film thickness	Oil resistant aluminum coating for interior of gear cases or housings

TABLE XVI. Special paint finishes for metals - Continued

Finish No.	Description of Coating	Remarks
24.14	MIL-C-4556 (2 coat system, 3.0 mil minimum dry film thickness per coat)	Epoxy coating kit for interior of fuel transportation and storage tanks
24.15	MIL-P-23236 class 3 (3.0-4.0 mil dry film thickness)	Zinc rich primer for steel structures that receive severe exposure to adverse weather, condensing moisture, corrosive atmospheres and marine environments
24.16	MIL-P-38336 (3.0-4.0 mil dry film thickness)	
24.17	MIL-P-23377, MIL-C-22750	For protection of areas exposed to chemicals and solvents
24.18	TT-P-664[2/], MIL-C-46127 plus MIL-E-46096	Lustreless olive drab solar heat reflecting enamel. Performance equivalent to TT-E-516.
24.19	TT-P-636[2/], MIL-C-46127[3/] plus MIL-E-46117	Lustreless olive drab solar heat reflecting enamel. Performance equivalent to TT-E-527
24.20	TT-P-664[4/], MIL-C-46127[3/] plus MIL-L-46138	Lustreless olive drab solar heat reflecting lacquer. Performance comparable to MIL-L-19538
*24.21	MIL-E-46136	Semi-gloss olive drab solar heat reflecting enamel.
24.21.1	TT-P-636[2/], MIL-C-46127[3/] plus MIL-E-46136, type I	Performance equivalent to TT-E-529, class A
24.21.2	TT-P-664[2/], MIL-C-46127[3/] plus MIL-E-46136, type II	Performance equivalent to MIL-E-52227
24.21.3	TT-P-664[2/]. MIL-C-46127[3/] plus MIL-E-46136, type III	Performance equivalent to TT-E-529, class B
*24.22	MIL-E-46139 (2 coats)	Semi-gloss rust inhibiting olive drab solar heat reflecting enamel for ferrous metal
24.22.1	MIL-E-46139, type I (2 coats)	Performance equivalent to TT-E-485, type II
24.22.2	MIL-E-46139, type II (2 coats)	Performance equivalent to TT-E-485, type IV

TABLE XVI. Special paint finishes for metals - Continued

Finish No.	Description of coating	Remarks
24.23	MIL-L-46142	Gray or near black lustreless solar heat reflecting lacquer for marking of finish coat. Performance equivalent to TT-L-20
24.24	TT-P-1757 4/, MIL-L-46142	Gray or near black lustreless solar heat reflecting lacquer for finish coat

*General finish requirement headings shall not be specified. The specific Finish Number(s) only shall be specified. See page iii for the proper method of specifying finishes.

1/ MIL-E-5558 coating shall be applied at a wet film thickness of 5 to 8 mils, unless otherwise specified. When this finish is specified for aluminum or magnesium the primers shall be as specified in paragraph 5.3.1 for aluminum and paragraph 5.3.2 for magnesium.

2/ When these finishes are specified for aluminum or magnesium the primers shall be as specified in paragraph 5.3.1 for aluminum and paragraph 5.3.2 for magnesium except that MIL-P-15930 shall not be used.

3/ MIL-C-46127 is required when these finishes are specified for ferrous metal. It is not required when used on aluminum or magnesium.

4/ When this finish is specified for aluminum or magnesium MIL-P-7962 primer shall be used.

5.4 PRESERVATIVE TREATMENTS FOR WOOD. For most uses, whether painted or not, wood shall be treated with a water-repellent preservative. The surface shall be dry, and free from grease and other foreign matter, before the wood is treated. Wood that is to be treated shall not have a moisture content exceeding 20 percent of its oven dry weight. Where possible, wood parts shall be cut to final dimensions, planed or sanded smooth, and holes, rabbets, and the like, shall be made before treatment. In the event that it becomes necessary to make holes, rabbets, sawcuts, or the like, after treatment, preservative shall be applied liberally to surfaces exposed by these operations. Table XVII lists three treatments, finish 25.1 being the most effective and preferred treatment; finish 25.3 being the least effective. The procuring activity shall select the finish and shall reference it on drawings, in specifications or in contracts by the number shown in the table

