

AEROSPACE MATERIAL SPECIFICATION

Rubber, Chlorosulfonated Polyethylene Elastomer, Sheet and Molded Shapes, Ozone Resistant

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1. SCOPE:

1.1 Scope:

This specification covers the requirements for ozone resistant chlorosulfonated polyethylene rubber in sheet form and as molded or extruded parts.

1.2 Classification:

The rubber shall be of the following types, as specified (see 6.2).

Type I - Sheet form

Type II - Molded or extruded parts

2. APPLICABLE DOCUMENTS:

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

2.1 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

NN-P-530	Plywood, Flat Panel
UU-P-268	Paper, Kraft, Untreated, Wrapping
PPP-B-601	Boxes, Wood, Cleated-Plywood
PPP-B-621	Boxes, Wood, Nailed and Lock-Corner
PPP-B-636	Box, Fiberboard
PPP-T-45	Tape, Gummed, Paper, Reinforced and Plain, for Sealing and Securing
TT-W-572	Wood Preservative, Water Repellent
MIL-P-4861	Packing, Preformed, Rubber, Packing, Packaging of
MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-289	Visual Inspection Guide for Rubber Sheet Material
MIL-STD-407	Visual Inspection Guide for Rubber Molded Items

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor, West Conshohocken, PA 19428-2959.

ASTM D 257-66	Tests for D-C Resistance or Conductance of Insulating Materials
ASTM D 412-68	Tension Testing of Vulcanized Rubber
ASTM D 471-68	Test for Change in Properties of Elastomeric Vulcanizates Resulting from Immersion in Liquids
ASTM D 746-64T	Test for Brittleness Temperature of Plastics and Elastomers by Impact
ASTM D 1149-64	Test for Accelerated Ozone Cracking of Vulcanized Rubber
ASTM D 2240-68	Test for Indentation Hardness of Rubber and Plastic by Means of a Durometer

2.3 Consolidated Classification Committee Publications:

Available from Consolidated Classification Committee, 202 Chicago Union Station, Chicago, IL, 60606.

Uniform Freight Classification Rules

3. REQUIREMENTS:

3.1 First article:

When specified by the procuring activity, the rubber sheet or molded parts shall have been inspected and passed the first article inspection specified herein (see 4.3).

3.2 Materials:

The rubber shall be chlorosulfonated polyethylene which has been properly compounded to meet all the requirements of this specification. All materials utilized in the compounding operation shall be of the best quality and suitable for the intended use.

3.3 Dimensions and tolerances:

- 3.3.1 Sheet and strip: The width of sheet material shall be 36 inches \pm 1 inch, and the width of strip material or shapes cut from sheet shall be as specified with tolerances of \pm 5 percent. The length shall have a tolerance of \pm 1 percent or as specified. Unless otherwise specified in the contract or order, the tolerances on thickness shown in Table I shall apply.

TABLE I - THICKNESS TOLERANCES FOR SHEET

NOMINAL THICKNESS (INCH)	TOLERANCES (INCH)
1/16 and less	± 0.010
Over 1/16 to 1/8, inclusive	± 0.016
Over 1/8 to 1/2, inclusive	± 0.031
Over 1/2 to 1, inclusive	± 0.047
Over 1	± 0.063

3.3.2 Molded or extruded parts: Dimensions and tolerances shall be as specified on the drawing, contract or order (see 6.2).

3.4 Identification of product:

3.4.1 Sheet and strip (cut from sheet): Unless otherwise specified, sheet material shall be marked to show the specification number, date of manufacture (by quarters), manufacturer's designation (compound number), and manufacturer.

Example: MIL-R-81828 (AS)
Compound Number
Date of manufacture (Calendar Year and Quarter)
Manufacturer

The identification shall recur constantly from one end of the sheet to the other in rows, spaced approximately 5 inches apart; shall be clearly legible and not less than 3/8 inch high; and shall be applied by suitable means, using marking fluid that is not deleterious to the synthetic rubber. The marking shall be not be obliterated by normal handling. The color of the marking shall be white or a contrasting color if the product is very light.

3.4.2 Extruded parts: Where the size of the finished part permits, the identification shall be marked as indicated in 3.4.1. When identification marking of the product is impractical, the unit package shall show the manufacturer's name and compound number, in addition to the markings specified in 5.3.

