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FEDERAL SPECIFICATION

PLATES AND FOILS, PHOTOGRAPHIC (PHOTOSENSITIVE ANODIZED ALUMINUM)

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers the requirements for photosensitive anodized aluminum sheets and foils. For purposes of this specification, foils as referred to in this specification is defined as material 0.010 inch and thinner.

1.2 Classification.

1.2.1 Types and classes. The anodized photosensitive aluminum shall be of the following types and classes.

Type I - Impregnated with silver compound (grades A and B).
Type II - Coated with compounds other than silver (grades A and B).
Class 1 - One side printable area.
Class 2 - Two sides printable area.

2. APPLICABLE DOCUMENTS

2.1 The following specifications and standards of the issues in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.)

(Single copies of this specification and other product specifications required by activities outside the Federal Government for bidding purposes are available without charge at the General Services Administration Regional Offices in Boston, New York, Washington, D.C., Atlanta, Chicago, Kansas City, MO., Fort Worth, Denver, San Francisco, Los Angeles, Seattle, Wash.)

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

Federal Specifications

P-C-437	-	Cleaning Compound, High Pressure (Steam) Cleaner
QQ-A-250/lb	-	Aluminum Alloy 1100, Plate and Sheet
TT-S-735	-	Standard Test Fluids: Hydrocarbon
CCC-T-191	-	Textile Test Methods
PPP-B-636	-	Box, Fiberboard
PPP-T-60	-	Tape, Pressure-Sensitive Adhesive, Waterproof, for Packaging and Sealing

Federal Standards

Fed. Std. 123	-	Marking for Domestic Shipment (Civilian Agencies)
Fed. Test Method Std. No. 151	-	Metals; Test Methods

Military Specifications

MIL-P-116	-	Preservation, Methods of
MIL-J-5161	-	Jet Fuel, Referee
MIL-C-25769	-	Cleaning Compound, Aircraft Surface, Alkaline Waterbase

Military Standards

MIL-STD-105	-	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	-	Marking for Shipment and Storage

(Copies of Military Specifications and Standards required by contractors in connection with specific procurement functions should be obtained from the procuring activities or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Materials. The photosensitive aluminum plates and foils procured in accordance with this specification shall meet all the requirements and tests specified herein. The base material shall be composed of high grade aluminum alloy in accordance with QQ-A-260/lb except that 1/8 inch material may be Alcoa CB-76F, or equal, when greater strength is required. The working surface shall contain no broken areas, surface defects, or other defects of manufacture which would impair image quality. Where there is no specific reference herein to grades A or B, the requirements shall apply to either grade.

3.1.1 Anodic layer thickness. The anodic layer thickness of the photosensitive anodized aluminum plates furnished under this specification shall be 0.0015 ± 0.0001 inches. The anodic layer thickness photosensitive aluminum foils shall be 0.00035 ± 0.0001 inches. The anodic

layer thickness for plate and foils shall be measured in accordance with 1.3.1.1 and 1.3.1.2 as applicable.

3.2 Dimensions.

3.2.1 Thickness. Thickness of the aluminum plates and foils shall be in accordance with the aluminum industry standards as listed in table I. The thickness of the plates and foils shall be measured in accordance with 4.3 (see 6.2).

3.2.2 Width and length. Unless otherwise specified in the order or invitation for bids the photosensitive aluminum plates and foils shall be furnished in the widths and lengths shown in table II (see 6.2).

3.3 Processing. The photosensitive aluminum plates and foils specified herein shall be handled, exposed and processed in accordance with the manufacturer's instructions, in commercially known and readily available chemicals.

3.4 Sealing. When required and applicable, sealing of photosensitive plates and foils shall be accomplished in accordance with the manufacturer's instructions.

3.5 Resolution. Types I and II, Grade A photosensitive aluminum shall be capable of resolving not less than 150 lines per millimeter. Grade B photosensitive aluminum shall be capable of resolving not less than 25 lines per millimeter. Resolution shall be measured in accordance with 1.1.

3.6 Flexibility. There shall be no flaking, chipping, peeling, or significant loss, or degradation of the image when tested as specified in 4.5. Crazing of the anodic layer is permissible.

