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L-P-349c
January 20, 1971
SUPERSEDING
Fed. Spec. L-P-349b
April 28, 1967

FEDERAL SPECIFICATION

PLASTIC MOLDING AND EXTRUSION MATERIAL, CELLULOSE ACETATE BUTYRATE

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

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers the requirements for cellulose acetate butyrate material. The appendix contains requirements for parts molded or extruded from such material, together with general provisions for the inspection of such parts. The appendix is applicable only when specified in the contract or purchase order (see 6.2).

1.2 Classification.

1.2.1 Grades. The cellulose acetate butyrate material covered by this specification shall be furnished in the grades listed in table I as specified (see 6.2).

TABLE I. Grades of cellulose acetate butyrate material

Grade	Flow temperature °C (±5°C)
H4	170
H3	165
H2	160
H	155
MH	150
M	145
MS	140
S	135
S2	130

1.2.2 Classes. When specified (see 6.2), cellulose acetate butyrate material shall be of the following classes:

Class E - Electrical properties controlled
Class O - Optical properties controlled

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of the specification to the extent specified herein.

FEDERAL SPECIFICATIONS

PPP-D-723 - Drums, Fiber.
PPP-D-729 - Drum, Metal, 55 Gallon (For Shipment of Noncorrosive Material).

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FEDERAL STANDARDS

FED-STD-123 - Marking for Domestic Shipment (Civil Agencies).
FED-STD-406 - Plastics: Methods of Testing.

(Activities outside the Federal Government may obtain copies of Federal Specifications and Standards, as outlined under General Provisions in the Index of 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, D. C. 20402.)

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

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

MILITARY SPECIFICATIONS

MIL-P-116 - Preservation, Methods of.
MIL-C-45662 - Calibration System Requirements.

MILITARY STANDARDS

MIL-STD-104 - Limits for Electrical Insulation Color.
MIL-STD-129 - Marking for Shipment and Storage.

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

2.2 Other publications. The following document forms a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

American Society for Testing and Materials (ASTM)

D 707 - Specification for Cellulose Acetate Butyrate Molding and Extrusion Compounds.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. REQUIREMENTS

3.1 Material. The material shall consist of virgin cellulose acetate butyrate so formulated as to meet the requirements of this specification, and shall be suitable for compression or injection molding, or for extrusion. No scrap material shall be utilized.

3.1.1 Uniformity. All material of the same brand from one supplier shall be free of foreign particles and other contamination, and shall be uniform in texture, in color and in other properties as determined by the quality conformance inspections (see 4.4 and 6.3).

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3.1.2 Transparency and color. The material shall be furnished transparent, translucent, or opaque, as specified; in the colors, tints, or hues specified and with the tolerances specified (see 6.2). Colors shall be in accordance with MIL-STD-104.

3.1.3 Property values. The values obtained from any set of specimens for any property, after any one conditioning procedure, shall be averaged, and the average value so obtained shall be not less than the minimum nor more than the maximum, as applicable, specified herein.

3.1.3.1 Grades. Property values shall meet the requirements of table II.

3.1.3.2 Class E. When class E is specified (see 6.2), the material properties shall meet the requirements of tables II and III.

TABLE II. Property values for specimens made from cellulose acetate butyrate material 1/

Property to be tested (see table VII)	Conditioning procedure (see 4.5.2.3)	Value required								
		Grade								
		H4	H3	H2	H	MH	M	MS	S	S2
Flow temperature, °C ±5°C	C-72/23/0	170	165	160	155	150	145	140	135	130
Specific gravity, 2/ 23°/23° C, maximum	A	1.23	1.22	1.22	1.21	1.21	1.20	1.20	1.19	1.19
Tensile strength minimum, lb_f/in^2	C-96/23/50	5900	5500	5000	4500	3900	3500	3200	2800	2300
Deflection temperature at 264 lb_f/in^2 fiber stress, minimum, °C	C-96/23/50	83	76	69	63	58	54	50	48	45
Impact strength (Izod) minimum, foot-pound per inch of notch	C-96/23/50	1.8	2.3	2.8	3.4	4.0	4.7	5.4	6.2	7.0
	E-1/-40	0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.7	0.7
Water absorption (procedure A-24 hours immersion): Weight gain plus soluble matter loss, maximum, percent	(See method 7031, FED-STD-406)	2.2	2.0	1.9	1.8	1.7	1.7	1.6	1.6	1.5
Soluble matter loss, maximum, percent		0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.6	0.8
Weight loss on heating, maximum, percent	C-48/23/0	0.3	0.5	0.6	1.0	1.3	1.8	2.2	2.7	3.0
Flammability, maximum, inches per minute	C-48/23/50	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0

