

AEROSPACE MATERIAL SPECIFICATION

SAE AMS3222H

Issued 1945-07
Reaffirmed 1998-08
Revised 2008-06

Superseding AMS3222G

Synthetic Rubber
Hot Oil Resistant, High Swell
45 - 55

RATIONALE

AMS3222H is a Five Year Review and update of this specification.

1. SCOPE

1.1 Form

This specification covers a synthetic rubber in the form of sheet, strip, tubing, extrusions, and molded shapes.

1.2 Application

This product has been typically used for gasket-type seals in contact with hot, petroleum-based lubricating oils where a space-filling seal operating from -40 to +212 °F (-40 to +100 °C) is required, but usage is not limited to such applications.

1.3 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 724-776-4970 (outside USA), www.sae.org.

AMS2279 Tolerances, Rubber Products
AMS2810 Identification and Packaging, Elastomeric Products

SAE Technical Standards Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2008 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)

Tel: 724-776-4970 (outside USA)

Fax: 724-776-0790

Email: CustomerService@sae.org

<http://www.sae.org>

SAE WEB ADDRESS:

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 D 395	Rubber Property Compression Set
ASTM D 412	Rubber Properties in Tension
ASTM D 471	Rubber Property Effect of Liquids
ASTM D 573	Rubber Deterioration in an Air Oven
ASTM D 2137	Rubber Property Brittleness Point of Flexible Polymers and Coated Fabrics
ASTM D 2240	Rubber Property Durometer Hardness

3. TECHNICAL REQUIREMENTS

3.1 Material

Shall be a compound, based on a synthetic elastomer, suitably cured to produce a product meeting the requirements of 3.2.

3.1.1 Color

Shall be black.

3.2 Properties

The product shall conform to the following requirements as shown in Table 1; tests shall be performed on the product supplied and in accordance with specified ASTM methods, insofar as practicable:

TABLE 1 – PROPERTIES

Paragraph	Property	Requirement	Test Methods
3.2.1	As Received		
3.2.1.1	Hardness, Durometer "A" or equivalent	50 ± 5	ASTM D 2240
3.2.1.2	Tensile Strength, minimum	1.5 ksi (10.3 MPa)	ASTM D 412, Die B or C
3.2.1.3	Elongation, minimum	400%	ASTM D 412, Die B or C
3.2.2	Petroleum Lubricating Oil Resistance (Immediate Deteriorated Properties)		ASTM D 471 Medium: ASTM Oil No. 1 Temperature: 302 °F ± 5 (150 °C ± 3) Time: 24 hours ± 0.2
3.2.2.1	Hardness Change, Durometer "A" or equivalent	-5 to +5	
3.2.2.2	Tensile Strength Change, maximum	-50%	
3.2.2.3	Elongation Change, maximum	-50%	
3.2.2.4	Volume Change	+15 to +30%	
3.2.2.5	Decomposition	None	
3.2.2.6	Surface Tackiness	None	
3.2.3	Petroleum Lubricating Oil Resistance (Immediate Deteriorated Properties)		ASTM D 471 Medium: ASTM Oil No. 1 Temperature: 302 °F ± 5 (150 °C ± 3) Time: 70 hours ± 0.5
3.2.3.1	Hardness Change, Durometer "A" or equivalent	-10 to +10	
3.2.3.2	Volume Change	+15 to +40%	
3.2.3.3	Decomposition	None	
3.2.3.4	Surface Tackiness	None	

TABLE 1 – PROPERTIES (CON'T.)

Paragraph	Property	Requirement	Test Methods
3.2.3.5	Bend (flat)	No cracking or checking	
3.2.4	Dry Heat Resistance		ASTM D 573 Temperature: 212 °F ± 2 (100 °C ± 1)
3.2.4.1	Hardness Change, Durometer “A” or equivalent	0 to +10	Time: 70 hours ± 0.5
3.2.4.2	Tensile Strength Change, maximum	-40%	
3.2.4.3	Elongation Change, maximum	-50%	
3.2.5	Compression set		ASTM D 395, Method B Temperature: 212 °F ± 2 (100 °C ± 1)
3.2.5.1	Percent of Original Deflection, maximum	85	Time: 70 hours ± 0.5
3.2.6	Low-Temperature Resistance		ASTM D 2137, Method A Temperature: -40 °F ± 2 (-40 °C ± 1)
3.2.6.1	Brittleness	Pass	Time: 5 hours ± 0.2

3.3 Quality

The product, as received by purchaser, shall be uniform in quality and condition, as free from foreign materials as commercially practicable, and free from imperfections detrimental to usage of the product.

3.4 Dimensions and Tolerances

Dimensions and tolerances shall be as specified in the parts standard, drawing or purchase document. If not specified, shall conform to all applicable requirements of AMS2279.

3.5 Toxicological Formulations

The material shall have no adverse effects on the health of personnel when used for its intended purpose in accordance with manufacturer's instructions and with appropriate handling procedures.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The vendor of the product shall supply all samples for vendor's tests and shall be responsible for the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Tests for the following requirements shown in Table 2 are acceptance tests and shall be performed on each lot:

TABLE 2

Requirement	Paragraph Reference
Hardness, as received	3.2.1.1
Tensile Strength, as received	3.2.1.2
Elongation, as received	3.2.1.3
Volume Change in Oil	3.2.2.4 and 3.2.3.2

4.2.1.1 Lot

A quantity of one size of product processed and packaged as one production entity from a batch.

4.2.1.2 Batch

The quantity of compound run through a mill or mixer at one time.

4.2.1.3 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 iterations for each requirement shall be specified in the applicable test procedure.

4.2.1.4 Sample shall be from a production batch/lot.

4.2.2 Preproduction Tests

All technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of a product to a purchaser, when a change in ingredients and/or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.3 Sampling and Testing

Shall be as follows:

4.3.1 For Acceptance Tests

Sufficient product shall be taken at random from each lot to perform all required tests. The number of determinations for each requirement shall be as specified in the applicable test procedure or, if not specified therein, not less than three.

4.3.1.1 If specimens cannot be prepared from the product, ASTM test specimens prepared from the same batch and state of cure shall be used. When the product supplied is an extrusion of such shape that suitable test specimens cannot be cut from the product, a separate flat strip test sample from the same production lot shall be supplied upon request. This strip shall be prepared from tubing 1.000 inch $\pm$ 0.063 (25.40 mm $\pm$ 1.60) in OD by 0.075 inch $\pm$ 0.008 (1.90 mm $\pm$ 0.20) in wall thickness, mechanically slit and flattened into a strip while being extruded, and cured in the same manner as production product. When the product is a molded shape from which test specimens cannot be cut, a slab, 6 inches (152 mm) square by 0.075 inch $\pm$ 0.008 (1.90 mm $\pm$ 0.20) thick, molded from the same batch of compound shall be supplied upon request.

4.3.1.2 When a statistical sampling plan has been agreed upon by purchaser and vendor, sampling shall be in accordance with such plan in lieu of sampling as in 4.3 and the report of 4.5 shall state that such plan was used.

4.3.2 For Preproduction Tests

As agreed upon by purchaser and vendor.

4.4 Approval

4.4.1 Sample product shall be approved by purchaser before product for production use is supplied, unless such approval is waived by the purchaser. Results of tests on production product shall be essentially equivalent to those on the approved sample.