3.4.3 Molded parts: The marking shall be as specified on the drawing or in the contract or order.

3.5 Physical properties:

The physical properties of the cured chlorosulfonated polyethylene rubber shall be as specified in Table II.

3.6 Workmanship:

The product shall be uniform in quality and condition; clean and free of foreign material. Parts shall be smooth and free of flash, unless otherwise specified. There shall be no defects detrimental to fabrication, appearance, or performance of parts.

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.

TABLE II - PROPERTIES

Property	Requirement	Test Para.
<u>Physical</u>		
Hardness, Shore A	65±5	4.6.1
Tensile strength, psi, min	2000	4.6.2
Ultimate elongation, %, min	400	4.6.3
Modulus @ 200% strain, psi, min	1000	4.6.4
<u>Oil resistance</u>		
Volume swell, %, max.	10	4.6.5
Tensile strength, % retention of original	75	
Brittleness point, °F, min	-50	4.6.6
Ozone Resistance	No Cracking	4.6.7
<u>Electrical</u>		
Volume Resistivity, OHM-CM, min	2×10^{11}	4.6.8

4.2 Classification of inspections:

The inspections of the synthetic rubber shall be classified as follows:

1. First article inspection (see 4.3)
2. Quality conformance inspection (see 4.4)

4.3 First article inspection:

First article inspection shall be performed on the first lot or order of material furnished under this specification and on any subsequent lot or order when specified by the procuring activity (see 6.2). First article inspection shall consist of all the tests and inspections of this specification.

- 4.3.1 Sampling instructions: The first article inspection sample shall consist of one (1) sheet, 24 by 36 inch, for sheet material. For molded items, the manufacturer shall submit one (1) molded part and four (4) 6 by 6 by 0.075 molded plaques. All samples shall be of the same composition and state of cure as the molded part. The first article sample shall be identified and shall contain the following information:

Sample for First Article Inspection

RUBBER, CHLOROSULFONATED POLYETHYLENE ELASTOMER,
SHEET AND MOLDED SHAPES, OZONE RESISTANT

Name of Manufacturer

Compound Number

Date of manufacture

Submitted by (name and date), for first article inspection in accordance with the requirements of (contract or order).

- 4.3.2 Manufacturer's data: The manufacturer shall submit two (2) copies of his test report which show the rubber conforms to the requirements of this specification. The test report shall reference the specific requirements and test methods in this specification.

4.4 Quality conformance inspection:

- 4.4.1 Lot formation: A lot shall consist of all the material from the same batch of rubber compound processed into a finished form such as molded parts, sheets, strips, or extruded shapes in one continuous run and submitted for the manufacturer's final inspection at one time. A batch shall be the quantity of material run through a mill or mixer at the same time.

4.4.2 Sampling:

- 4.4.2.1 Physical property tests: Two samples shall be randomly selected from each lot (see 4.4.1). The amount of rubber selected for each sample shall be sufficient for the tests specified in 4.4.3.1. When molded parts are inspected, the manufacturer shall supply molded plaques 6 by 6 by 6 by 0.075 inch in lieu of the parts. All samples shall be of the same composition and state of cure as the molded part.

4.4.2.2 Visual and dimensional examination: The end item shall be selected in accordance with Inspection Level II of MIL-STD-105. The sample unit shall be one (1) yard for sheet and strip, or one (1) molded part. Each end item shall be examined as specified in 4.4.3.2.

4.4.2.3 Packaging, packing and marking examinations: A quantity of shipping containers fully prepared for delivery, just prior to closure, shall be selected at random from each lot in accordance with MIL-STD-105, Inspection Level S-2. The lot size for this examination shall be the number of shipping containers. The selected sample shall be examined as specified in 4.4.3.3.

4.4.3 Inspections:

4.4.3.1 Physical property tests: Test specimens prepared from the samples selected in accordance with 4.4.2.1 shall be tested to the requirements of Table III. Nonconformance of a test specimen to a single requirement (Table III) shall be cause for rejecting the lot represented by the sample.