TABLE XVII. Wood preservative treatments

Finish No.	Requirements
25.1	Vacuum-pressure or vacuum-soak treatment. The clean dry, well seasoned wood, free of outer and inner bark, shall be surfaced to the correct cross-sectional dimension and then treated by vacuum and pressure, or vacuum and soak. The treating material shall conform to composition A of TT-W-572. Retention on treatment shall be not less than 3 pounds per cubic foot, and not more than 6 pounds per cubic foot for hard woods, or more than 8 pounds per cubic foot for soft woods. If retention is less than 3 pounds per cubic foot on initial test cycle, treatment shall be to refusal, using a soak cycle of not less than 24 hours. A maximum of 14 days after treatment, two representative samples from each charge shall be removed and tested for paintability in accordance with applicable section of TT-W-572. The temperature of the preservative during the treating process is to be at the discretion of the contractor so long as the requirements of TT-W-571 as to penetration and the above retention requirements are met.
25.2	Immersion treatment. Dress the wood part to correct cross-sectional dimensions. Immerse in pentachlorophenol solution, TT-W-572, for not less than 4 hours. Allow the treated wood to air-dry or kiln-dry before it is painted.
25.3	Surface treatment. Dress the wood part to correct cross-sectional dimensions. Apply one liberal coat of pentachlorophenol solution, TT-W-572. Where practical, apply the solution by immersion for not less than 3 minutes. Otherwise brushing or low pressure spraying (no atomization) is acceptable. Allow the treated wood to air-dry or kiln-dry before it is painted.

5.5 PAINT FINISHES FOR WOOD. Paint finishes for wood are indicated in table XVIII. The treatment of the wood in accordance with one of the systems indicated in table XVII prior to painting provides a more weather resistant finish for exterior exposure and is at the option of the procuring activity. The wood shall not have a moisture content exceeding 20 percent of its oven dry weight. Additional paint finishes for wood are indicated in table XIX.

TABLE XVIII. Paint finishes for wood

Finish No.	First coat	Topcoat(s)	Remarks
		LUSTERLESS	
26.1	TT-P-636	TT-E-529 plus TT-E-527	Three coat alkyd finish for general use
26.2	Discontinued	Use finish 26.1	
26.3	MIL-P-12742 (2 coats)	TT-E-522	Three coat phenolic finish for wood or metal Same as finish 20.18
		SEMIGLOSS	
27.1	TT-P-636	TT-E-529 (2 coats)	Three coat alkyd finish for general use
27.2	Discontinued	Use finish 27.1	
27.3	TT-E-485 or TT-P-636	TT-E-485 or TT-E-529	Two coat alkyd finish for general use
27.4	Discontinued	Use finish 27.3	
27.5	Discontinued	Use finish 27.3	
27.6	Discontinued	Use finish 27.1	
27.7	Discontinued	Use finish 27.3	
27.8	Discontinued	Use finish 27.1	
		FULL GLOSS	
28.1	TT-P-636[1/] alkyd finish for general	TT-E-489	Two coat or three coat14 use
28.2	TT-P-659[1/]	TT-E-489	Two coat or three coat alkyd finish, in white not for exposure to weather
28.3	TT-P-336 When needed for filling	TT-V-121 (2 coats)	Spar varnish
28.4	Discontinued		
28.5	TT-S-300; specify type and grade	TT-S-300	Shellac varnish

1/An additional coat of TT-P-636 primer or TT-P-659 primer surfacer shall be applied, if necessary for proper surfacing, prior to applying the indicated topcoat.