TABLE I.

Thickness (inches)	Tolerance (inches)	Thickness (inches)	Tolerance (inches)
.003	± 0.0003	.202	± 0.0020
.005	± 0.0005	.032	± 0.0020
.008	± 0.0015	.063	± 0.0030
.012	± 0.0015	.125	± 0.0045

Squareness of plates and foils shall be 90° ± 1°.

TABLE II

Size (inches)	Tolerance	
	Each (inches)	Dimension
4 x 5	± 1/16	
8 x 10	± 1/16	
10 x 12	± 1/16	

10 x 14	± 1/8	
12 x 12	± 1/8	
12 x 24	± 1/8	
18 x 24	± 1/8	
20 x 24	± 1/8	
24 x 36	± 1/8	
10 x 12 12 x 20 18 x 24 20 x 24 24 x 30 24 x 40	Shall be oversize by at least 3/8 inch from the respective printable area *	

*Printable area tolerance on individual plates shall be not more than 1/16 inch.

3.7 Permanency.

3.7.1 Abrasion resistance, types I and II. Grade A photosensitive anodized aluminum plates and foils shall show no pronounced image loss, degradation, or reduced readability when subjected to not less than 7000 cycles of an abrading wheel. Grade B photosensitive anodized aluminum plates and foils shall show no pronounced image loss, degradation, or reduced readability when subjected to 200 cycles of an abrading wheel. Abrasion resistance shall be tested in accordance with 4.6.

3.7.1.1 Acid corrosion. Types I and II photosensitive anodized plates and foils, sealed in accordance with the manufacturer's instructions, shall show no softening or deterioration of the anodic layer and no image loss or degradation when tested as specified in 4.7.

3.7.1.2 Heat resistance. There shall be no impairment of abrasion resistance of the anodic layer and no legibility loss or degradation when grade A photosensitive anodized aluminum plates and foils are subjected to a temperature of 1000 °F. Grade B photosensitive anodized aluminum plates and foils shall show no legibility loss or degradation when subjected to a temperature of not less than 250 °F. All photosensitive plates and foils specified herein shall be tested for heat resistance in accordance with 4.8. Slight crazing of the anodic layer will be permissible.

3.7.1.3 Salt spray corrosion. Prolonged exposure to salt spray shall have no deleterious effect on grade A and grade B photosensitive plates and foils, anodic layer or image. Slight discoloration or fading may be permissible on grade B plates and foils only. The plates and foils shall be tested for salt spray corrosion in accordance with method 811.1 of Fed. Test Method Std. No. 151 (see 4.9).

3.7.1.4 Accelerated light and weather resistance. When tested in accordance with 4.10, image permanence of grades A and B photosensitive plates and foils shall not be affected and there shall be no pronounced deterioration of legibility.

3.7.1.5 Accelerated oxygen aging. When tested in accordance with 4.11 the image surface shall show no signs of discoloration or legibility.

3.7.1.6 Oven aged fog. There shall be no serious loss of legibility and the clear areas shall show no fog when tested as specified in 4.12.

3.7.1.7 Stain resistance. All photosensitive aluminum plates and foils specified herein shall be stain resistant. The plates and foils shall meet the test for stain resistance specified in 4.13.

3.7.1.8 Cleaning resistance. When tested in accordance with 4.14 the photosensitive aluminum plate and foils and the image surface shall show no deleterious effects as a result of the test.

3.7.1.9 Low temperature resistance (cryogenic). The photosensitive plates and foils shall be able to withstand a minimum of minus 50 °F without any deleterious effect on the base materials and without any image fad, loss or impairment (4.15).

3.7.10 Organic solvents resistance. The anodic layer shall not be dissolved or softened by organic solvents when tested as specified in 4.16. The image surface shall show no staining or noticeable fade or loss. The photosensitive aluminum plates and foils shall meet the specified test in each of the following solvents.

