AEROSPACE MATERIAL SPECIFICATION

AMS3240™	REV. L

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Superseding AMS3240K

(R) Elastomer: Chloroprene Rubber (CR)
Weather Resistant
35 - 45

RATIONALE

Five-Year Review and update of this document to standardize the document so that it conforms to the format of the latest AMS3XXX series template.

1. SCOPE

1.1 Form

This specification covers a chloroprene rubber (CR) that can be used to manufacture product in the form of sheet, strip, tubing, extrusions, and molded shapes such as window channels, bumper pads, chafing strips, etc. For molded rings, compression seals, molded O-ring cord, and molded-in-place gaskets for aeronautical and aerospace applications, use the equivalent AMS7XXX specification.

1.2 Application

This material type has resistance to weathering but usage is not limited to such applications. This material type has a typical service temperature range of -40 to +212 °F (-40 to +100 °C). The service temperature range of the material is a general temperature range, but the presence of particular fluids and specific design requirements may modify this range. Each application should be considered separately. It is the responsibility of the user to determine that this specification is appropriate for the environments (temperature range, fluids exposure, etc.) in which it is sought to be used.

1.3 Order of Precedence

This specification is in addition to and in no way limiting, superseding, or abrogating any contractual obligation as required by the applicable procurement document. In the event of conflict in requirements, the order of precedence shall be:

1. Statutory and regulatory requirements,
2. Procurement document or contractual agreement,
3. Applicable purchaser's drawing and/or design data including specifications and requirements specified therein,
4. This document,
5. All specifications referenced in this document.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/AMS3240L/

1.4 Safety-Hazardous Materials

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards which may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2279	Tolerances, Rubber Products
AMS2810	Identification and Packaging, Elastomeric Products
AMS4027	Aluminum Alloy, Sheet and Plate, 1.0Mg - 0.60Si - 0.28Cu - 0.20Cr (6061; -T6 Sheet, -T651 Plate), Solution and Precipitation Heat Treated
AMS5513	Steel, Corrosion-Resistant, Sheet, Strip, and Plate, 19Cr - 9.2Ni (SAE 30304), Solution Heat Treated
AMS5630	Steel, Corrosion-Resistant, Bars, Wire, and Forgings, 17Cr - 0.52Mo (0.95 - 1.20C) (440C)
AMS6345	Steel, Sheet, Strip, and Plate, 0.95Cr - 0.20Mo (0.28 - 0.33C) (SAE 4130), Normalized or Otherwise Heat Treated
AMS-QQ-A-250/4	Aluminum Alloy 2024, Plate and Sheet
AMS-QQ-A-250/12	Aluminum Alloy 7075, Plate and Sheet

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM D297	Standard Test Methods for Rubber Products - Chemical Analysis
ASTM D395	Standard Test Methods for Rubber Property - Compression Set
ASTM D412	Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D471	Standard Test Methods for Test Methods for Rubber Property - Effect of Liquids
ASTM D573	Standard Test Methods for Rubber - Deterioration in an Air Oven
ASTM D624	Standard Test Methods for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
ASTM D1149	Standard Test Methods for Rubber Deterioration - Cracking in an Ozone Controlled Environment

ASTM D2137 Standard Test Methods Rubber Property - Brittleness Point of Flexible Polymers and Coated Fabrics

ASTM D2240 Standard Test Methods for Rubber Property - Durometer Hardness

2.3 ASME Publications

Available from American Society of Mechanical Engineers, 22 Law Drive, P.O. Box 2900, Fairfield, NJ 07007-2900, Tel: 973-882-1170, www.asme.org.

ASME B46.1 Surface Texture, Surface Roughness, Waviness and Lay

2.4 U.S. Government Publications

Copies of these documents are available online at https://quicksearch.dla.mil.

MIL-PRF-6083 Hydraulic Fluid, Petroleum Base

3. TECHNICAL REQUIREMENTS

3.1 Material

Shall be prepared from ingredients as shall be necessary to achieve the requirements detailed in this standard and shall be a compound, based on the polymer specified in 1.1, suitably cured to produce product meeting the requirements of 3.2. Reprocessed vulcanized material (regrind) is not acceptable.

3.2 Properties

The product shall conform to requirements shown in Table 1.

