

Alexandria Metal Finishers

PROCESS	SPEC	THICKNESS	COMMENTS
ANODIZE SULFURIC	MIL-PRF-8625 MIL-A-8625	0.0002" - 0.0010"	All aluminum alloys, but do not use where solution will entrap.
Color will vary with alloy. Aluminum with low alloying elements will show practically no color change. Best coating on aluminum for dyeing. Can be dyed practically any color or shade (Black, blue, red, gold, orange, green, etc.).	Type II Type IIB Class 1 Class 2	Light Coating Non-dyed	Dyed For Class 1, Alexandria's standard practice for sealing is "Clear, hot DI water". Dichromate seal may be specified (freshening color will be pale yellow-green). FED-STD-NO. 595 may be used as a guide for specifying color (approximate comparison only).
Salt spray requirement is 336 hours (5% NaCl solution) per method B-117 of ASTM. Minimum weight for type II coatings. Class 1 1.000 Milligrams/sq.ft.			
ANODIZE TO AEROSPACE MATERIAL SPECIFICATIONS (AMS)	AMS-2469 AMS-2471 AMS-2472 AMS-2482	Hardcoat 0.0002" ± 0.0005" Sulfuric Acid Process - no dye coating Sulfuric Acid dye Hardcoat 0.0002" ± 0.0005" with Teflon	Salt Spray test is requirement (when sealed) for 336 hours 336 hours salt spray test required and controlled on 6061-T3 aluminum. (Dichromate Sealed) 336 hours salt spray test required and controlled on 6061-T3 aluminum. 336 hours salt spray test required. Coefficient of friction test required.
AMS anodizing specifications are similar to MIL-PRF-8625. The major differences are in the testing requirements. All AMS specs do run until preproduction samples have been approved or waived in writing by purchaser. Coating weight test may be required on a lot basis rather than a monthly basis. Additional and/or specific tests may be required. *** The AMS 2469-2482 in this block are the only finishes not included in our Nadcap scope. All other finishes and specifications shown are included.			
CHEMICAL FILM	MIL-DTL-5541		Class 1A is used as a corrosion preventative film (if unprinted) or to improve adhesion of paint finish systems (if painted). Class 3 is used as a corrosion preventative film for electrical and electronic applications, where low resistance contacts are required. Low electrical resistance test not required unless specified.
Coatings for aluminum. Color can vary from colorless to golden - iridescent brown. Materials should conform to MIL-DTL-81706. Coatings shall be continuous, free from powdery areas, breaks, scratches, etc. Type I Yellow or Clear Chromate. Type II Clear (RoHS compliant Hex-free, Cl. 1A or 3)	Class 1 A Class 3	No Dimensional Change	
CHEMICAL FINISH (Black)	MIL-F-495		Used as a base for lacquer, light oil, or wax. For decorative, optical, and corrosion retardant application.
A uniform black corrosion retardant for copper. Coating has no abrasion resistance. (1) Notice 2.		No Dimensional Change	

JANUARY						
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FEBRUARY						
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MARCH						
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PROCESS	SPEC	THICKNESS	COMMENTS
PASSIVATE	ASTM-A-967		Nitric Acid (Vol. %) Sodium Dichromate (Weight %)
Alternate spec to supersede QQ-P-35. In addition to passivate using Nitric Acid (and Sodium Dichromate), this ASTM also introduces passivation using Citric Acid which at the present time, Alexandria Metal Finishers does not perform.	Nitric 1 Nitric 2 Nitric 3 Nitric 4 Nitric 5	120°-130°F 20 min. 70°-90°F 30 min. 120°-140°F 20 min. 120°-130°F 30 min. As required	20 - 25 2.5 ± 0.5 20 - 45 none 20 - 25 none 45 - 55 none As required to pass test

APRIL						
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MAY						
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JUNE						
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PROCESS	SPEC	THICKNESS	COMMENTS
RHODIUM	MIL-R-46085		Over Nickel, Silver, Gold, or Platinum Over other metals (require Nickel Undercoat) Used on Silver for tarnish resistance. Applications range from electronic to nose cones wherever wear, corrosion resistance, solderability, and reflectivity are important.
Metallic and similar to stainless steel in color. Excellent corrosion resistance. Almost as hard as chromium. Very good abrasion resistance. Good solderability. Low contact resistance. Thicker coatings are very brittle. Has high reflectivity. Inactive for new design. Provided for reference.	Type I Type II Class 1 Class 2 Class 3 Class 4 Class 5	0.00002" min. 0.00001" min. 0.00002" min. 0.00010" min. 0.00025" min.	