1/ Property values are based on specimens prepared in accordance with paragraph 4.5.2.1.
2/ Applicable to unfilled material only.

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TABLE III. Additional property values for class E, for specimens made from cellulose acetate butyrate material

Property to be tested (see table VII)	Conditioning procedure (see 4.5.2.3)	Value required
Volume resistivity, minimum, ohm-centimeters	C-96/23/50	10^{13}
	C-96/23/50+D-48/50+D- ½ /23	10^{11}
Dielectric strength (flatwise), minimum volts per mil:		
Short-time test	C-96/23/50	325
	C-96/23/50+D-48/50+D- ½ /23	300
Step-by-step test	C-96/23/50	325
	C-96/23/50+D-48/50+D- ½ /23	300

3.1.3.3 Class O. When class O is specified (see 6.2), the material properties shall meet the requirements of table II, shall be clear-transparent, and, with no special conditioning, shall have a luminous transmittance of 80 percent minimum (see table VII).

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 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.

4.1.1 Test equipment and inspection facilities. Test and measuring equipment and inspection facilities of sufficient accuracy, quality and quantity to permit performance of the required inspection shall be established and maintained by the supplier. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with MIL-C-45662.

4.2 Classification of inspections. The inspections specified herein are classified as follows:

Quality conformance inspections (see 4.4).
(1) Inspection of product for delivery (see 4.4.1).
(2) Inspection of preparation for delivery (see 4.4.2).

4.3 Inspection conditions. Unless otherwise specified herein, all inspection shall be made under the conditions specified in FED-STD-406.

4.4 Quality conformance inspections.

4.4.1 Inspection of product for delivery. Inspection of product for delivery shall consist of batch inspection (see 4.4.1.2) and periodic-batch inspection (see 4.4.1.3).

4.4.1.1 Batch. A batch shall be defined as a unit of product prepared for shipment, and may consist of a uniform blend of two or more "production runs" of cellulose acetate butyrate of the same grade, class, and color.

4.4.1.2 Batch inspection. Batch inspection shall consist of the test specified in table IV, as applicable.

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TABLE IV. Batch inspection

Test	Applicability	Requirement table	Test table
Flow temperature	All grades and classes	Table II	Table VII

4.4.1.2.1 Sampling plan. Batch sampling (see 4.5.1) and inspection shall be made on each batch (see 4.4.1.1), and shall be the basis for acceptance or rejection of the batch.

4.4.1.3 Periodic-batch inspection. Periodic-batch inspection shall consist of the tests specified in table V, as applicable.

4.4.1.3.1 Sampling frequency. Periodic-batch inspection shall be made on the first batch of material furnished under this specification and on every twelfth batch thereafter, or once each year, whichever occurs first (see 4.5.1).

TABLE V. Periodic-batch inspection

Test	Applicability	Requirement table	Test table
Specific gravity	All grades	Table II	Table VII
Tensile strength	All grades	Table II	
Deflection temperature	All grades	Table II	
Impact strength (Izod)	All grades	Table II	
Water absorption	All grades	Table II	
Weight loss on heating	All grades	Table II	
Flammability	All grades	Table II	
Volume resistivity	All grades, class E	Table III	
Dielectric strength (flatwise):			
Short-time test	All grades, class E	Table III	
Step-by-step test	All grades, class E	Table III	
Luminous transmittance	All grades, class O	(See 3.1.3.3)	

4.4.1.4 Rejection. Failure to comply with any of the requirements of this specification shall be cause for rejection of the batch represented.