TT-S-735 hydrocarbon fluid	MIL-L-5161 turbine and jet fuel
JP-4 fuel	Kerosene
Gasoline	Motor oil (high detergent)
Motor oil (drained from crank case)	Ethyl amyl ketone
Ethyl acetate	Xylol
Mineral spirits	Acetone
Ethyl alcohol	Chloroform
Carbon tetrachloride	Toluol
Methyl ethyl ketone	Heptaue
Turpentine	Trichlorethylene

3.8 Expiration date. Unless otherwise specified, the expiration date of the photosensitive aluminum plates and foils, from date of shipment, shall be no less than two years when stored in the original unopened packages in a room maintained at a temperature of 68 ± 2 °F and at a relative humidity of 50 ± 2 percent.

3.9 Uniformity of characteristics. Uniformity of physical and photosensitive characteristics among specimens of the same manufacture and coating number, and among different manufacturing lots of a given type, shall be maintained within the closest practical limits.

4. QUALITY ASSURANCE PROVISIONS

4.1 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, the supplier may utilize his own facilities or any commercial laboratory acceptable to 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.

4.2 Sampling for inspection and acceptance. Unless otherwise specified, sampling for inspection and acceptance shall be performed in accordance with the provisions set forth in MIL-STD-105. The manufacturer's sampling and inspection procedures may be utilized providing such sampling and inspection methods will assure quality equal to or better than that obtained by the following provisions set forth in MIL-STD-105, and provided the manufacturer's methods have been approved by the procuring activity. For purposes of sampling, an inspection lot shall consist of all material of the same type submitted for delivery at one time.

4.2.1 Inspection of materials and components. In accordance with 4.1 above, the supplier is responsible for insuring that materials and components used were manufactured, tested, and inspected in accordance with the requirements of reference subsidiary specifications and standards to the extent specified, or if none, in accordance with this specification. In the event of conflict, this specification shall govern.

4.2.2 Inspection and quality of the end item.

4.2.2.1 Quality of the end item. The quality of the end item is the manufacturer's responsibility and can be determined by either of the means of inspection and sampling set forth in 1.2. However, the quality of the end item must be equal or better than the quality obtained by the requirements set forth in the following paragraphs.

4.2.2.1.1 Examination of the end item. Examination of the end item shall be made in accordance with the classification of defects, inspection levels, and acceptable quality levels (AQLs specified in 4.2.2.1.6). The lot size for determining the sample size in accordance with MIL-STD-105 shall be expressed in units of packages of photosensitive aluminum plates and foils for examination under 4.2.2.1.2, 4.2.2.1.3, and 4.2.2.1.4 and may be performed at any points immediately prior to or during the packaging operation.

4.2.2.1.2 Examination of the end item for defects in appearance and workmanship. The sample unit for this examination shall be photosensitive aluminum plate or foil. Not more than one sample, in each thickness, shall be drawn from the manufacturing or sensitizing run. The sample shall be drawn at random immediately after the sensitizing operation.

Examine	Defect
Appearance and workmanship	Plates or foils not completely or evenly covered with photosensitive layer. Plates contain scuffs, gouges, scratches, cuts, cracks, foreign matter, or abrasions on the coated surface.

4.2.2.1.3 Examination of the end item for dimensional defects. The sample unit for this examination shall be one sensitized plate or foil, as applicable. The sample unit shall be drawn immediately after the cutting operation.

Examine	Defect
Physical dimensions	Length or width varies by more than that specified in table II. Plates or foils not cut square (table I).

4.2.2.1.4 Examination of the end item for defects in plate or foil constructions and count of plates. The sample unit for the examination shall be one package of plates or foils, as applicable. The sample unit shall be drawn immediately after the pouching or packaging operations.

Examine	Defect
Plates and foils	Plates or foils cracked, broken, scratched, mutilated or bent.
Count per pouch or package	Number of plates or foils per pouch or package less than specified.

4.2.2.1.5 Examination for preparation of delivery. An examination will be made to determine that marking, materials, workmanship, contents, and weights comply with the requirements of section 5 of this specification. Defects will be scored in accordance with the classification below. The sample unit shall be one shipping container, fully packaged, selected just prior to the closing operation. Shipping containers fully prepared for delivery shall be examined for closure defects. The lot size shall be the number of shipping containers fully prepared for delivery submitted for acceptance at one time.