JULY						
SUN	MON	TUE	WED	THUR	FRI	SAT
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AUGUST						
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SEPTEMBER						
SUN	MON	TUE	WED	THUR	FRI	SAT
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PROCESS	SPEC	THICKNESS	COMMENTS
SILVER	GG-S-365		Increasing use in both decorative and engineering fields, including electrical and electronics fields.
White matte to very bright in appearance. Good corrosion resistance depending on base metal. Will tarnish easily. Hardness varies from about 90 Brinell to about 135 Brinell depending on process and plating conditions. Solderability is excellent, but decreases with age. Best electrical contact characteristics for anti galling uses on static seals, bushings, etc. This specification is provided for reference purposes only as it has been cancelled. Users may consult ASTM-B-700 (see below).	Type I Type II Type III Grade A Grade B	0.0005" min. unless otherwise specified for Fe Alloys, unless otherwise specified, it shall be 0.00025" min. of silver with a total plating thickness of 0.001" min. (the balance to be Cu + Ni, but should not exceed 0.0005")	Matte Semi-Bright Bright Chromate post treatment to improve tarnish resistance ** No Chromate treatment ** (Lot test required)

OCTOBER						
SUN	MON	TUE	WED	THUR	FRI	SAT
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NOVEMBER						
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DECEMBER						
SUN	MON	TUE	WED	THUR	FRI	SAT
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PROCESS	SPEC	THICKNESS	COMMENTS
SILVER	ASTM-B-700		99.9% min. 99.0% min. 98.0% min. Matte Bright (obtained by the use of Brighteners) Bright (obtained by polishing of Grade A coatings) Semi-bright (obtained by the use of addition agents) No supplementary tarnish resist (Chromate) treatment With supplementary tarnish resist (Chromate) treatment (not suitable for food service applications)
This specification covers requirements for electroplated coatings of silver. The purpose of this specification is to provide a standard for the electroplating of silver. The silver plating shall be of the following types: Type I - Matte Type II - Semi-bright Type III - Bright Grade A - Matte Grade B - Bright (obtained by the use of Brighteners) Grade C - Bright (obtained by polishing of Grade A coatings) Grade D - Semi-bright (obtained by the use of addition agents) Class N - No supplementary tarnish resist (Chromate) treatment Class S - With supplementary tarnish resist (Chromate) treatment (not suitable for food service applications)	Type I Type II Type III Grade A Grade B Grade C Grade D Class N Class S	0.0005" min. unless otherwise specified for Fe Alloys, unless otherwise specified, it shall be 0.00025" min. of silver with a total plating thickness of 0.001" min. (the balance to be Cu + Ni, but should not exceed 0.0005")	