TABLE XIX. Miscellaneous paint finishes for wood

Finish No.	Requirements
29.1	Stain-varnish-wax. Apply olive-drab stain to bare wood. Let dry. Apply two coats varnish, TT-V-121. Let each coat dry thoroughly. Apply wax, MIL-W-3688. Let dry. Polish with clean, dry cloth.
29.2	Oil-shellac-varnish. Apply linseed oil, TT-L-215, to bare wood. Let stand for 24 hours. Squeegee off excess. Let dry for at least 16 hours. Apply one coat shellac varnish, TT-S-300, type II, grade A. Let dry. Apply two coats varnish, TT-V-121. Let each coat dry thoroughly.
29.3	Oil-shellac-clear lacquer. Apply linseed oil, TT-L-215, to bare wood. Let stand for 24 hours. Squeegee off excess. Let dry at least 16 hours. Apply three coats of shellac varnish, TT-S-300, type I, grade B. Let each coat dry thoroughly, and rub each coat lightly with fine sandpaper. Apply two coats of clear lacquer, TT-L-58. Let dry between coats.
29.4	Oil-shellac-lacquer. Apply linseed oil, TT-L-215, to bare wood. Let stand for 24 hours. Squeegee off excess. Let dry for at least 16 hours. Apply three coats shellac varnish, TT-S-300, type I, grade B. Let each coat dry thoroughly, and rub each coat lightly with fine sandpaper. Apply white lacquer, MIL-L-11195 to a thickness of 2.5 to 3.0 mils, approximately 3 coats, if applied hot, 6 coats if applied cold.
29.5	Preservative-shellac-varnish. Apply finish 25.1. Apply one coat shellac varnish, TT-S-300, type II, grade A. Let dry. Apply one coat varnish, TT-V-121. Let dry.
29.6	Preservative-varnish. Apply finish 25.1. Apply two coats varnish, TT-V-121.
29.7	For wood components of small arms. Apply protective finish, TT-L-190 or MIL-F-13088, as specified.
29.8	Fire retardant paint for wooden crates, olive drab. Apply MIL-P-52024 over wood treated in accordance with finish 25.1, 25.2, or 25.3.

TABLE XX. Miscellaneous finishes not classified

Finish No.	Requirements
*30.1	Filler, graduation, TT-F-325
30.1.1	Type I, crayon type; color as specified; black, deep red, white, translucent white
30.1.2	Type II paste type; color as specified, black, deep red, white, translucent white
30.2	Non-skid coating, 1/32 to 1/16 inch dry film thickness, MIL-D-23003, color as specified
30.3	Walkway coating and matting, nonslip, MIL-W-5044, type and color as specified
*30.4	Coating, luminescent, fluorescent and phosphorescent
30.4.1	Luminescent material, fluorescent, type I, MIL-L-25142
30.4.2	Luminescent material, phosphorescent, type P, form 1, MIL-L-3891
30.4.3	Luminescent material, fluorescent, type F, form 1, MIL-L-3891, color as specified
30.5	MIL-V-173; applied in accordance with MIL-T-152. For moisture and fungus proofing of electronic and associated equipment
30.6	MIL-I-46058, conformal coating for printed wiring boards
30.7	MIL-L-46010, Lubricant, Solid Film, Heat Cured, Corrosion Inhibiting
30.8	MIL-L-46147, Lubricant, Solid Film, Air Cured (Corrosion Inhibiting)

*General finish requirement headings shall not be specified. The specific finish numbers(s) only shall be specified. See page iii for the proper method of specifying finishes.

6. INSPECTION

6.1 RESPONSIBILITY FOR INSPECTION. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

6.1.1 Contractor is responsible for inspection. The inspections set forth in the standard shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the standard shall not relieve the contractor of his responsibility for assuring that all supplies submitted to the Government for acceptance conform to all requirements of the contract.

6.2 GENERAL INSPECTION REQUIREMENTS. All equipment being processed shall be inspected at the various stages of cleaning, surface treating, painting, electroplating, and application of other types of finishes and coatings, to ascertain that each process is done in strict accordance with this standard and individual specifications. The inspections and tests covered in this section shall not be considered restrictive. Any condition not in full accord with the applicable drawings and specifications shall be regarded as defective.