Table 1 - Properties

Paragraph	Property	Test Sample	Requirement	Test Method
3.2.1	Original physical properties			
3.2.1.1	Hardness, durometer, Type "A"	Button or plied platens	40 ± 5	ASTM D2240
3.2.1.2	Tensile strength, min	ASTM platen	900 psi (6.21 MPa)	ASTM D412, Die C
3.2.1.3	Elongation, min	ASTM platen	350%	ASTM D412, Die C
3.2.1.4	Tensile stress at 100% elongation	ASTM platen	Preproduction value ± 20%	ASTM D412, Die C (stretch specimen to 125% elongation twice within 5 minutes before testing)
3.2.1.5	Tear strength, min	ASTM platen	80% of preproduction value	ASTM D624, Die B
3.2.1.6	Specific gravity/relative density	ASTM platen	Preproduction value ± 0.03	ASTM D297, Hydrostatic Method
3.2.1.7	Compression set, percent of original deflection, max	-	-	ASTM D395, Method B Temperature: 212 °F ± 2 °F (100 °C ± 1 °C) Time: 70 hours ± 0.5 hour
3.2.1.7.1	For parts other than extrusion	ASTM platen, plied disks	75	
3.2.1.7.2	For extruded parts	Extruded strip, plied discs	83	
3.2.1.8	Low temperature resistance, brittleness	ASTM platens	No cracks, no breaks	ASTM D2137, Method C Temperature: -31 °F ± 2 °F (-35 °C ± 1 °C)
3.2.2	Dry heat resistance - ASTM D573			
3.2.2.1	Hardness change, durometer Type "A"	Button or plied platens	0 to +15	ASTM D573 Temperature: 212 °F ± 2 °F (100 °C ± 1 °C) Time: 70 hours ± 0.5 hour
3.2.2.2	Tensile strength change, max	ASTM platen	-25%	
3.2.2.3	Elongation change, max	-	-	
3.2.2.3.1	For parts other than extrusions	ASTM platen	-50%	
3.2.2.3.2	For extruded parts	Extruded strip	-60%	
3.2.2.4	Bend (flat)	ASTM platen	No cracking, no checking	
3.2.3	Fluid resistance - ASTM D471 in IRM903			
3.2.3.1	Tensile strength change, max	ASTM platen	-70%	ASTM D471 Temperature: 212 °F ± 2 °F (100 °C ± 1 °C) Time: 70 hours ± 0.5 hour Fluid: IRM903
3.2.3.2	Elongation change, max	ASTM platen	-50%	
3.2.3.3	Volume change	ASTM platen	+60 to +120%	
3.2.4	Corrosion and adhesion	AS568-214 O-rings	None	Paragraph 4.6.1

3.2.5 Weather Resistance

The product shall show no evidence of cracking when tested in accordance with ASTM D1149, Method B, Procedure B2 for 7 days at 105 °F ± 2 °F (40 °C ± 1 °C). The ozone pressure shall be 50 MPa ±5 MPa.

3.3 Quality

The product, as received by purchaser, shall conform to dimensional requirements, be uniform in quality and condition, as free from foreign material as commercially practical, and free from internal imperfections (such as voids, etc.) that are detrimental to usage of the product.

3.4 Tolerances

Shall conform to all applicable requirements of AMS2279 unless otherwise specified by the drawing, P.O., design data, or contract.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The manufacturer of the product shall be responsible to assure that all required testing and product inspection has been performed and that the test data is available. for performing all required tests. Unless specified otherwise by contractual requirements, testing may be performed at either the product vendor's own internal test facility, at the mixer, or at a suitable independent test facility. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to the requirements.

4.2 Classification of Tests

4.2.1 Preproduction Tests

Preproduction testing is defined as the necessary testing required to show that a compound complies with all of the technical requirements of this specification as listed in 3.2 and includes all such testing. This testing must be performed upon the initial development of the compound in order for any product to be certified to this specification. Once performed, a copy of this testing must be kept on file as objective evidence of compliance and must be made available upon request. Preproduction testing is valid for a period of 5 years and must be re-performed if any one of the following occurs:

- At the end of the current 5 year validity period, or
- When a change in ingredients and/or process requires reapproval (see 4.4), or
- If contractually required by the purchaser.

4.2.2 Acceptance Tests

The tests for the following requirements are acceptance tests and shall be performed on each lot. If test specimens cannot be prepared from the end item, the applicable ASTM method shall be applied using material from the same batch and same state of cure and tested within 90 days of the manufacture subject lot.

Table 2

Paragraph	Property	Test Sample	Requirements	Test Method
3.2.1	As received			
3.2.1.1	Hardness, durometer Type "A"	Button or plied platens	40 ± 5	ASTM D2240
3.2.1.2	Tensile strength, min	ASTM platen	900 psi (6.21 MPa)	ASTM D412, Die C
3.2.1.3	Elongation, min	ASTM platen	350%	ASTM D412, Die C
3.2.1.6	Specific gravity/relative density	ASTM platen	Preproduction value ± 0.03	ASTM D297, Hydrostatic Method
3.2.1.7	Compression set, percent of original deflection, max	-		ASTM D395, Method B Temperature: 212 °F ± 2 °F (100 °C ± 1 °C) Time: 70 hours ± 0.5 hour
3.2.1.7.1	For parts other than extrusions	ASTM platen, plied disks	-75%	
3.2.1.7.2	For extruded parts	Extruded strip, plied disks	-83%	
3.3	Quality	Part	3.3	Inspection

4.2.2.1 Lot Acceptance Testing

Should the purchaser require additional or reduced product lot acceptance testing other than what is stated in Table 2, then the details of such testing shall be agreed upon between the purchaser and the manufacturer and shall be defined in the purchase agreement and/or specified in the design data.

