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FEDERAL SPECIFICATION

RUBBER FOR MOUNTINGS (UNBONDED-SPOOL AND COMPRESSION TYPES)

The General Services Administration has authorized the use of this federal specification by all federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers uncured rubber compound or finished (cured) resilient components to be used in unbonded-spool and compression typed mountings, as specified.

2. APPLICABLE DOCUMENTS

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

FEDERAL STANDARDS

FED-STD-123	-	Marking for Shipment (Civil Agencies)
FED-STD-601	-	Rubber: Sampling and Testing

MILITARY STANDARDS

MIL-STD-129	-	Military Marking for Shipment and Storage
MIL-STD-407	-	Visual Inspection Guide for Rubber Molded Items

(Copies of these documents are available online at http://assist.daps.dla.mil/quicksearch/ or http://assist.daps.dla.mil or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2 Other publications. The following documents form 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.

ASTM INTERNATIONAL

ASTM D395	-	Standard Test Methods for Rubber Property – Compression Set (DoD adopted)
ASTM D412	-	Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension (DoD adopted)
ASTM D573	-	Standard Test Method for Rubber – Deterioration in an Air Oven (DoD adopted)

Beneficial comments, recommendations, additions, deletions, clarifications, etc. and any data that may improve this document should be sent to: Commander, Naval Sea Systems Command, ATTN: SEA 05M2, 1333 Isaac Hull Avenue, SE, Stop 5160, Washington Navy Yard DC 20376-5160 or emailed to CommandStandards@navy.mil, with the subject line "Document Comment". Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at http://assist.daps.dla.mil.

ASTM D624	-	Standard Test Method for – Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers (DoD adopted)
ASTM D792	-	Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement (DoD adopted)
ASTM D945	-	Standard Test Methods for Rubber Properties in Compression or Shear (Mechanical Oscillograph) (DoD adopted)
ASTM D1229	-	Standard Test Method for Rubber Property – Compression Set at Low Temperature (DoD adopted)
ASTM D2240	-	Standard Test Methods for Rubber Property – Durometer Hardness (DoD adopted)

(Copies of these documents are available from ASTM International, 100 Barr Harbor Dr., P.O. Box C700, West Conshohocken, PA 19428-2959 or online at www.astm.org.)

3. REQUIREMENTS

3.1 First article. When specified (see 3.1.1 and 6.2), a sample shall be subjected to first article inspection in accordance with 4.3.

3.1.1 First article inspection. First article inspection shall be performed when one or more of the following apply:

a. Upon initial offering of a material to the government by the vendor.

b. When any change in material formulation is made from previous first article test samples.

c. When any change in manufacturing processes or conditions are made from previous first article test samples.

d. When the product being offered is manufactured at a plant different than that of previous first article test samples.

e. When required by the Naval Sea Systems Command.

3.2 Material. The material shall be a synthetic rubber compound using a copolymer product of butadiene and acrylonitrile which meets the requirements of 3.4 when cured.

3.2.1 Uncured compound. Uncured compound shall be furnished in sheet form ranging in size from 2 feet to 3 feet wide, by 3 feet to 6 feet in length, and ¼ inch to 1 inch thick.

3.2.2 Recovered materials. The offeror/contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with paragraph 23.403 of the Federal Acquisition Regulation (FAR).

3.3 Type, dimensions, and tolerances of resilient components. The type, dimensions, and tolerances of resilient components shall be as specified in the contract or purchase order (see 6.2).

3.4 Physical requirements. The cured rubber shall conform to the requirements specified in table I.

TABLE I. Physical requirements and tests.

Properties	First Article Testing Required	Conformance Testing Required	Requirement	Test Method Paragraph
Initial properties				
Tensile strength, psi, minimum	X	X	1,800	4.5.1
Ultimate elongation, percent, minimum	X	X	300	4.5.1
Tensile stress (modulus) psi at 100% elongation	X	X	As determined	4.5.1
Hardness, Type A durometer	X	X	55±5	4.5.2
Specific gravity	X	X	1.25±0.10	4.5.3
Tear resistance, pounds per inch, minimum	X		130	4.5.4
Properties after oven aging for 96±½ hour at 194±2 °F (90±1.1 °C)				
Tensile strength, percent of initial, minimum	X		80	4.5.5
Ultimate elongation, percent of initial, minimum	X		75	4.5.5
Tensile stress (modulus) psi at 100% elongation	X		As determined	4.5.5
Hot compression set, percent, maximum	X		45	4.5.6
After immersion in medium No. 3 oil for 96±½ hour at 122±2 °F (50±1.1 °C)				
Volume change, percent	X		±10	4.5.7
Properties at 73.4±2 °F (23±1.1 °C)				
Deformation, percent	X		19±2	4.5.8
Resilience, percent, maximum	X		70	4.5.8
Frequency, Hz	X		4.1±0.3	4.5.8
Absorbed energy, inch-pounds per cubic inch	X		29±3	4.5.8
Properties at 32±2 °F (0±1.1 °C)				
Deformation, percent of value at 73.4±2 °F (23±1.1 °C), minimum	X		75	4.5.8
Resilience, percent, maximum	X		70	4.5.8
Frequency, Hz, minimum	X		3.6	4.5.8
Absorbed energy, percent of value at 73.4±2 °F (23±1.1 °C), minimum	X		45	4.5.8
Cold compression set, percent, maximum	X		15	4.5.9