6.2.1 Tests. Materials prior to their use, shall be inspected, sampled and tested in accordance with the applicable specification and standard to determine compliance with the requirements of the particular specification. When purchasing camouflage paint, production samples from each lot of paint manufactured shall be forwarded to the laboratory specified in 5.2.7.1. The submission of these samples is for validation of the paint for spectral and specular characteristics. With this information, the inspector will have the means, along with the painting procedures, to accept or reject an end product.

6.2.2 Test specimens. When available, test specimens shall be actual production items, or parts of the items. When approved by the contracting officer, coating systems, may be tested on an approved number of test panels of the same metal as, and coated identically and concurrently with, the manufactured parts they represent.

6.3 CONDITION OF SURFACE PRIOR TO PAINTING. All surfaces shall be examined just prior to painting to assure that the previously cleaned and pretreated surface is dry and free from soil or contamination of any kind. Poor adhesion of paint shall be construed as evidence of improper cleaning. When poor adhesion is indicated, the entire part shall be stripped and the part shall be refinished.

6.4 CONTINUITY AND UNIFORMITY OF COATINGS. All coatings, inorganic, and organic, shall be visually examined for continuity and uniformity.

6.5 THICKNESS OF COATINGS. All coatings, inorganic and organic, shall be checked for dry film thickness as required by this standard, the applicable specification or drawing. The correct dry film thickness of pretreatment coating, DOD-P-15328 is very important. Small steel panels prepared with films, too thick, too thin, and correct, may serve as visual color guides for wash primer and zinc chromate primer. Film thickness gages shall be used for other coatings.

6.6 PAINT APPLICATION. The weather and other conditions shall be checked during application of paint for conformance to this standard (see 5.2.1).

6.7 PAINT ADHESION. The painted items, or specimen panels shall be examined for adhesion in accordance with TT-C-490 and MIL-P-14072 after the coated items, or specimen panels, have dried for a minimum of 24 hours for quick-drying and baking systems, and for a minimum of 72 hours for all other systems.

6.8 COLOR. The color of painted surfaces shall be checked against the standard color chip representing the specified color in Fed. Std. No. 595 or other standard as furnished by the procuring activity. Color comparisons shall be made using the applicable test method of Fed. Test Method Std. No. 141. Camouflage color chips can be obtained from US Army Mobility Equipment Research and Development Command, ATTN: DRDME-VO, Fort Belvoir, VA 22060.

6.9 HIDING POWER, GLOSS, AND SMOOTHNESS OF PAINT. The painted surfaces (when dry) shall be checked visually for hiding power, gloss, and smoothness against samples (when available) furnished or approved by the procuring activity.

6.10 INSPECTION AND ACCEPTANCE OF CAMOUFLAGE PAINTING. The following are inspections that must take place before acceptance can be made on the end item:

(a) The acceptance of the color of the paints shall not be based upon a color match to a standard color chip. Total acceptance of this paint shall be based only upon whether the individual lot of subject paint was approved by the US Army Mobility Equipment Research and Development Command, ATTN: DRDME-VO, Fort Belvoir, VA 22060.

(b) Surface cleaning and treatment requirements shall comply to this standard.

(c) The camouflage paint shall be applied at a total dry film thickness of not less than 1.8 mils.

(d) Proper solvent selections and application techniques shall be adhered to.

(e) The dry color shall be uniform for each individual part, but not necessarily from part to part.

(f) There shall be no running of the paint.

(g) The end product shall not be blotchy.

(h) Upon application, the paint shall not be applied in a dry spray. The paint shall be allowed to flow when applied to the substrate. A dry spray would produce a chalky effect which would allow the paint to be removed just by light rubbing.

(i) Isolated marring and scratching from handling shall be allowed as long as the substrate is not exposed. This slight marring and scratching will not affect the camouflage properties when observed by either visual or photographic means.

Custodian:
Army - MR
Navy - SH
Air Force - 11

Preparing activity:
Army - MR

Project No. MFFP-0174

Review interest:
Army - GL, ME, MI, AR, ER, CR
Air Force - 99

User interest:
Army - AT, AV, AL
Navy - SH, OS, YD

APPENDIX

SELECTION OF FINISHES. The finishes should be selected from this standard. The selection of finishes for any particular application should be made in accordance with the following recommendations or as otherwise indicated in this standard. However, final selection shall rest with the activity responsible for the end item.

