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Alexandria Metal Finishers

www.alexandriametalfinishers.com

2026

Quality Metal Finishing Since 1962

PROCESS	SPEC	THICKNESS	COMMENTS
ANODIZE SULFURIC	MIL-PRF-8625 MIL-A-8625		
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.). Salt spray requirement is 336 hours (5% NaCl solution) per method B-117 of ASTM.	Type II Type IIB Class 1 Class 2	0.000070" - 0.0010" Light Coating	All aluminum alloys, but do not use where solution will entrap. Thin coating use as a non-chromate alternative for Type I, chromic acid anodize. Non-dyed Dyed For Class 1, Alexandria's standard practice for sealing is "Clear, hot DI water". Dichromate seal may be specified (resulting color will be pale yellow-green). FED-STD-No. 595 may be used as a guide for specifying color (approximate comparison only).
ANODIZE TO AEROSPACE MATERIAL SPECIFICATIONS (AMS)			
AMS anodizing specifications are similar to Mil-A-8625. The major differences are in the testing requirements. All AMS specs do not allow production parts to be 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. *** AMS 2471/2472/2482 are not currently included in our Nadcap scope.	AMS-2469 AMS-2471 AMS-2472 AMS-2482	Hardcoat 0.002" ± 0.0005" Sulfuric Acid Process - no dye coating Sulfuric Acid dye Black Hardcoat 0.002" ± 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.
CHEMICAL FILM	MIL-DTL-5541		
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 Type I Type II	No Dimensional Change	Class 1A is used as a corrosion preventative film (if unpainted) 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.
CHEMICAL FINISH (Black)	MIL-F-495		
A uniform black corrosion retardant for copper. Coating has no abrasion resistance.		No Dimensional Change	Used as a base for lacquer, light oil, or wax. For decorative, optical, and corrosion retardant application.

JANUARY

SUN	MON	TUE	WED	THUR	FRI	SAT
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
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FEBRUARY

SUN	MON	TUE	WED	THUR	FRI	SAT
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MARCH

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APRIL

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MAY

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31						

JUNE

SUN	MON	TUE	WED	THUR	FRI	SAT
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JULY

SUN	MON	TUE	WED	THUR	FRI	SAT
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AUGUST

SUN	MON	TUE	WED	THUR	FRI	SAT
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30	31					

SEPTEMBER

SUN	MON	TUE	WED	THUR	FRI	SAT
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OCTOBER

SUN	MON	TUE	WED	THUR	FRI	SAT
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NOVEMBER

SUN	MON	TUE	WED	THUR	FRI	SAT
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DECEMBER