4.4.1.5 Rejected lots. If a batch is rejected as the result of batch or periodic batch inspection, no further batches will be accepted for inspection until the supplier has taken corrective measures and has satisfied the Government that these measures will enable the material to meet the requirements of this specification. Rejected batches may be reworked and resubmitted, but must be kept separate from new batches.

4.4.2 Inspection of preparation for delivery. Sample packages and packs and the inspection of the preservation and packaging, packing and marking for shipment and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

4.5 Methods of examination and test.

4.5.1 Sampling. A representative sampling shall be taken from each batch offered for acceptance. A sample of sufficient quantity shall be taken to furnish sufficient material for the supplier to mold specimens for each of the required tests.

4.5.2 Specimens.

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4.5.2.1 Preparation. The values specified in table II are based on injection molded specimens 1/8 inch thick, except for deflection temperature which is based upon compression molded specimens 1/2 inch thick. The values specified in table III are based on compression molded specimens 1/8 inch thick. The specimens shall be prepared in accordance with the paragraph on specimen preparation in ASTM D 707.

4.5.2.2 Tolerances. Unless otherwise specified herein, tolerance on dimensions shall be ±5 percent.

4.5.2.3 Conditioning. Specimens shall be conditioned before test, as specified in tables II and III.

4.5.2.3.1 Designation. The type of conditioning required shall be designated as follows:

Condition A - As received; no special conditioning.
Condition C - Humidity conditioning.
Condition D - Immersion conditioning in distilled water.
Condition E - Temperature conditioning.
Condition des - Desiccation conditioning, cooling over silica gel or calcium chloride in a desiccator at 25° ±5° C for 16 to 20 hours.

4.5.2.3.2 Procedures. The conditioning procedure required, with the exception of conditions A and des, shall be indicated by the following combination of symbols:

(a) A capital letter indicating the type of conditioning; i.e., humidity, immersion, or temperature conditioning.
(b) A number indicating in hours the duration of the conditioning.
(c) A number indicating in degrees centigrade the conditioning temperature.
(d) A number indicating relative humidity, whenever relative humidity is controlled. A cipher indicates conditioning in a desiccator over silica gel or calcium chloride.

The numbers shall be separated from each other by slant marks, and from the capital letter by a dash. A sequence of conditions shall be denoted by use of a plus (+) sign between successive conditions.

4.5.2.3.3 Time tolerances. Time tolerances and additional testing information shall be as specified in table VI.

TABLE VI. Time tolerances and testing information

Conditioning procedure	Time tolerance (hours)		Test temperature, humidity, and tolerances	Remarks
	Oven, air, or desiccator	Distilled water		
All "C" conditions	-0, + indefinite for 50 percent RH: -0, +1 for desiccation	---	23° ±5° C, 50 ±5 percent RH	If convenient, store the specimens at 23° C and 50 percent RH before tests are started, except for desiccated specimens which shall be tested immediately.
C-96 23/50+ D-48/50+D-23	-0, +2	-0, +2	23° ±5° C, 50 ±5 percent RH: 50° ±2° C	Start test within 2 minutes after removing specimens from final conditioning bath. 1/
E-1 -40	-0, +2	---	-40° ±2° C	Test in refrigerator.

1/ After immersion conditioning, surface water shall be removed by wiping the specimen with a damp cloth, followed by wiping with a dry cloth.

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4.5.3 Test methods and specimens. The test methods and the number and form of the specimens to be tested shall be as specified in table VII, and as modified herein.