TABLE III - PHYSICAL PROPERTY INSPECTION

Property	Test Paragraph
Hardness	4.6.1
Tensile strength	4.6.2
Elongation	4.6.3
Modulus	4.6.4

4.4.3.2 Visual and dimensional inspection of the end item: Samples selected as specified in 4.3.3 shall be visually examined to the requirements in Table IV. The Acceptable Quality Level (AQL) for this inspection shall be 1.5 percent defective.

TABLE IV - VISUAL EXAMINATION

Inspection	Defect
Appearance & Workmanship Sheet	Inspected in accordance with requirements of MIL-STD-289
Molded Parts	Inspected in accordance with requirements of MIL-STD-407
Dimensions & Tolerances Sheets & Molded Parts	Not in accordance with 3.2.1. Not as specified in the contract or order

4.4.3.3 Inspection of packaging, packing and marking: Shipping containers selected in 4.3.4 shall be visually examined for conformance to Table V and all other applicable requirements of Section 5 of this specification. The Acceptable Quality Level (AQL) shall be 2.5 percent defective. In addition, shipping containers fully prepared for delivery shall be examined for closure defects.

4.5 Test methods:

4.5.1 Standard conditions: Unless otherwise specified herein, all test specimens shall be conditioned for 4 hours at $23 \pm 1^\circ\text{C}$ ($73.4 \pm 2^\circ\text{F}$) and a relative humidity of 50 ± 5 percent prior to testing at these conditions.

4.5.2 Specimens for test: Unless otherwise specified all test specimens shall be cut from sheets or molded plaques (see 4.3.2). The molded plaques shall be from the same batch as the item and shall have been processed under the same conditions of temperature and cure.

4.5.3 Reporting of results: Unless otherwise specified, all results shall be reported as the average of all obtained values. Individual results shall be recorded on the test report and all values shall meet the requirements of Table II.

4.6 Physical Properties:

4.6.1 Hardness: Hardness shall be determined in accordance with ASTM D 2240, Shore A-2. 5 readings shall be made immediately upon firm indentation. Specimens less than 0.25 inch thick shall be plied to or as close to that thickness as possible.

- 4.6.2 Tensile strength: Five specimens shall be tested for tensile strength in accordance with ASTM D-412. Specimens shall be cut using Die "C". One inch benchmarks shall be used. Any break out of the bench marks shall be discarded and another specimen tested.
- 4.6.3 Ultimate elongation: The ultimate elongation shall be observed during the tensile strength determination. Method of determination and calculations shall be in accordance with ASTM D-412.
- 4.6.4 Tensile stress: The tensile stress at 200 percent strain shall be determined in accordance with ASTM D-412.
- 4.6.5 Oil resistance: Five (5) tensile specimens (4.6.2) and five (5) - 1 by 2 by 0.075 inch rectangular specimens shall each be immersed in kerosene for 22 hours at $23\pm 2^{\circ}\text{C}$ ($73.4\pm 3.6^{\circ}\text{F}$). The volume of fluid for each immersion shall be at least 20 times the volume of the specimen. Volume swell and tensile strength after immersion shall be accomplished in accordance with ASTM D-471.

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TABLE V

<u>Examine</u>	<u>Defect</u>
Packaging molded parts and extruded shapes	<p>Not the level specified.</p> <p>Not packaged as specified or required.</p> <p>Packaging material, closures not as specified.</p> <p>Unit items not individually wrapped when specified.</p>
Sheets	Not interleaved; separator sheets do not fully cover the full area of contact between the sheets.
Strips	<p>Stacked over 10 inches high.</p> <p>Not in rolls; not wound on suitable cores.</p> <p>Rolls not wrapped or sealed as specified.</p> <p>Total length per roll varies by more than the indicated tolerances (5.1.1.1.1).</p>
Packing	<p>Not level specified; not in accordance with contract requirements.</p> <p>Container not as specified, closures not accomplished by specified or required methods or materials.</p> <p>Any nonconforming component, component missing, damaged or otherwise defective, affecting serviceability.</p> <p>Inadequate application of components, such as incomplete closure of case liners, containing flaps loose or inadequate strapping, bulbed or distorted containers.</p>
Count	Less than specified or indicated quantity, linear footage, or units, as applicable.