Examine	Defect
Packaging and preservation as applicable	Not as specified, not in accordance with contract requirements. Not unit wrapped and packaged as specified.
Packing	Unit packages not uniform. Containers of improper construction. Not packed as specified. Packaging material not as specified; closures not accomplished by specified or required methods or materials. Number of boxes or packages per carton less than indicated.
Markings (interior and exterior)	Interior markings not correct color. Data not in accordance with contract specifications, labels (when used) not properly attached. Labels or markings illegible, incorrect, incomplete, omitted, or not in accordance with contract requirements.
Weight (Interior and exterior)	Gross weight exceeds contract requirements.

4.2.2.1.6 Inspection levels and acceptable quality levels (AQL's) for examinations. The inspection levels for determining the sample size, and the acceptable quality levels (AQL's) expressed in defects per 100 units shall be as follows:

Examination paragraph	Inspection level	AQL
4.2.2.1.1	I	1.0
4.2.2.1.2	S-3	2.5
4.2.2.1.3	S-2	2.5
4.2.2.1.4	S-4	4.0

4.2.3 Testing of the end item. Testing of the end item shall be conducted in accordance with table III for the characteristics as indicated therein. The sample unit, as referenced herein is defined as the amount of material required to perform all tests at one time. Samples for testing the physical characteristics may be drawn at any point after the emulsion or coating operation. Samples for the remaining tests may be drawn at any point not sooner than immediately prior to the beginning of the packaging operation.

4.2.3.1 All tests specified herein which require an image shall have the image created by the contact printing of a good quality line cut negative of printed copy onto the sample plate and then processed in accordance with manufacturer's instruction.

4.3 Thickness. The thickness of the plates and foils shall be measured with a thickness gauge or micrometer caliper which is capable of measuring thickness accurately to 0.001 inch. All thickness tests shall be conducted on a fully processed plate, 4 by 5 inches or larger. The thickness shall be measured in five different areas of the plate and the average computed (see 3.2.1). Thickness shall not exceed the limits shown in table I.

TABLE III

Characteristics	Specification reference		Requirement applicable to		No. of per sample unit	Results pass or fail	Reported As numerically to nearest
	Req.	Test method	Indiv. Unit	Lot Aver.			
Thickness	3.2.1	4.3	X	--	5	--	.0001 in.
Anodic layer thickness	3.1.1	4.3.1 & 4.3.1.2	X	--	2	--	.0001 in.
Processing	3.3	--	X	--	--	--	Visual
Resolution	3.5	4.4	X	--	3	--	Lines MM
Flexibility	3.6	4.5	X	--	1	--	Visual
Abrasion resistance	3.7.1	4.6	X	--	1	--	Cycle
Acid corrosion	3.7.1.1	4.7	X	--	1	--	Visual
Heat resistance	3.7.1.2	4.8	X	--	1	--	°F
Salt spray corrosion	3.7.1.3	4.9	X	--	2	--	Hour
Accelerated light and weather resistance	3.7.1.4	4.10	X	--	2	--	Visual
Accelerated oxygen Aging	3.7.1.5	4.11	X	--	2	--	Hour
Oven aged fog	3.7.1.6	4.12	X	--	1	--	Visual
Stain resistance	3.7.1.7	4.13	X	--	4	--	No fading
Cleaning resistance	3.7.1.8	4.14	X	--	4	--	Visual
Low temperature resistance	3.7.1.9	4.1.5	X	--	1	--	Visual
Organic solvents resistance	3.7.1.10	4.1.6	X	--	1	--	Visual

4.3.1 Measurement of the anodic layer thickness of photosensitive anodized aluminum foil. A Light-Section microscope, non-destructive coating thickness tester consisting of a microscope with built-in illuminating device, coaxial coarse and fine adjustment, built-in measuring eye piece 16X, pair of objectives for 200X total magnification, pair of objectives for 400X total magnification, stand with stage plate and extension piece for observing test piece in longitudinal direction, or instrumentation of equivalent accuracy shall be used to determine the thickness of the anodic layer. Determination of the true thickness of the anodic layer shall be done in accordance with the instructions for the use of the Light-Section microscope or other instrumentation of equivalent accuracy used. The true thickness of the anodic layer shall be based on refractive index 1.60 (see 6.2).