TABLE VII. Test methods and specimens

Test	FED-STD-406, method No.	Modified by paragraph	Number of specimens	Form of specimens
Flow temperature	2041	---	3	Cylinder, 3/8 inch dia. x 3/8 inch high
Specific gravity	5012	---	3	(See 5012)
Tensile strength	1011	---	5	Type I, 1/8 inch thick as per 1011
Deflection temperature	2011	---	3	1/2 inch x 1/2 inch x 5 inches
Impact strength (Izod)	1071	---	5	(See 1071)
Water absorption	7031	---	3	Disk, 2 inches dia. x 1/8 inch thick
Weight loss on heating	----	4.5.3.1	3	Disk, 2 inches dia. x 1/8 inch thick
Flammability	2021	---	10	1/2 inch x 1/8 inch x 6 inches
Volume resistivity	4041	---	5	Disk, 4 inches dia. x 1/8 inch thick
Dielectric strength (flatwise):	----	4.5.3.2	--	---
Short-time test	4031	4.5.3.2.1	5	Disk, 4 inches dia. x 1/8 inch thick
Step-by-step test	4031	4.5.3.2.2	5	Disk, 4 inches dia. x 1/8 inch thick
Luminous transmittance	3022	---	3	Disk, 2 inches dia. x 1/8 inch thick

4.5.3.1 Weight loss on heating.[1/] Three specimens 2 inches in diameter by 1/8 inch in thickness shall be conditioned for 48 hours over anhydrous calcium chloride at 23° ±1° C. The specimens shall be weighed and then placed in a circulating-air oven for 72 hours at 82° ±1° C ; the specimens shall be supported flatwise on a screen in the oven. Upon removal from the oven, the specimens shall be cooled in a desiccator over anhydrous calcium chloride to 23° ±1° C. The specimens shall then be weighed and the percentage weight loss calculated.

4.5.3.2 Dielectric strength (flatwise). The test shall be made under oil at a frequency not exceeding 100 hertz.

4.5.3.2.1 Short-time test. The voltage shall be increased uniformly at the rate of 500 volts per second.

4.5.3.2.2 Step-by-step test. The voltage shall be increased in the increments shown in table VIII. It shall be held at each step for 1 minute and then changed to the next higher one within 10 seconds. This process shall be continued up to failure.

TABLE VIII. Voltage increase for dielectric strength step-by-step test

Breakdown by short-time method	Increment of increase
Kilovolts	Kilovolts
12.5 or less	0.5
Over 12.5 to 25, inclusive	1.0
Over 25 to 50, inclusive	2.5
Over 50 to 100, inclusive	5.0
Over 100	10.0

1/ Weight loss on heating is a measure of the relative amount of volatile plasticizer in the plastic composition. Loss of plasticizer on aging in service results in shrinkage, decreased impact strength, and other undesirable changes in properties.

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4.6 Test reports. Test reports shall be made as specified in FED-STD-406; in addition, a summary sheet of test results shall be furnished.

4.6.1 Accuracy of calculations. Observed or calculated values shall be rounded off to the nearest digit in the last right-hand place of figures used in expressing the specified value, except as follows:

(a) From 500 to 1,000, inclusive-to the nearest 5.
(b) From 1,001 to 10,000, inclusive-to the nearest 100.

5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging. Preservation and packaging shall be level A or C, as specified (see 6.2).

5.1.1 Levels A and C.

5.1.1.1 Cleaning. The material shall be cleaned of foreign particles in accordance with MIL-P-116, process C-1 (see 3.1.1).

5.1.1.2 Drying. The material shall be dried, when required, in accordance with MIL-P-116.

5.1.1.3 Preservative application. Not applicable.

5.1.1.4 Unit packaging. The material shall be packaged in accordance with MIL-P-116, method III insuring compliance with the general requirements paragraph under *methods of preservation (unit protection)* and the physical protection requirements paragraph therein. Unless otherwise specified (see 6.2), the quantity (amount) per unit package shall be limited to a maximum of 200 pounds net for fiber drums and 400 pounds net for metal drums. The unit container, which shall suffice as a shipping container, shall meet the requirements of 5.2.1, 5.2.2 or 5.2.3 in accordance with the level of packing specified.

5.1.1.5 *Intermediate packaging.* Not applicable.

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

5.2.1 Level A. The material shall be packed in fiber drums conforming to type III, grade A of PPP-D-723 or in metal drums conforming to type III or IV of PPP-D-729. Each fiber drum shall be furnished with a 0.004 inch thick heat sealable polyethylene liner. Closure shall be in accordance with the requirements of the drum specification.