EXPOSURE CLASSIFICATION. For application of finishes to materiel, surfaces are classified by exposure as follows:

Type I (Exposed). Type I surfaces are areas, either exposed to view when equipment is in operating or traveling conditions or areas not exposed to view but subject to combined direct action of climatic elements. Climatic elements include temperature extremes, humidity extremes, rain, hail, snow, sleet, salt laden air, industrial atmospheres, direct solar radiation, dust and scouring action of wind-blown sand.

Type II (Sheltered). Type II surfaces are not exposed to view during equipment operation and not subject to direct action of rain, hail, snow, sleet, direct solar radiation, and sand.

APPENDIX A. Finish selection

Class of part	Conditions affecting finish selection	Type exposure	Applicable finish recommendations: Cleaning and pretreatment	Paint finishes: Lustreless	Semigloss	Gloss
FABRICATED FROM FERROUS ALLOYS OTHER THAN CORROSION-RESISTING STEEL						
1. Massive structural parts and assemblies, such as the bodies of trucks, semitrailers, tanks and vans, special purpose vehicles and vans of all types, large brackets, gussets, and assembly hardware	a. Vat pretreatment is practical	I	5.1.1			
	b. Vat pretreatment is not practical	I	4.1 or 4.4 plus 5.2	20.4 or 20.8	21.3, 21.5, 21.11, 21.19 or 21.21	22.2 or 22.3
	c. Parts which have a prior zinc coating and require painting	I	6.1.1.1 or 6.1.1.2 plus 5.2			
2. Large bolts, nuts, washers, and similar type hardware for assembly of massive structures	a. Parts will require painting after assembly	I	1.1.2.3	Same as 1 - Finish after assembly		
	b. Parts will not require painting after assembly	I	1.9.4			
3. Lesser structural parts and assemblies such as racks, cases, castings, housings, panels brackets, etc.	a. Vat treatment is practical	I	5.1.1			
	b. Vat treatment is not practical	I	4.1 or 4.4 plus 5.2	Same as 1		
4. Ground rods, stakes, ground plates, etc.	Parts will be used in contact with soil	I	1.9.4			

APPENDIDIX A. Finish selection - Continued

Class of part	Conditions affecting finish selection	Type exposure	Applicable finish recommendations: Cleaning and pretreatment	Paint finishes: Lustreless Semigloss Gloss
5. a. Inside open hollow members		I	4.4	21.1 - Fill and drain
b. Inside closed hollow members		I	MIL-C-11796 class 1	
6. Small hardware (except threaded parts) such as hinges, fasteners, catches, handles, etc.	a. Parts will be exposed to view when assembled in equipment	I	5.1.1 or (4.1 or 4.4 plus 5.2)	
	b. Parts will not be exposed to view when assembled in equipment	I	5.1.1; 4.1 or 4.4 plus 5.2; 1.1.2.3 or 1.9.4.1	Same as 1 - Finish after assembly
	c. Parts will be painted after assembly	I	1.2.1.1, 1.9.2.2 or 1.9.4.1	
	d. Parts will be in view when assembled and cannot be painted	I	1.4.1.2 (Matte finish) or 1.2.3	
7. Screws, holes, nuts washers and small specialty parts	a. Prior to assembly in equipment	I	1.1.2.3	
	b. After assembly in equipment (parts were plated with cadmium or zinc	I	6.1.1.1 or 6.1.1.2 plus 5.2	Same as 1 - Finish after assembly

APPENDIX A. Finish selection - (Continued)