Anodizing, Electroplating, Chemical Finishing

PROCESS	SPEC	THICKNESS	COMMENTS
ELECTROLESS NICKEL	ASTM-B-733	Range from 0.0002" - 0.0024"	ASTM specification requires the purchaser to well define the "type", "class", "service condition", "composition", "test method", etc. on ordering documents. Porosity testing would have to be waived as it is not currently offered.
ELECTROPOLISHING	NO MIL SPEC	Typical material removal: 0.0002"	Typical dimensional reduction of 0.0002" per surface. Process is not recommended for close tolerance surfaces.
GOLD	MIL-G-45204	Unless otherwise specified:	Yellow to orange color depending on proprietary process used. Will range from matte to bright finish depending on base metal. Good corrosion resistance, and has high tarnish resistance. Provides a low contact resistance, and is a good solderability. Unless otherwise specified, an intermediate nickel plate is required on copper base alloys or copper plated surfaces prior to the gold plating. Please note: This specification is provided for reference only as it has been superseded (See below).
GOLD	ASTM-B-488	Unless otherwise specified:	Alternate gold specification to supersede MIL-G-45204. Very compatible to MIL-G-45204 except that adhesion bake test (if chosen) will be @ 570°F/ 60°F for 30 minutes. A bend test may also be substituted. (Note: Sampling for destructive test is higher than that of MIL-G-45204).
GOLD	MIL-DTL-45204	Unless otherwise specified:	Alternate spec to supersede MIL-G-45204. Yellow gold to orange color depending on proprietary process used. Will range from matte to bright finish depending on the base metal. Good corrosion resistance and has high tarnish resistance. Provides a low contact resistance and is a good conductor. Has excellent solderability. Unless otherwise specified, an intermediate nickel plate is required on copper base alloys or copper plated surfaces prior to the gold plating. Note: Unless a specific class is specified, Class 1 shall be specified. Except for hydrogen embrittlement relief, no postplating thermal treatment. Customer is required to elect verification Level from I to VII per MIL-STD-1916. Where not specified, Alexandria will elect to sample per MIL-G-45204. Alternatively customer may elect to specify a different inspection plan (such as per MIL-G-45204). Alexandria Metal Finishers performs Grade A & Grade C only. Other grades quoted upon request.

PROCESS	SPEC	THICKNESS	COMMENTS
HARD ANODIZE	MIL-PRF-8625 MIL-A-8625	Type III As specified on drawing. If not specified nominal thickness shall be 0.0002" ± 0.0004"	Color will vary from light tan to black depending on alloy and thickness. Can be dyed in darker colors depending on thickness. Coating PENETRATES base metal as much as builds up on the surface. The term THICKNESS includes both the build-up and penetration. Provides very hard ceramic type coating. Abrasion resistance will vary with alloy and thickness of coating. Good dielectric properties. Corrosion resistance is good, but recommend seal hard anodize in 5% dichromate solution where increased corrosion resistance is required. Where extreme abrasion resistance is required, do not seal as some softening occurs. Sampling will be per MIL-STD-105E unless otherwise specified.
NICKEL	AMS-GD-N-290	AMS-GD-N-290	There is a nickel finish for almost any need. Nickel can be deposited soft or hard - dull or bright, depending on process used and conditions employed in plating. Thus, hardness can range from 150 - 500 Vickers. Can be similar to stainless steel in color, or can be a dull gray or light gray (almost white) color. Corrosion resistance is a function of thickness. Has a low coefficient of thermal expansion. Is magnetic. All steel parts having a hardness of Rc-40 or greater require a post-bake at 375° ± 25°F for 3 hours minimum.
NICKEL	AMS-2403	As specified on drawing.	Alexandria Metal Finishers applies this specification for undercoating only generally under 0.0005"
PASSIVATE	AMS-GQ-P-35	No dimensional change	A process designed to remove foreign metals from the surface of stainless and corrosion resistant steels and to promote natural tendency of surface to oxidize. Does not change the appearance of the base metal. Process purifies surface and therefore, improves corrosion resistance. Drawing on purchase order documentation should specify stainless steel alloy. (Cancelled Feb. 2005)
PASSIVATE	SAE-AMS-2700	Selection of "Types" is more relevant than AMS-GQ-P-35.	At this point, Alexandria Metal Finishers performs method 1 (nitric), Type 2 and 6