5.2.2 Level B. The material shall be packed as specified in 5.2.1 except that the fiber drums shall be type I or II.

5.2.3 Level C. The material shall be packed in shipping containers in a manner that will afford adequate protection against damage during shipment from the supply source to the first receiving activity. These packs shall conform to the applicable carrier rules and regulations.

5.2.4 Unitized loads. Unitized loads shall be used whenever total quantities for shipment to one destination equal 40 cubic feet or more. Quantities less than 40 cubic feet need not be unitized. Unitized loads shall be uniform in size and quantities to the greatest extent practicable. The material, packed as specified, shall be unitized with pallets of the type, size and kind commonly used for the purpose and shall conform to the applicable carrier rules and regulations.

5.3 Marking.

5.3.1 Civilian agencies. In addition to any special marking required by the contract or purchase order (see 6.2), marking for shipment shall be in accordance with FED-STD-123.

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5.3.2 Military agencies. In addition to any special marking required by the contract or purchase order (see 6.2), each container and unitized load shall be marked in accordance with MIL-STD-129.

5.4 General. Containers (see 5.2.1, 5.2.2 and 5.2.3) shall be of a minimum tare and cube consistent with the protection required and shall contain equal quantities of identical stock numbered material to the greatest extent practicable.

6. NOTES

6.1 Intended use. Parts made from these various types of molding and extrusions material are intended for use in general-purpose application where ease of fabrication is an important factor. In designing molded articles from cellulose acetate butyrate, their limited resistance to cold flow and the slight dimensional changes to be expected in the finished item must be considered. Cellulose acetate butyrate is suitable only for applications involving relatively low loads in the temperature range of -40°C to +65°C.

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) Grade desired (see 1.2.1).
(c) Class, if required (see 1.2.2, 3.1.3.2, and 3.1.3.3).
(d) Transparency, color and tolerances required (see 3.1.2).
(e) Selection of the applicable levels of preservation, packaging, and packing, and applicable marking (see section 5).
(f) Appendix, if required.

6.3 Texture. In this specification, texture comprises average particle size, particle size distribution, and particle shape.

6.4 International standardization agreement. Certain provisions of this specification are the subject of international standardization agreement ABC-NAVY-STD-17C. When amendment, revision, or cancellation of this specification is proposed which will affect or violate the international agreement concerned, the preparing activity will take appropriate reconciliation action through international standardization channels including departmental standardization offices, if required.

6.5 Cross references to earlier editions of L-P-349. (See table IX.)

TABLE IX. Cross reference to types, grades and classes of earlier editions of L-P-349 with suggested replacement grades and classes of L-P-349c

L-P-349a / L-P-349b		L-P-349c
Type	Class	Grade
I	H2	H2
	MH	MH
	MS	MS
	S2	S2
II	H4	H4
	H2	H3
	MH	H
	MS	M
III	H2	H
	MH	M
	MS	S
	S2	S2

Grade
E
O

Class
E
O

NOTE: The major divisions for cellulose acetate butyrate are by grades, therefore the two special classes of material are Class E and Class O under the new revision (L-P-349c).

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MILITARY INTEREST:

Custodians:
Army - EL
Navy - AS
Air Force - None

Review activities:
Army - EL, MU, MR
Navy - AS, OS
Air Force - None

User activities:
Army - EL, MU, MR
Navy - SH, YD, MC
Air Force - None

CIVIL AGENCY INTEREST:

GSA - FSS
AGR
HEW
COM - NBS
JUS

Preparing activity:
ARMY - EL

Agent:
DSA - ES

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APPENDIX

10. SCOPE

10.1 This appendix describes general requirements for parts molded or extruded from material covered by this specification, together with procedure for the inspection of such parts. In the event of any conflict between the provisions of this appendix and the contractual documents for a specific part, the provisions of the latter shall govern.

20. APPLICABLE DOCUMENTS

20.1 Specifications and standards. The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of the specification to the extent specified herein.

MILITARY STANDARD:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.

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

30. REQUIREMENTS

30.1 Material. Parts furnished under this specification shall be molded or extruded from a brand of material which has passed the periodic batch inspection and from a batch of that brand which has passed the batch inspection. No scrap material (previously molded and reground) shall be used.