SUN	MON	TUE	WED	THUR	FRI	SAT
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PROCESS	SPEC	TEMPERATURE/ TIME	COMMENTS
PASSIVATE	ASTM-A-967		
Alternate spec to supersede QQ-P-35. In addition to passivate using Nitric acid (and Sodium Dichromate). Alexandria Metal Finishers currently offers Nitric 1 and Nitric 2 passivation. For any other types, please contact for consultation.			Nitric Acid (Vol. %) / Sodium Dichromate (Weight %)
	Nitric 1	120°-130°F 20 min.	20 - 25 / 2.5 ± 0.5
	Nitric 2	70°-90°F 30 min.	20 - 45 / none
	Nitric 3	120°-140°F 20 min.	20 - 25 / none
	Nitric 4	120°-130°F 30 min.	45 - 55 / none
	Nitric 5	As required	As required to pass test
RHODIUM	MIL-R-46085	THICKNESS	
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	----------	Over Nickel, Silver, Gold, or Platinum
	Type II	----------	Over other metals (require Nickel Undercoat)
	Class 1	0.000002" min.	Used on Silver for tarnish resistance. Applications range from electronic to nose cones wherever wear, corrosion resistance, solderability, and reflectivity are important
	Class 2	0.00001" min.	
	Class 3	0.00002" min.	
	Class 4	0.00010" min.	
	Class 5	0.00025" min.	
SILVER	QQ-S-365		
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 conductor. Has excellent lubricity and smear characteristics for anti-galling uses on static seals, bushings, etc. This specification is provided for reference purposes only as it has been canceled. Users may consult ASTM-B-700 (see below).	Type I	0.0005" min. unless otherwise specified for most metals. For Fe Alloys, unless otherwise specified, it shall be 0.0005" min. of silver with a total plating thickness of 0.001" min. (the balance to be Cu + Ni, but should not exceed 0.0005")	Increasing use in both decorative and engineering fields, including electrical and electronics fields.
	Type II		Matte
	Type III		Semi-Bright
	Grade A		Bright
	Grade B		Chromate post treatment to improve tarnish resistance**
			No Chromate treatment
			**(Lot test required)
SILVER	ASTM-B-700		
This specification covers requirements for electrodeposited coatings of silver used for engineering purposes that may be matte, bright, or semibright and are not less than 98% silver purity. Bi yearly analysis of purity of deposited silver required. Tarnish resistance test not required	Type I	----------	99.9% min.
	Type II	----------	99.0% min.
	Type III	----------	98.0 % min.
	Grade A		Matte
	Grade B		Bright (obtained by using Brighteners)
	Grade C		Bright (obtained by polishing of Grade A coatings)
	Grade D		Semibright (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)
Our Class T tarnish resistant treatment is accomplished with a rhodium or tin flash after silver plating.	Class T	As Specified (ref. Table 3.1)	Supplementary Non-Chromate Tarnish Resist.
SULFAMATE NICKEL	MIL-P-27418		
The plating conforming to this specification is intended to facilitate the formation of a seal between two metallic surfaces. PLATING HARDNESS. Not to exceed 150 Knoop hardness (500 gm. load) after annealing. (or 300 Knoop before annealing) inactive specification per notice 3. MIL-P-27418 is not currently included in our Nadcap scope. If Nadcap is a requirement, AMS 2403 and AMS-QQ-N-290 may be used for Sulfamate Nickel, specifically.	See Comments	Unless otherwise specified: 0.0020" ± 0.0003" on all surfaces that can be touched by 0.0625" Dia. Ball.	The nickel plating shall have columnar crystalline structure before annealing. Unless otherwise specified, the bath shall be chloride free. Certification to this spec is available only when specific waivers / clarifications / deviations are received from the customer (i.e. hardness, thickness, bath, composition, etc.)
TIN	MIL-T-10727		