4.2.3 Retesting

If any original test fails to meet the specified requirements, the re-sampling and retesting requirement of the relevant ASTM test method shall be observed (see note). If the relevant ASTM test method makes no mention of a re-sampling or retesting requirement, then repeat the test using valid test specimens from the same lot under consideration for product acceptance. If a failure occurs using this one additional test set then the lot shall be rejected. The same lot and batch of product as was used for the original test shall be used for retesting. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the products represented. If failure is due to a testing error or flawed specimen, then the test is considered invalid and new specimens can be issued for testing.

NOTE: Example—As ASTM D412 for tensile tests: run three samples; if any fail, then two additional samples shall be tested with test results reporting the median of the five.

4.2.3.1 No batch may be retested more than two times.

4.3 Blending of Compound

If the practice is observed for blending batches, the compounder/manufacturer shall have a material approval process, which shall include these minimum requirements:

4.3.1 The original batch numbers and weights utilized in the blended batch shall be documented and easily accessible.

4.3.2 The original batches used shall be the same formulation and the same mix location.

4.3.3 The original batches used in creating a blended batch shall meet all of the acceptance testing criteria prior to blending and shelf life requirements the manufacturer shall run batch acceptance tests on stored compound if it has exceeded its initial shelf life per the applicable specification. If all the values are within the acceptance testing requirements per the applicable specification, then the material is still approved for use. This process shall not exceed a maximum of 1 year for all specifications and if beyond 1 year the manufacturer shall have a process to run a batch/acceptance test prior to extending the shelf life for an additional shelf life cycle per the applicable specification.

4.3.4 The new, blended batch shall be tested for batch and lot acceptance testing prior to shipment.

4.3.5 The new, blended batch shelf life shall be determined based upon the shelf life of the oldest original batch date of manufacture and shall follow the requirements of 4.2.5.1.3 used in the blend.

4.3.6 Blended material cannot be blended a second time.

4.4 Random Sampling

The method shall be as specified in the parts standard, drawing or purchase document. If not specified, product shall be taken at random from each lot to perform all the required acceptance tests. The number of test specimens for each requirement shall be specified in the applicable test procedure.

4.4.1 A lot shall be all product of the same size and dimensions, cured from the same batch of compound, processed in one continuous production run, and presented for inspection at one time.

4.4.2 A batch shall be the quantity of compound run through a mill or mixer at one time. If different batches of the same compound are blended, then the compounder/manufacturer shall have a material approval process, which shall include the minimum requirements listed in 4.3.

4.5 Approval

4.5.1 Manufacturer shall use ingredients, manufacturing procedures, processes, and methods of inspection on production products which are essentially the same as those used on the qualification sample. If any change in process control factors procedures is necessary, manufacturer shall submit for reapproval to the customer a statement of the proposed changes in ingredients and/or processing and, when requested, sample product. Production product made by the revised procedure shall not be shipped prior to receipt of reapproval.

4.5.2 Manufacturer shall establish, for each size of product, parameters for the process control factors which will produce products meeting the technical requirements of this specification. These shall constitute the approved procedures and shall be used for manufacturing production of products. If necessary to make any change in parameters for the process control factors, manufacturer shall submit for reapproval a statement of the proposed changes in ingredients and/or processing. When requested, sample products shall be submitted in accordance with the provisions of 4.1. Products manufactured using a revised procedure shall not be shipped prior to reapproval of qualification in writing.

4.5.2.1 Process control factors include, but are not limited to:

Compound ingredients and proportions thereof within established limits
Major change in sequence of mixing compound ingredients, as defined within the manufacturer's and compounder's agreed upon procedure
Type of mixing equipment
Method and equipment for preparing preforms
Basic molding procedure (compression, transfer, injection)
Curing time, temperature, and pressure (beyond mfr typical requirements)
Finishing methods
Methods of inspection

4.6 Test Methods

4.6.1 Corrosion and adhesion

Mold at least two each, size AS568-214 O-rings from this material, for each metallic plate listed below. This testing shall be performed using whole uncut rings. Condition the O-rings for corrosion testing by inserting sufficient quantities in a desiccator or similar humidity chamber maintained at 92% minimum relative humidity and 75 °F ± 5 °F for at least 72 hours.

Plates of the metals listed below shall be polished to a surface roughness of 4 to 16 RHR in accordance with ASME B46.1. The edges shall also be polished to reduce the formation of edge corrosion. The plates shall be washed with toluene or similar degreasing agent that will produce a clean dry surface free from film. The metals used shall be as follows:

AMS4027	Aluminum Alloy, Sheet and Plate, 1.0Mg - 0.60Si - 0.28 Cu - 0.20Cr (6061; -T6 Sheet, -T651 Plate), Solution and Precipitation Heat Treated
AMS5513	Steel, Corrosion-Resistant, Sheet, Strip, and Plate, 19Cr - 9.2Ni (SAE 30304), Solution Heat Treated.
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AMS-QQ A-250/4	Aluminum Alloy 2024, Plate and Sheet
AMS-QQ-A-250/12	Aluminum Alloy 7075, Plate and Sheet