30.2 Uniformity. The molded or extruded part shall be uniform in color, texture, finish, density, and other physical properties.

30.3 Color. All parts shall be furnished in the colors, tints, or hues specified and with the tolerances specified (see 60.1).

30.4 Transparency. All parts shall be furnished transparent, translucent, or opaque, as specified (see 60.1).

30.5 Design and dimensions. The design and dimensions of the molded or extruded part shall be as specified (see 60.1). All sizes shall be within the limits specified in the contract or order, or on the contract drawings. If no limits are specified, standard commercial tolerances shall apply. Accuracy of molding or extrusion shall be such as to assure interchangeability of all parts made to the same drawing.

30.6 Inserts. All inserts, holes, lugs, etc., shall be correctly spaced as shown on the contract drawings. The inserts, holes, or lugs shall not be battered or damaged in any way, nor shall they be coated with material in such a manner as to lead to an imperfect electrical contact or a poor mechanical fit. All inserts shall be so designed and assembled in the material that they will amply withstand the tensile or torsional load that is to be applied.

30.7 Threads. All threaded sections, whether threaded metal inserts or threads molded or tapped into the part itself, shall be smooth, clean, and free from nicks, tears, or other damage.

30.8 Finish. The molded or extruded part shall have a finish as specified (see 60.1). When a smooth surface is specified, it shall be similar to a polished finish. When a dull finish is specified, the light sheen of the finished molded material as it comes from the mold shall be removed by sand-

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blasting or other suitable means to give a dull nonreflecting surface. Unless otherwise specified (see 60.1), no surface shall be painted and no machining of surfaces shall be permitted except that flash, burrs, or projecting ridges at the dividing line of the mold shall be removed.

30.9 Machinability. All parts shall be suitable for fabrication by standard machining operations, when performed in accordance with good practice, and shall not crack, split, craze, or distort as a result of such operations.

30.10 Chemical resistance. When specified, the resistance of the molded or extruded part to specific chemicals shall be as specified (see 60.1).

30.11 Suitability for use with explosives. When specified (see 60.1), the part shall be suitable for use with a particular explosive.

30.12 Marking. Each part shall be marked with the drawing or part number (if available), the molder's or extruder's trade-mark, and the cavity number. If, because of the small size of the part, some but not all of the marking can be shown, the order of preference shall be as listed above. Molded parts shall have the information molded thereon. For extruded parts, the marking shall be accomplished by means of die-cutting, metal-stamping, or other suitable means, as specified (see 60.1).

30.13 Contract inspection tests. All parts shall conform to the requirements of the tests specified in the contract or purchase order, or on the contract drawings (see 60.1).

30.14 Workmanship.

30.14.1 Surface defects. The finish shall not be disturbed. All parts shall be free from warp, twist, cracks, chipped edges or surfaces, blisters, uneven surfaces, scratches, dents, heat marks, etc. They shall be free from fins, burrs, and projecting ridges at the dividing line of the mold, and free from unsightly finish caused by chipping, filing, or grinding the ridges. Buffing or polishing may be employed if necessary to remove fins, burrs, etc.

30.14.2 Porosity. All parts shall be uniformly dense throughout their structure, and free from porosity.

40. QUALITY ASSURANCE PROVISIONS

40.1 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.

40.1.1 Test equipment and inspection facilities. Test and measuring equipment and inspection facilities of sufficient accuracy, quality and quantity to permit performance of the required inspection shall be established and maintained by the supplier. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with MIL-C-45662.

40.2 Classification of tests. All tests shall be classified as follows:

(a) Pilot-lot tests.
(b) Lot-acceptance tests.

40.2.1 Pilot-lot tests. These tests shall be performed on a pilot lot of finished molded or extruded parts, and shall be used to determine whether or not the molder or extruder shall proceed with the production of parts under the contract or order.

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40.2.1.1 Frequency. Pilot-lot tests shall be made after award of contract and prior to production of the molded or extruded part for delivery under contract. If additional contracts are awarded for the part, the Government may waive these tests and rely on the lot-acceptance tests (see 40.2.2) on future deliveries.