Color is gray-white in a plated condition. Has very high luster in fused condition. Soft, but is very ductile. Corrosion resistance is good. (Coated item should meet 24 hour 5% salt spray requirement). Solderability is excellent. Tin is not good for low temperature applications (changes structure and loses adhesion when exposed to temperature below -40°C). Plate directly on steel substrate (no undercoating for steel unless otherwise specified). Please Note: This specification is provided for reference purposes only as it has been superseded by ASTM-B-545 (see below) and ASTM-B-339 (not available at Alexandria Metal Finishers).	Type I	As Specified on drawing. Thickness guide (not part of spec.) As follows:	Alexandria Metal Finishers provides both "Bright" and Matte finishes. If not specified, bright will be generally provided.
		----------	Electrodeposited. Use ASTM-B-545 as guideline.
		0.0001-0.00025"	Flash for soldering
		0.0002 - 0.0004"	To prevent galling and seizing
		0.0003 min	Where corrosion resistance is important
		0.0002 - 0.0006"	To prevent formation of case hardening during nitriding.
	Type II	----------	Hot dipped (not currently available at Alexandria Metal Finishers)
TIN	ASTM-B-545		
ASTM requires purchaser to supply information: base metal, underplating, test requirements, test methods, etc. In general, copper alloys containing more than 5% Zn shall have a copper undercoating of at least 0.0001" or nickel undercoating of at least 0.000050", optional co-deposited lead in the range of 2-12% may be specified	Class A	0.0001" min.	
	Class B	0.0002" min.	
	Class C	0.00032" min.	0.0004" min. for steel
	Class D	0.0006" min.	0.0008" min. for steel
	Class E	0.0012" min.	
	Type Matte		
	Type Bright		
	Type Flow Brightened	----------	Flow brightening not currently available at Alexandria Metal Finishers.
TIN LEAD	AMS-P-81728		
Alexandria Metal Finishers offers a matte finish. 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.	Standard composition 60/40 Sn-Pb	Unless Otherwise specified: 0.0003" - 0.0005"	50% - 70% Tin, remainder is Lead
	Optional composition 90/10 Sn-Pb		Nominal 88% - 97% Tin, remainder is Lead
ZINC	ASTM-B-633		
Either a bright or dull finish is acceptable. Bright zinc plating closely resembles bright chromium. However, bright zinc does not have the permanence of surface appearance. Zinc coated steel will not rust even when exposed by scratches because of the sacrificial protection of the zinc. On weathering, zinc turns to a drab gray color. Zinc should be deposited directly on the base metal (Nickel is permissible undercoat if base metal is a corrosion resisting steel). Parts having a hardness above 31 HRC shall be pre- and post-baked IAW ASTM-B-849 and ASTM-B-850. Purchaser is responsible for the selection of bake temperature and duration. If bakes are not required, it shall be stated on PO or drawing. *Types IV, V and VI not available at Alexandria Metal Finishers.	Fe/Zn25 SC4 (very severe)	0.0010" min.	The primary use of chromate finishes on zinc is to retard or prevent formation of white corrosion products on zinc surfaces.
	Fe/Zn12 SC3 (severe)	0.00050" min.	
	Fe/Zn8 SC2 (moderate)	0.00030" min.	The primary purpose of phosphate coating on zinc is to provide a paint base. We currently offer only chromate.
	Fe/Zn5 SC1 (mild)	0.00020" min.	
	Type I	Customer to specify whether steel hardness is Rc=31 or greater. If it is, customer to specify pre-bake class per ASTM-B-849 and post-bake class per ASTM-B-850	Without supplementary treatment
	Type II		With supplementary chromate treatment.
	Type III		With supplementary colorless chromate treatment.
			Corrosion resistance requirements: Type II 96 hours Type III 12 hours