Class of part	Conditions affecting finish selection	Type exposure	Applicable finish recommendations: Cleaning and pretreatment	Paint finishes: Lustreless Semigloss Gloss
	c. Parts will not be exposed to view after assembly	I	1.1.2.1 or 1.9.4.1	Same as 1 - Finish after assembly
	d. Parts will be exposed to view after assembly. Not painted	I	1.4.1.2 (matte finish) or 1.2.3	
8. Any type of part except threaded part	Parts will be subjected to temperatures in excess of 160 F	I or II	1.2.2 or 1.4.2	
9. Hardware such as hinges, catches, clamps, clips, screws, bolts, nuts, washers, etc.	a. Parts will be subjected to temperatures in excess of 160 F	II	1.2.2 or 1.4.2 30.7 or 30.8	None
	b. Parts will not be subjected to temperatures in excess of 160 F	II	1.4.1.3 or 1.2.2	
	c. Parts will be in contact with uncured phenolics or subjected to phenolic vapors (see 4.8)	II	1.2.2 or 1.4.2	

APPENDIX A. Finish selection - (Continued)

Class of part	Conditions affecting finish selection	Type exposure	Applicable finish recommendations: Cleaning and pretreatment	Paint finishes: Lustreless	Semigloss	Gloss
10. Wearing parts lubricated in service	a. Parts will be oiled or greased but not during operation	II	5.3.1.3			
	b. Parts will be splash or force-feed lubricated in operation	II	5.3.1.3			
11. Sliding wearing surfaces such as guide rails, etc., requiring electrical conductivity	Parts cannot be lubricated	II	1.4.1.3 or 1.4.1.3 plus 1.2.2 (1.0 mil thick)			
12. Gears, cams, slides, etc.	a. Parts cannot be lubricated and will not be subjected to high temperature	II	1.1.2.2			
	b. Parts cannot be lubricated and will be subjected to high bearing pressure	II	1.4.1.3 or 1.4.1.3 plus 1.2.2 (1.0 mil thick)			
13. Any type of part	An electrical conductive dissimilar metal contact is required	II	Any plate providing a permissible couple per table I			

APPENDIX A. Finish selection - (Continued)

Class of part	Conditions affecting finish selection	Type exposure	Applicable finish recommendations: Cleaning and pretreatment	Paint finishes: Lustreless	Semigloss	Gloss
14. Hardened steel parts such as coil springs, washers, etc., subject to hydrogen embrittlement	Plating is required for protection due to equipment design	I or II	Any type plating required for exposure plus precautions in paragraphs 5.1.1.1 and 5.1.1.2			
15. Steel small arms parts	Part subjected to temperature in excess of 160 F	I or II	5.3.1.2 or 5.3.2.2			

FABRICATED FROM STAINLESS STEEL OR NICKEL-BASE ALLOYS

20. Large parts	a. Parts will be exposed to view in assembled equipment	I	5.5.1	Same as 1
	b. Part will not be exposed to view in assembled equipment	I	5.4.1	No finish required
21. Small parts	a. Parts will be exposed to view in assembled equipment	I	5.5.1	Same as 1
	b. Parts will not be exposed to view in assembled equipment	I	5.4.1	No finish required

Class of part	Conditions affecting finish selection	Type exposure	Applicable finish recommendations: Cleaning and pretreatment	Paint finishes: Lustreless	Semigloss	Gloss
22. Welded or machined parts made of stainless steel		I	5.4.1			
23. Any type parts		II	No finish required			
24. *Open* hollow members		I or II	4.4	21.1 - Fill and drain		
25. Closed hollow members		I or II	MIL-C-11796 Class 1			
FABRICATED FROM ALUMINUM-BASE ALLOYS (For applicable primers see paragraph 5.3.1)						
30. Massive structural parts and assemblies brackets, gussets, and hardware assemblies	a. Vat pretreatment is practical	I	7.1.1 or 7.2.1	20.4 or 20.8	21.3, 21.5 21.11 or 21.19	22.2 22.3
	b. Vat pretreatment is not practical	I	7.3 or 5.2		21.21	
31. Lesser structural parts and assemblies such as racks, cases, castings, housings, panels, brackets, etc.	a. Vat pretreatment is practical	I	7.1.1 or 7.2.1	Same as 30 after assembly		
	b. Vat pretreatment is not practical	I	7.3 or 5.2			

APPENDIX A. Finish selection - (Continued)