3.5 Marking.

3.5.1 Civil agencies. In addition to any special marking specified in the contract or order (see 5.1 and 6.2), shipping containers shall be marked in accordance with FED-STD-123. The information shall include nomenclature, Federal stock number, or manufacturer's part number, contract or order number, cure date, contractor's name and destination.

3.5.2 Military agencies. In addition to any special marking required by the contract or order (see 5.1 and 6.2), interior packages and exterior containers shall be marked in accordance with MIL-STD-129 and shall also include nomenclature, Federal stock number or manufacturer's part number, contract or order number, cure date, contractor's name and destination.

3.6 Workmanship. The workmanship shall meet all the applicable requirements of this specification.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the contractor 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 that supplies and services conform to prescribed requirements.

4.2 Classification of examinations and tests. The inspection requirements specified herein are classified as follows:

a. First article inspection (see 4.3).

b. Quality conformance inspection (see 4.4).

4.3 First article inspection. First article inspection shall be performed when a first article sample is required (see 3.1.1 and 6.2). This inspection shall include the examination of 4.4.2.1 (for resilient components only) and the tests specified in table I.

4.3.1 First article samples and tests. Material submitted for first article examinations and tests shall be certified to have the same composition, construction, and manufacturing process as the material to be supplied on subsequent lots. A representative sample of 10 resilient components shall be submitted for first article examination. Samples in accordance with 4.4.1.4 shall be submitted for first article tests. If any of the first article examinations or tests do not conform to the applicable requirements, this shall be cause for denial to proceed with production of the uncured compound and finished resilient components. When specified (see 6.2), the supplier shall prepare a first article test report. Production of the uncured rubber compound or finished resilient (cured) components by the supplier prior to approval of the procuring activity or the completion of first article examinations and tests shall be at the supplier's risk.

4.4 Quality conformance inspection. Conformance inspection shall include the examination of 4.4.2.1 (for resilient components only) and the conformance tests in table I.

4.4.1 Sampling.

4.4.1.1 Lot of uncured compound. For the purposes of sampling for examination and tests, a lot of uncured compound shall consist of not more than 200 pounds of the material produced in one plant under the same conditions, and offered for delivery at one time.

4.4.1.2 Lot of resilient components. For the purpose of sampling for examination, a lot of resilient components shall consist of those components of the same form, type, and dimensions produced in one plant under the same conditions, and offered for delivery at one time.

4.4.1.3 Sampling for visual and dimensional examination. For the examination specified in 4.4.2.1, representative samples shall be taken at random from each lot of resilient components in accordance with table II.

TABLE II. Sampling for examination.

Number of Components in Lot	Number of Components in Sample	Major Defects
		Acceptance Number
40 and under	10	0
41 to 110	15	0
111 to 300	25	1
301 to 500	35	1
501 to 800	50	2
801 to 1300	75	3
1,301 and over	110	4

4.4.1.3.1 Major defect defined. A major defect is a defect that is likely to result in failure or to reduce materially the usability of the resilient components for its intended purpose.

4.4.1.4 Sampling for tests. For the tests specified in 4.5, the contractor shall furnish three cured sample pieces 6 inches long by 6 inches wide by 0.080±0.010 inch thick and one cured sample piece at least 6 inches long by 6 inches wide by 0.500±0.010 inch thick, to represent each lot of either uncured compound or resilient components. The sample pieces shall be certified by the supplier to be identical in composition and prepared at the same time from material used in the lot offered for delivery.

4.4.2 Quality conformance examination and tests.

4.4.2.1 Examination. Each of the samples taken in accordance with 4.4.1.3 shall be subjected to examination for workmanship, dimensions, and tolerances. MIL-STD-407 shall be used to determine and evaluate defects.

4.4.2.1.1 Rejection. Any component in the sample containing one or more defects shall not be offered for delivery. If the number of defective components in any sample exceeds the acceptance number for that sample, this shall be cause for rejection of the lot represented by the sample.