4.3.1.1 Measurement of the anodic layer thickness of photosensitive anodized aluminum plates. A Dermitron non-destructive coating thickness tester, model D-5 or an instrument of equivalent accuracy shall be used to determine the thickness of anodic layer of photosensitive anodized aluminum plates. Determinations for the thickness of the anodic layer shall be done in accordance with the instructions for the use of the Dermitron model D-5 as covered in the

detailed operating procedure for case III, or the applicable instructions of other instrumentation of equivalent accuracy used to make such determinations (see 6.3).

4.4 Resolution test. The equipment and methods specified in the following paragraphs shall be used to determine resolving power.

4.4.1 Test target. The test target shall be of the parallel line type consisting of clear lines on an opaque ground. A suitable test target is the Data Corporation 260 line per millimeter test target or the USAF-1951 (Buckbee Mears Co.) 0.25 to 0.227 line per millimeter test target. Other test targets of quality equal to or better than the test targets specified may be used (see 6.3).

4.4.1.1 Illumination. The light used to expose the test target shall be a good commercially available 200 watt second strobe light, modified to produce a collimated light source. The strobe light can be modified by cutting a ¾-inch diameter hole in the center of an opaque piece of cardboard and placing the cardboard over the strobe light so that the light passes only through the ¾ inch hole. Alternatively, a commercial available number 1 Photoflood bulb in a suitable reflector may be used for the exposure.

4.4.1.2 Method of test. Adjust the modified strobe light so that it will be 24 inches from the test plate to be exposed. Set the strobe for ¼ power and discharge once in order to make certain that there is no excess charge in the light. Under darkroom safelight conditions, place in a printing frame an unexposed and unprocessed photosensitive aluminum plate, with its emulsion side of the plate. The lines on the resolution target should be positioned perpendicular to the grain of the plate. Excellent contact between the plate and the resolution target is essential. There should be no dust either on the surface of the plate or the target itself. Close the printing frame. If the number 1 Photoflood bulb is used for the exposure, it shall be placed 6 inches from the test plate to be exposed.

4.4.1.3 Exposure duration. The exposure shall be in accordance with manufacturer's instructions.

4.4.1.4 Processing. The plate shall be completely processed in accordance with the manufacturer's recommendation.

4.4.1.5 Viewing microscope. The test sample shall be viewed in either a monocular or binocular 250 power microscope.

4.4.1.6 Resolving power. The criterion of resolution is the ability to count the lines in the body of the image of the test pattern. If the number of the lines is not in accordance with the resolution rating as indicated with the resolution target specified, the resolution is spurious resolution and the image is considered to be not resolved. In some patterns, when the lines cannot be counted in the body of the pattern, it is possible to count the lines in the target at the end of the image. In such cases, the image is considered to be not resolved. The resolution shall be not less than 150 lines per millimeter for grade A and not less than 25 lines per millimeter for grade B.

4.5 Flexibility. The test specimen shall be 1 inch by 3 inches in size with a thickness of .032 inch and fully processed. The test specimen is placed between two ½ inch diameter steel rods. One end of the two rods is clamped in a vise while the other end is clamped together with a "C" clamp. The test specimen should be held firmly but not pinched. The test specimen is carefully bent 180 degrees to conform to the 1/8 inch diameter of one of the rods. After bending, the specimen is examined visually on both the tension and compression side of the bend. The bent area shall show no flaking, chipping, peeling or significant loss of legibility. Crazing of the anodic layer is permissible.

4.6 Abrasion. A fully processed specimen plate, 4 inches square with a ¼ inch center hole is placed on the E100-125 specimen holder of a Taber Abraser, model 171 or equal, with CS-17 Calibrase Wheels and Wheel Refacer, model 200 or equal. The Taber 171 Abraser is available from Taber Instrument Corporation, North Tonawanda, New York (see 6.2). A total of 1000 grams weight is pinced on the abrading wheel mounting assembly. A pair of freshly refaced CS-17 Calibrase Wheels are mounted on the wheel shaft and the abrading heads are lowered carefully onto the specimen. The suction nozzle is adjusted to 1/16 of an inch above the specimen surface. The suction control is set to 50 points on the dial. The cycles and the abraser is then started. Visual examination of the specimen shall be made at each 1000 cycles for grade A material and at each 50 cycles for grade B material. The end point is indicated by the wear effect on the readability of the image. The entire test shall be run without intermittent refacing of the abrading wheels. There shall be no pronounced loss of readability at the end of 7000 cycles of grade A material and at the end of 200 cycles of grade B material.