Anodizing, Electroplating, Chemical Finishing

PROCESS	SPEC	THICKNESS	COMMENTS
ELECTROLESS NICKEL	ASTM-B-733		
3 - 13% phosphorous EN deposit. Alexandria Metal Finishers offers electroless nickel plating with a phosphorous range of 6-12%. More stringent, specific and detailed than MIL-C-26074, AMS-2404 & AMS-2405. Ordering data must be complete. Plating on special metals such as titanium, etc. requires customer to supply test coupons of identical material to be used for plating adhesion tests.		Range from 0.000004" - 0.003"	ASTM specification requires the purchaser to well define the "type", "class", "service condition", "composition", "test method", etc. on ordering documents. Porosity testing is offered when requested on purchasing documents. The customer must specify testing method and requirements.
ELECTROPOLISHING	NO MIL SPEC		
Process electrolytically removes or diminishes scratches, burrs and unwanted sharp edges from most 300 series stainless steel alloys. Finishes from satin to mirror-bright are produced by controlling time, temperature, or both.		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		
Yellow to orange color depending on proprietary process used. Will range from matte to bright finish depending on basis 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. Please note: This specification is provided for reference only as it has been superseded (See below).		Unless otherwise specified:	
	Type I	99.7% gold min.	
	Type II	99.0% gold min.	
	Type III	99.9% gold min.	
		Grade A 90 Knoop max.	
	Class 00	0.00002" min.	Grade B 91-129 Knoop
	Class 0	0.00003" min.	Grade C 130 - 200 Knoop
	Class 1	0.00005" min.	Grade D above 200 Knoop
	Class 2	0.00010" min.	Type I (Grades A, B or C)
	Class 3	0.00020" min.	Type II (Grade B, C or D)
	Class 4	0.00030" min.	Type III (Grade A only)
	Class 5	0.00050" min.	Alexandria Metal Finishers performs Grade A & Grade C only. Other grades quoted upon request.
	Class 6	0.00150" min.	
GOLD	ASTM-B-488		
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 - 660°F for 30 minutes. A bend test may also be substituted. (Note: Sampling for destructive testing will be higher than that of MIl-G-45204).		Unless otherwise specified:	
	Type I	Purity 99.7% gold min.	
	Type II	99.0% gold min.	
	Type III	99.9% gold min.	
	Code A	Hardness 90 HK(25gr) max.	
	Code B	91-129 HK (25gr) N/A @AMF	
	Code C	130 - 200 HK (25gr)	
	Code D	200 min HK (25gr) N/A @AMF	
	Class	Thickness	Thickness shall be specified as minimum in micrometers such as 0.25, 0.50, 0.75, 1.00 .....
			Alexandria Metal Finishers performs Code A & Code C only. Other codes quoted upon request.
GOLD	MIL-DTL-45204		
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 basis 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.		Unless otherwise specified:	
	Type I	99.7% gold min.	
	Type II	99.0% gold min.	
	Type III	99.9% gold min.	
	Class 00	0.00002" min.	Grade A 90 Knoop max.
	Class 0	0.00003" min.	Grade B 91-129 Knoop
	Class 1	0.00005" min.	Grade C 130 - 200 Knoop
	Class 2	0.00010" min.	Grade D above 200 Knoop
	Class 3	0.00020" min.	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.
	Class 4	0.00030" min.	
	Class 5	0.00050" min.	Alternately customer may elect to specify a different inspection plan (such as per MIL-G-45204).
	Class 6	0.00150" min.	Alexandria Metal Finishers performs Grade A & Grade C only. Other grades quoted upon request.

PROCESS	SPEC	THICKNESS	COMMENTS
HARD ANODIZE (HARDCOAT)	MIL-PRF-8625 MIL-A-8625		
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	Type III Class 1 Class 2	As specified on drawing. If not specified nominal thickness shall be 0.002" - ±0.0004" Alloys with Copper greater than 5% or Silicon greater than 8%, shall not be processed. Customer to specify type of alloy or alloy composition	Most aluminum alloys depending on process used. Where maximum serviceability or special properties are required, consult metal finisher for best alloy choice. Thick coatings (over .004") will tend 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
NICKEL	AMS-QQ-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 grey or light grey (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.	Class 1 Grade A Grade B Grade C Grade D Grade E Grade F Grade G Class 2	---------- 0.0016" min. 0.0012" min. 0.0010" min. 0.0008" min. 0.0006" min. 0.0004" min. 0.0002" min. 0.002" max. (unless otherwise speicified)	NOTE: All steel parts having a tensile strength of 220,000 or greater shall not be nickel plated without specific approval of procuring agency. For corrosion protection. With typical 0.0002" copper undercoating prior to the nickel plate. For Class 1, if thickness is not specified, it shall be Grade C for steel & zinc base metals, and Grade D for Copper base metals. For engineering applications.
NICKEL	AMS-2403	As specified on drawing.	Alexandria Metal Finishers applies this specification for undercoating only generally under 0.0005"
PASSIVATE	AMS-QQ-P-35		
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 or purchase order documentation should specify stainless steel alloy. (Cancelled Feb. 2005) Alexandria Metal Finishers currently offers Type II and Type VI nitric acid passivation. For any other types, please contact for consultation.	Type II Type VI	No dimensional change	Medium temperature with sodium dichromate. Low temperature. 24 hour high humidity test required. Salt spray or copper sulfate tests can be used in lieu of or in addition to high humidity test. Large parts may require copper sulfate testing as they may not fit in the salt spray or high humidity test chambers.
PASSIVATE	SAE-AMS-2700		
Alternate spec. for AMS-QQ-P-35. Alexandria Metal Finishers currently offers Type 2 and Type 6 nitric acid passivation. For any other types, please contact for consultation.	Type 2 Type 6	Selection of "Types" is more relaxed than AMS-QQ-P-35 Type II Type VI	Differences from AMS-QQ-P-35: Cl. 1: Special Sampling for test Cl. 2: Testing is only 1 pc/lot. (Cl. 2 is "generally" defaulted to when class is not specified.) Cl. 3: Validation testing performed on a periodic basis Cl. 4: Parts originally for QQ-P-35