4.4.2.2 Tests. The samples submitted in accordance with 4.4.1.4 shall be subjected to the conformance tests specified in table I.

4.4.2.2.1 Action in case of nonconformance. If any of the samples representing a lot is found to be not in conformance with the requirements of this specification, this shall be cause for rejection of the lot it represents.

4.5 Test methods.

4.5.1 Tensile properties. Tensile strength, ultimate elongation, and tensile stress (modulus) at 100 percent elongation shall be determined in accordance with ASTM D412, Test Method A. Die C specimens shall be used for all determinations of tensile properties.

4.5.2 Hardness. Hardness shall be determined by ASTM D2240, Type A durometer. The three-second reading shall be taken on a 0.500±0.010 inch thick specimen.

4.5.3 Specific gravity. Specific gravity shall be determined in accordance with ASTM D792.

4.5.4 Tear resistance. Tear resistance shall be determined by ASTM D624 using Die C specimens that are 0.800±0.010 inch thick.

4.5.5 Tensile properties after oven aging. Tensile strength, ultimate elongation, and tensile stress (modulus) at 100 percent elongation after oven aging shall be determined in accordance with ASTM D573. The aging period shall be 96±½ hour at 194±2 °F (90±1.1 °C). Determination shall be made not less than 20 hours or more than 48 hours after removal from the oven.

4.5.6 Hot compression set. Hot compression set shall be determined by ASTM D395, Test Method B, with specimens clamped to 40 percent deflection and aged for 96±½ hour at 194±2 °F (90±1.1 °C).

4.5.7 Volume change after immersion in oil. The volume change shall be determined by Method 6211 of FED-STD-601 after immersion in medium No. 3 oil of Method 6001 of FED-STD-601 for 96±½ hour at 122±2 °F (50±1.1 °C).

4.5.8 Deformation, resilience, frequency, and absorbed energy. Deformation, resilience, frequency, and absorbed energy shall be determined using a Yerzley oscillograph following the procedure for measurements in compression detailed in ASTM D945. The mechanical properties shall be determined at both 73.4±2.0 °F (23.0±1.1 °C) and 32.0±2.0 °F (0.0±1.1 °C), after conditioning the specimens for 2 days at room temperature plus 4.0±0.1 hour at each test temperature

4.5.8.1 Deformation. Deformation is the percent deflection of the specimen caused by five standard weights, calculated as one inch equals 20 percent.

4.5.8.2 Resilience. The resilience shall be calculated by dividing the vertical distance of the upstroke of the first cycle (rebound) by the vertical distance of the down-stroke of the first cycle from the starting point and multiplying by 100.

4.5.8.3 Frequency. The frequency shall be determined by counting a convenient number of cycles, then measuring in inches the horizontal distance along the center axis of the set of oscillations covered by this number of cycles, and by dividing the number of cycles by the measured distance.

4.5.8.4 Absorbed energy. The absorbed energy shall be calculated by multiplying the vertical distance in inches of the down-stroke of the first cycle by the constant 20. (The constant 20 equals the energy of 5 weights corresponding to one inch vertical distance on the chart per cubic inch of material.)

4.5.9 Cold compression set. Cold compression set shall be determined by ASTM D1229, with specimens clamped to 40 percent deflection and conditioned for 96±½ hour at 32±2 °F (0±1.1 °C), and allowed to recover for 30 minutes at the conditioning temperature before measuring the final thickness.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

INFORMATION FOR GUIDANCE ONLY. (This section contains information of a general or explanatory nature that is helpful, but is not mandatory.)

6.1 Intended use. This specification describes a synthetic rubber material used as resilient elements of unbonded-spool type and compression type mountings that are used to mount equipment and gages for shock protection and vibration isolation.

6.2 Acquisition requirements. 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. Form of material required (see 1.1 and 3.2.1).
c. When first article is required (see 3.1 and 3.1.1).
d. Type, dimensions, and tolerances required for resilient components (see 3.3).

e. Marking required (see 3.5.1 and 3.5.2).

f. First article test report (see 4.3.1).

g. Packaging requirements (see 5.1).

6.3 Subject term (key word) listing:

Elastomers

Synthetic

6.4 Changes from previous issue. Asterisks (or vertical lines) are not used in this revision to identify changes with respect to the previous issue due to the extensive changes.

MILITARY INTERESTS

Custodians:
Army – MR
Navy – SH

Review Activities:
Army – AR, CR, MI,
Navy – MC
DLA – GS, IS

Preparing Activity:
Navy – SH
(Project 9320-2008-002)

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at http://assist.daps.dla.mil