4.7 Acid resistance. A fully processed sample, not less than 3 inches by 5 inches shall be placed in a glass beaker containing a 3% nitric acid solution, by volume, and maintained at room temperature for a period of 24 hours. At the end of the test period remove the sample from the acid and thoroughly wash and dry. The dried sample is then rubbed with a dry cloth to determine whether there has been any deterioration or softening of the layer. There shall be no softening of the layer or noticeable deterioration of the image.

NOTE: When handling nitric acid extreme caution should be exercised. To make a 3% nitric acid solution, dilute 15 ml of concentrated acid in 185 ml of water. Always pour the acid into the water, never pour the water into the acid. Failure to comply with the outlined procedure may cause acid to splatter or the glass beaker to shatter, which may cause serious injury to the eyes, face and hands.

4.8 Heat resistance. An electric oven large enough to accommodate a test sample 2 inches by 4 inches or 4 inches by 5 inches, and capable of maintaining a continuous heat of 1000 degrees F, shall be used for this test. A fully processed grade A sample, in either of the sizes specified above is placed in the electric oven which has been preheated to 500 degrees F. The temperature of the oven is then increased to 1000 degrees F, and maintained at this temperature for 10 minutes. Remove the grade A sample from the oven and visually examine. There shall be no pronounced legibility loss or degradation. Grade B samples shall be tested in the oven preheated to 110 degrees F. The temperature is then increased to 250 degrees F, and maintained

at this temperature for 3 hours. Remove the grade B sample from the oven and visually examine. There shall be no pronounced legibility loss, fade or degradation.

4.9 Salt spray corrosion. Grade A plates and foils shall be subjected to a 720 hour salt spray (fog) test, and grade B plates and foils shall be subjected to a 150 hour salt spray (fog) test in accordance with method 811.1 of Fed. Test Method Std. No. 151.

4.10 Accelerated light and weather resistance. Four completely processed plates, 4 inches by 5 inches, shall be used for this test. The developed image should constitute 70 percent of the black. An area across the 4 inch dimension shall be masked with a 1 ½ inch wide and 0.020 inch thick, commercially available, black electrical plastic tape No. 520 or equivalent. The tape is wrapped so it overlaps the other side of the plate. The plates shall then be placed in a National Carbon Model X-1-A Weatherometer, employing copper-clad sunshine electrodes, Corex D filters, and water spray. Any weatherometer, similarly equipped, which will give equivalent results may be used. (The National Carbon Model X-1-A Weatherometer can be procured from Atlas Electrical Devices Company, 4114 North Ravenswood Avenue, Chicago 13, IL.) The grade A plate shall be exposed in the weatherometer for a period of 400 hours, grade B plate for a period of 150 hours and intermittently sprayed with tap water as outlined in method 5801 of CCC-T-191. Visual examination of the masked and unmasked area is made. There shall be no deterioration of the image area or pronounced loss of readability.

4.11 Accelerated oxygen aging. A fully processed sensitized aluminum plate shall be subjected to 96 hours of oxygen bomb aging at 300 pounds per square inch (p.s.i.) and a temperature of 70 °C as outlined in method 5852 of CCC-T-191 to determine conformance with 3.7.1.5. There shall be no deterioration of the image area or pronounced loss of readability.

4.12 Oven aged fog. A sample unexposed plate of applicable grade, packaged, and sealed in accordance with the manufacturer's normal packaging procedures, shall be placed in an electric oven which has been preheated to 80 °C. The pouch is left in the oven for a period of 72 hours. At the end of the test period, the pouch is removed from the oven and allowed to come to room temperature. The test plate is then exposed through a negative and processed in accordance with the manufacturer's instruction. A control plate of applicable grade which has not been oven aged is processed alongside the test plate. The test plate shall reproduce without serious loss of legibility. The test plate shall compare with the control plate in all respects.