40.2.1.2 Size of pilot lot. Unless otherwise specified (see 60.1), the pilot lot shall consist of 2 percent of the total number of molded parts ordered, except that not less than 2 nor more than 20 molded parts shall be required. All molded parts in the pilot lot shall be inspected.

40.2.1.3 Inspection. Inspection of the pilot lot shall consist of the following:

40.2.1.3.1 Visual inspection. All molded or extruded parts shall be inspected for uniformity, color, and transparency (see 30.2 to 30.4, incl.); for dimensions, inserts, threads, finish, machinability and marking, as applicable (see 30.5 to 30.9, incl., and 30.12); and for workmanship (see 30.14).

40.2.1.3.2 Contract inspection tests. Contract inspection tests shall consist of such tests as are specified in the contract or order, or on the contract drawings (see 30.10, 30.11, 30.13, and 60.1).

40.2.1.3.3 Results of tests. Based upon satisfactory results of pilot-lot tests, the Government shall authorize the molder or extruder to start production.

40.2.2 Lot-acceptance tests. Tests shall be performed on molded or extruded parts to serve as a basis for acceptance or rejection of these parts under the contract or purchase order. Lot-acceptance tests shall consist of groups A and B tests.

40.2.2.1 Production lot. A production lot, hereinafter referred to as "lot", shall consist of all molded or extruded parts of one kind made from the same batch of compound by the same molding or extruding procedure and offered for delivery at one time.

40.2.2.2 Group A tests. Group A tests shall consist of the tests specified in table X.

40.2.2.2.1 Sampling plan. Statistical sampling and inspection shall be in accordance with MIL-STD-105. Unless otherwise specified (see 60.1), the acceptable quality levels (AQL) shall be 1.0 and 4.0 (percent defective) for major and minor defects, respectively. Major and minor defects shall be as defined in the end-item specification.

TABLE X. Group A lot-acceptance tests.

Test	Requirement paragraph	Test paragraph
Visual inspection ----------	30.2 to 30.4, incl. 30.5 to 30.9, incl. 30.12, and 30.14	40.2.1.3.1

40.2.2.3 Group B tests. Group B tests shall consist of the contract inspection tests (see 40.2.1.3.2). They shall be performed on sample units that have been subjected to and have passed the group A tests, unless the Government considers it more practical to select a separate sample from the lot for group B inspection.

40.2.2.3.1 Sampling plan. The sampling plan shall be in accordance with MIL-STD-105 for special inspection levels. Normal inspection shall be used at the start of the contract. The AQL shall be 6.5 percent defective and the inspection level shall be S-4.

40.2.2.3.2 Disposition of sample units. Sample units which have been subjected to the group B tests shall be disposed of as specified in the contract or order (see 60.1).

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40.2.2.4 Results of tests. A certified copy of the results of the lot-acceptance tests shall be furnished the Government.

50. PREPARATION FOR DELIVERY

50.1 Molded or extruded parts shall be prepared for delivery as specified in the contract or order (see 60.1).

60. NOTES

60.1 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) Class and grade, as applicable, of molding material (see 1.2).
(c) Color and tolerances required (see 30.3).
(d) Transparency required (see 30.4).
(e) Design and dimensions (see 30.5).
(f) Finish required (see 30.8).
(g) Chemical resistance, if required (see 30.10).
(h) Suitability for use with explosives, if required (see 30.11).
(i) Method of marking extruded parts (see 30.12).
(j) Contract inspection-test requirements (see 30.13 and 40.2.1.3.2).
(k) Change in size of pilot lot, if required (see 40.2.1.2).
(l) Change in AQL, if required (see 40.2.2.2.1 and 40.2.2.3.1).
(m) Disposition of sample units subjected to group B tests (see 40.2.2.3.2).
(n) Information for preparation for delivery (see 50.1).
(o) Bid samples, if required (see 60.2).
(p) Location at which inspection shall be made if other than the supplier's facilities or commercial laboratory (see 40.1).
(q) Form and presentation of inspection records (see 40.1.1).

60.2 It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If samples are required with bid, this requirement should be stated in the inquiry or invitation for bids (see 60.1).

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