Class of part	Conditions affecting finish selection	Type exposure	Applicable finish recommendations: Cleaning and pretreatment	Paint finishes: Lustreless Semigloss Gloss
32. Small hardware such as hinges, fasteners, catches, handles, screws, nuts, bolts, washers, etc.	a. Parts will be exposed to view when assembled in the equipment	I	7.1.1, 7.2.1 or 7.3	Same as 30 after assembly
	b. Parts will not be exposed to view when assembled in equipment	I	7.1.1 or 7.2.1	
33. Internal structural parts such as chassis, brackets, inside of panels, clamps, clips, hinges, etc.	a. None	II	7.1.1, 7.2.1 or 7.3	Same as 30
	b. RF electrical conducting surface as required	II	7.3.3	None
	c. A nonconducting surface is required	II	7.1.1 or 7.2.1	Same as 30
	d. Plating is required for contact with dissimilar metals	II	Any plate providing a permanent couple per table I	
34. Open hollow members		I or II	4.4	Fill with primer TT-P-1757 and drain
35. Closed hollow members		I or II	MIL-C-11796, class 1	
36. Parts requiring high wear resistance such as gears, cams, slides, etc.	Parts will be subjected to high bearing pressure	II	7.5 30.8	None None

APPENDIX A. Finish selection - (Continued)

Class of part	Conditions affecting finish selection	Type exposure	Applicable finish recommendations: Cleaning and pretreatment	Paint finishes: Lustreless	Semigloss	Gloss
PARTS FABRICATED FROM MAGNESIUM-BASE ALLOYS (For applicable primers see paragraph 5.3.2						
40. All parts fabricated from alloys other than "M" alloys	a. Where vat passivation is practical	I or II	8.1.1 plus 8.7	20.4 or 20.8	21.3, 21.5, 21.11 or 21.21	22.2 22.3
	b. Where vat passivation is not practical	I or II	8.6 plus 8.7			
41. All parts except those subject to flexing		I or II	8.1.2 plus 8.7	Same as 40		
42. All parts fabricated from "M" alloys		I or II	(8.1.1 or 8.4) plus 8.7	Same as 40		
43. Open hollow members		I or II	4.4	Fill with primer TT-P-1757 or MIL-P-23377 and drain		
44. Closed hollow members		I or II	MIL-C-11796, class 1			
45. For magnesium alloys subject to severe exposure (seashore, etc.). Paint system may also be used on steel and aluminum			8.1.1 plus 8.7	24.9		

APPENDIX A. Finish selection - (Continued)

Class of part	Conditions affecting finish selection	Type exposure	Applicable finish recommendations: Cleaning and pretreatment	Paint finishes: Lustreless	Semigloss	Gloss
FABRICATED FROM WOOD						
50. All wood surfaces otherwise specified	a. Where vacuum-soak treatment is practical	I or II	25.1	26.1	27.1	28.1
	b. Where vacuum-soak treatment is not practical	I or II	25.2 or 25.3			
51. Varnished surfaces		I or II		29.6		
52. Panel trucks, trailers, semi-trailers, etc.		I or II	25.1	Same as 50		

APPENDIX A. Finish selection - (Continued)

Class of part	Conditions affecting finish selection	Type Exposure	Applicable finish recommendations: Cleaning and pretreatment	Applicable finish recommendations: Paint finishes
		OTHER APPLICATIONS		
60. Crankcase sealer for cast iron housings of clutch, transmission, differential, final drive, and brakes	(Not applicable where metal to metal contact is made)	II	1/	MIL-R-3043 or 24.13
61. Components subject to high temperatures (400 to 1000 F)		I	1/	24.5
62. Storage battery areas	Acid	II	1/	24.2 or 24.10
63. Areas subject to spillage of hydraulic fluid		I or II	1/	24.8
64. Wrinkle finish		II	1/	23.1
65. Inclosed surfaces subject to spot or roll welding		II	1/	24.1
66. Parts subject to spillage of red fuming nitric acid		I or II	Steel: 4.3 Aluminum: 7.3	24.4
67. Coating for interior of ammunition items in contact with explosives		II	1/	24.2, 24.6 or 24.7

1/Cleaning and pretreatment shall be as applicable to basis metal.

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