4.13 Stain resistance. A sample plate, 4 inches by 5 inches, 0.032 inches thick, shall be completely processed in accordance with the manufacturer's instructions. The plates are rinsed in tap water and allowed to dry. A drop of tincture of iodine is placed on a black portion of the processed plate for 30 seconds. The plates are then washed with tap water and the spot where the iodine was placed is visually examined. There shall be no fading of the black. (To make a stock solution of tincture of iodine add 70 grams of iodine and 50 grams of potassium iodide to 50 ml. of water. Add alcohol to make up a total of solution of one liter.)

4.14 Cleaning resistance. The sensitized aluminum plates and foils shall withstand the effects of cleaning agents employed in P-C-137 and MIL-C-25769, applied by cold steam process, hose, brush, and hand wipe for a period of minute.

4.15 Low temperature resistance. A sub-zero chamber, with a temperature control capable of maintaining a temperature of -50 ± 1°C shall be used for this test. A fully processed sensitized aluminum plate 1 inch by 3 inches by 0.032 inches thick is placed in the low temperature chamber and held at a temperature of -50 ± 1°C for a period of one hour. At the end of the one hour period, the test plate is removed from the test chamber. The plate is visually examined and shall show no flaking, chipping, peeling or significant loss of legibility.

4.16 Organic solvents resistance. Laboratory beakers or test tubes large enough to accommodate a 1 ½ inch wide test sample shall be used. The beaker or test tube shall be half filled with solvent. The test sample shall be a fully processed plate cut to the 1 ½ inch width, and of such a length that only part of it will be immersed in the test fluid. The test sample shall stand for a period of 24 hours in the test fluid at room temperature. At the end of the 24 hour period, the test sample is removed from the solution, visually examined and scratched to determine if there has been any softening of the oxide layer. Both the totally immersed areas of the test sample and the air-solvent interface shall be evaluated. There shall be no noticeable loss of legibility, staining, attack, or softening of the legend surface. Test sample shall satisfactorily pass the above test in each of the solutions specified in 3.7.1.10.

5. PREPARATION FOR DELIVERY

5.1 Packaging.

5.1.1 Level A or C. Packaging shall be level A or C as specified (see 6.2).

5.1.2 Level A. The sensitized aluminum plates and foils shall be packaged in units as specified (see 6.2). Unless otherwise specified, the plates and foils shall be interleaved and securely wrapped in chemically and photographically inert paper to protect the sensitized aluminum plates and foils from moisture, light, and handling. The package of plates and foils shall be adequately sealed with a water-resistant tape conforming to PPP-T-60. Each package of sensitized plates and foils shall be preserved in accordance with method 1C of IL-P-116.

5.1.3 Level C. The sensitized aluminum plates and foils shall be packaged in accordance with the contractor's commercial practice.

5.2 Packing. Packing shall be level A, B, or C, as specified (see 6.2).

5.2.1 Level A. Plates and foils packaged as specified in 5.1 shall be packed in a fiberboard box conforming to PPP-B-636, class weather-resistant, grade V3c or V3s. The gross weight of each pack shall not exceed 150 pounds. The containers shall be closed in accordance with the appendix to PPP-B-636. Strapping shall not be required.

5.2.2 Level B. Plates and foils packaged as specified in 5.1 shall be packed in containers conforming to PPP-B-636, class domestic. The gross weight shall not exceed 150 pounds.

5.2.3 Level C. Plates and foils packaged as specified in 5.1 shall be packed to ensure carrier acceptance and safe delivery at destination in containers complying with the rules and regulations applicable to the mode of transportation.