PROCESS	SPEC	THICKNESS	COMMENTS
COPPER	MIL-C-14550	Unless otherwise specified: Class 0 0.001 - 0.005" Class 1 0.001" min. Class 2 0.0005" min. Class 3 0.0002" min. Class 4 0.0001" min.	For heat treatment stop-off For carburizing and decarburizing shield, also plated through printed circuit board As an undercoat for nickel and other platings. To prevent basic metal migration into tin (prevent poisoning solderability).
COPPER	AMS-2418	Unless otherwise specified: 0.0005" - 0.0007"	Copper flash about 0.0001" Preproduction approval required or must be waived in writing.
ELECTROLESS NICKEL	AMS-C-26074 (MIL-C-26074)	Unless otherwise specified:	Customer to specify the Rc hardness of steel and if it is greater than Rc-40, whether the steel is carburized. As Coated Steel and other base metals heat treatable to improve hardness. Aluminum alloy, heat treatable, processed to improve adhesion of nickel deposit. Aluminum alloy, heat treatable, processed to improve adhesion of nickel deposit.
ELECTROLESS NICKEL	AMS-2404	As specified on Drawings	Note: Unless a specific class is specified, Class 1 shall be specified. Except for hydrogen embrittlement relief, no postplating thermal treatment. Customer is required to elect verification Level from I to VII per MIL-STD-1916. Where not specified, Alexandria will elect to sample per MIL-G-45204. Alternatively customer may elect to specify a different inspection plan (such as per MIL-G-45204). Alexandria Metal Finishers performs Grade A & Grade C only. Other grades quoted upon request.

PROCESS	SPEC	THICKNESS	COMMENTS
SULFAMATE NICKEL	MIL-P-27418	See Comments	The nickel plating conforming to this specification is intended to facilitate the formation of a seal between two metallic surfaces. It is not intended to break down sharp edges. Typical applications: hydraulic cylinders, wear surfaces, actuating cams, etc. Can be used as an electrical insulation coating. "Flash" hard anodize may be used instead of conventional anodize for corrosion resistance and may be more economical in conjunction with other hard anodized areas. Hardcoat anodize is available with teflon impregnation also. If Class 1 is specified, hard anodize shall not be dyed. Non-dyed & un-sealed unless specified Dyed
TIN	MIL-T-10727	As Specified on drawing. Thickness guide (not part of spec.) Type I 0.0001 - 0.00025" Type II 0.0002 - 0.0004"	Alexandria Metal Finishers provides both "Bright" and "Matte" finishes. If not specified, bright will be generally provided. Electrodeposited. Use ASTM-B-545 as guideline. Flash for soldering To prevent galling and seizing Where corrosion resistance is important To prevent formation of case hardening during ribrinding. Hot dipped (not currently available at Alexandria Metal Finishers)
TIN	ASTM-B-545	Class A 0.0001" min. Class B 0.0002" min. Class C 0.0003" min. Class D 0.0008" min. Class E 0.0012" min. Type Matte Type Bright Type Flow Type Bright	ASTM requires purchaser to supply information: base metal, underlying test requirements, test methods, etc. In general, copper surfaces containing more than 5% Zn shall have a copper undercoating of at least 0.0001" or nickel undercoating of at least 0.00025" option. Co-plated lead in the range of 2-12% may be specified. Flow brightening not currently available at Alexandria Metal Finishers.
TIN LEAD	AMS-P-81728	Unless otherwise specified: 0.0003" - 0.0005"	Either a matte or luster is acceptable. Has excellent solderability. 0.0002" copper plate generally required on copper base alloys. No undercoating required on steel substrates unless specified. The MIL-P-81728 specification has been superseded by the AMS-P-81728 specification.
ZINC	ASTM-B-633	Fe/Zn25 SC4 (very severe) Fe/Zn12 SC3 (severe) Fe/Zn8 SC2 (moderate) Fe/Zn5 SC1 (mild) Type I Type II Type III	Customer to specify whether steel hardness is Rc-31 or greater. If it is, customer to specify pre-bake class per ASTM-B-649 and post-bake requirements: ASTM-B-650 Without supplementary treatment With supplementary chromate treatment. With supplementary colorless chromate treatment. Corrosion resistance requirements: Type II 96 hours Type III 12 hours

THE INFORMATION PROVIDED ON THESE CHARTS ARE FOR REFERENCE ONLY. IT IS A SUMMARY, AND IS NOT INTENDED TO BE COMPLETE. AS SPECIFICATIONS ARE CONSTANTLY CHANGING, PLEASE REFER TO THE CURRENT REVISION OF THE SPECIFICATION FOR COMPLETE REQUIREMENTS. ALTHOUGH LISTED, SOME FINISHES MAY NOT BE AVAILABLE AT ALEXANDRIA METAL FINISHERS