PROCESS	SPEC	THICKNESS	COMMENTS
COPPER	MIL-C-14550		
Copper in color and matte to a very shiny finish. Good corrosion resistance when used as undercoat. A number of copper processes are available, each design for a specific purpose: Brightness: To eliminate the need for buffing High speed: For electroforming Fine grain: To prevent casehardening Please note: This specification is provided for reference only, as it has been superseded by AMS-2418 (See below).		Unless otherwise specified:	
	Class 0	0.001 - 0.005"	For heat treatment stop-off
	Class 1	0.001" min.	For carburizing and decarburizing shield, also plated through printed circuit board
	Class 2	0.0005" min.	As an undercoat for nickel and other platings.
	Class 3	0.0002" min	to prevent basis metal migration into tin (prevent poisoning solderability).
	Class 4	0.0001" min.	
COPPER	AMS-2418		
Alternate spec. to supersede MIL-C-14550		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)		
Similar to stainless steel in color. Plates uniformly in recesses and cavities (does not build up on edges). Corrosion resistance is good for coating over 0.001" thickness. Electroless nickel is used extensively in salvage of mismachined parts. Also, for inside dimensions and irregular shapes (where assembly tolerances need uniformity provided by electroless process). This spec does not specify the phosphorous content in the EN deposit provided it passes 100 hours salt test at 1.0 mil for AL and 1.5 mil for steel. Microsectioning to determine coating thickness may be required under this spec when thickness is over 1 mil and non-destructive test method is not available.		Unless otherwise specified:	Customer to specify the Rc hardness of steel and if it is greater than RC40, whether the steel is carburized.
	Class 1		As Coated
	Class 2		Steel and other base metals heat treatable to improve hardness.
	Class 3		Aluminum alloy, not heat treatable, processed to improve adhesion of nickel deposit.
	Class 4		Aluminum alloy, heat treatable, processed to improve adhesion of nickel deposit.
	Grade A	0.0010" min.	
	Grade B	0.0005" min.	
	Grade C	0.0015" min.	Unless otherwise specified:
For plating on titanium alloys, customer to supply titanium coupons for adhesion testing.			Aluminum alloys will be Grade A. Cu, Ni, Co alloys will be Grade B. Ferrous alloys will be Grade C.
ELECTROLESS NICKEL	AMS-2404		
No definition of phosphorous content in the EN deposit. No "Grade" designation. Plating on special metals such as titanium, etc. requires customer to supply test coupons of identical material to be used for plating adhesion tests. Specs require the EN to pass 48 hours salt spray test for steel (at 1.0 mil min.) Specifications require no production parts unless preproduction samples have been approved or waived in writing by purchaser. EN deposit may be hardened by heating at 750° F for steel, but only when specified.		As specified on Drawings	Note: Unless a specific class is specified, Class 1 shall be supplied.
	Class 1	----------	Except for hydrogen embrittlement relief,no postplating thermal treatment.
	Class 2	(Not for Aluminum)	Thermal treatment at 450°F (232°C) or above to harden the deposit, hardness to 800 HK min.
	Class 3	----------	Thermal treatment at 375°F (191°C) to improve adhesion for non heat-treatable aluminum and beryllium alloys.
	Class 4	----------	Thermal treatment at 250°F (121°C) to improve adhesion for heat-treatable aluminum alloys.

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.

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