5.3 Marking.

5.3.1 Labeling. Military and civil agencies. Unless otherwise specified (see 6.2) commercial labeling of the unit and intermediate packages will be acceptable, provided that the label includes in legible characters the following information:

1. Type, class and grade.
2. Manufacturer's name
3. Trade name of product
4. Size (width, length and thickness)
5. Quantity
6. Coating or emulsion numbers
7. Expiration date
8. Specification

The labels shall also include in bold type, and in a contrasting color such as red, the following precautionary sentences:

PLATES, PHOTOSENSITIVE ALUMINUM
STORE IN A COOL DRY LOCATION AWAY FROM RADIOACTIVE MATERIALS
OPEN ONLY IN A PHOTOGRAPHIC DARKROOM OR SUBDUED LIGHT

The labels shall be placed in such a manner that they will not be damaged when the package is opened.

5.3.2 Exterior containers. Military agencies. Unless otherwise specified in the contract or purchase order, the shipping containers shall be marked in accordance with MIL-STD-129, except that the dimensions of the exterior container need not be included. The nomenclature shall be:

PLATES, PHOTOSENSITIVE ALUMINUM

Trade name of product, grade, class, size (width, length and thickness), expiration date, emulsion or coating numbers, shall be clearly marked on the containers. The additional precautionary marking in 5.3.1 shall appear thereon.

5.3.3 Exterior containers. Civil agencies. Unless otherwise specified in the contract or purchase order, shipping containers shall be marked in accordance with Fed. Std. No. 123. The nomenclature shall be:

PLATES, PHOTOSENSITIVE ALUMINUM

Trade name of product, grade, class, size (width, length and thickness), expiration date, emulsion or coating numbers, shall be clearly marked on the containers. The additional precautionary marking in 5.3.1 shall appear thereon.

6. NOTES

6.1 Intended use. The sensitized aluminum plates and foils covered by the specification are intended for use in the reproduction of line or continuous tone images by means of photographic or photo-etching processes. The latent image may be formed either by contact or projection printing methods in accordance with equipment and procedures recommended by the manufacturer.

6.2 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents:

(a) Title, number and date of this specification
(b) Type, grade, and class (see 1.2.1)
(c) Width, length and thickness (see 3.2)
(d) Selection of samples (see 4.2)
(e) Levels of packaging and packing (see 5.1 and 5.2)
(f) Marking and labeling (see 5.3)
(g) Preproduction samples are or are not required

6.3 Cross reference of classification. The items covered by this specification may be binned with prior items. The difference between the basic specification and this revised specification is shown in the cross reference below (see 1.2.1).

Basic specification	This specification
Grade A - anodized	Type I (grades A and B)
Grade B - anodized	Type II (grades A and B)

6.4 Apparatus used for determining tests. The following apparatus, or other appropriately designed equipment or chemicals which will give equivalent results, is obtainable at the corresponding listed sources:

(1) Dermitron, model D-5
Unit Process Assemblies, Inc.
53-15 37th Avenue
Woodside 77, Long Island, NY

(2) Sandoz, Inc.
61 Van Dam Street
New York 13, NY

(3) Data Corporation
7500 Old Xenia Pike

Dayton 31, Ohio

(4) Tabor Abraser
Model 174
Tabor Instrument Corporation
North Tonawanda, NY

(5) Weatherometer
Model X-1-A
Atlas Electrical Devices Co.
4114 North Ravenswood Avenue
Chicago 13, IL

(6) Light-Section Microscope
Carl-Zeiss, Inc.
444 Fifth Avenue
New York 18, NY

(7) Buckbee Mears Co.
St. Paul, MN 55101

6.5 Definitions.

6.5.1 Photographic process. A completely photographic procedure in which a latent image is formed in a light sensitive coating dispersed throughout the pores of the anodic layer of aluminum oxide. The real or visible image is brought out under darkroom conditions similar to those used to develop ordinary photographic prints.

6.5.2 Photo etching process. A photo-chemical procedure in which a latent image is formed in a layer of polymeric resin by photographic methods, leaving the exposed area covered by a layer of chemical resist. The unexposed salts are washed away and the unprotected areas chemically etched to bring the protected areas into relief.

MILITARY INTEREST:

Custodian:
Army - EL
Navy - NASC
Air Force - 70

Review activities:
Army - MO
Navy- NASC
Air Force - 70, 85

User activities:
Army - EL
Navy - NSSC

Preparing activity:
Navy - NASC

CIVILIAN AGENCIES INTEREST
GSA