NOT MEASUREMENT SENSITIVE

ZZ-R-765E/GEN
20 December 1991
SUPERSEDING
ZZ-R-765D/GEN
10 May 1989

FEDERAL SPECIFICATION

# RUBBER, SILICONE

(GENERAL SPECIFICATION)

This specification is approved by the Assistant Administrator, Office of Federal Supply and Services, General Services Administration, for the use of all Federal agencies.

## 1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers three classes of silicone rubber in various grades.

1.2 Classification. The silicone rubber shall be of the following classes and grades as specified (see 6.2). The designated grade number corresponds to the nominal Shore-A-durometer hardness value.

Class 1A - Low temperature resistant.
Grade - 40, 50, 60, 70 and 80

Class 1B - Low temperature resistant and low compression set at high temperature
Grade - 40, 50, 60, 70 and 80

Class 2A - High temperature resistant
Grade - 25, 40, 50, 60, 70 and 80

Class 2B - High temperature resistant and low compression set
Grade - 25, 40, 50, 60, 70 and 80

Class 3A - low temperature, tear and flex resistant
Grade - 30, 50 and 60

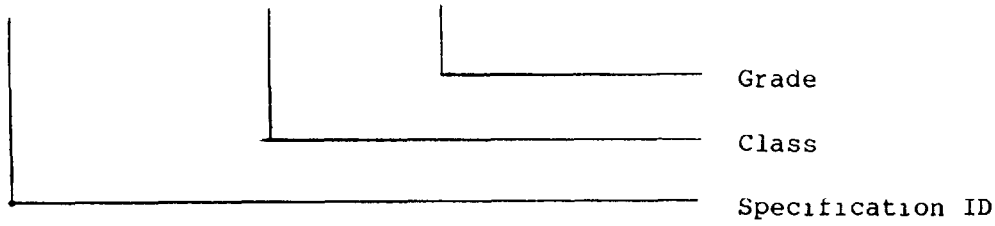
Class 3B - Tear and flex resistant
Grade - 30, 50, 60, 70 and 80

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Director, U.S. Army Laboratory Command, Materials Technology Laboratory, ATTN: SLCMT-MEE, Watertown, MA 02172-0001 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 9320

1.2.1 Military Part Number System. The silicone rubbers shall be designated as follows (see 6.7):

Example ZZR765 A 2




2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

A-A-1492 - Tape, Gummed, Paper, Plain
UU-P-268 - Paper, Kraft, Wrapping
PPP-B-566 - Boxes, Folding, Paperboard
PPP-B-576 - Boxes, Wood Cleated, Veneer, Paper Overlaid
PPP-B-591 - Boxes, Shipping, Fiberboard, Wood-Cleated
PPP-B-601 - Boxes, Wood, Cleated-Plywood
PPP-B-621 - Boxes, Wood, Nailed and Lock-Corner
PPP-B-636 - Box, Shipping, Fiberboard
PPP-B-665 - Boxes, Paperboard, Metal Edged and Components
PPP-B-676 - Boxes, Setup

MILITARY

MIL-L-10547 - Liners, Case, and Sheet, Overwrap; Water-Vaporproof or Waterproof, Flexible
MIL-L-35078 - Loads, Unit, Preparation of Semiperishable Subsistence Items, Clothing Personal Equipment and Equipage, General Specification For
MIL-B-43666 - Box, Shipping Consolidation

STANDARDS

FEDERAL

FED-STD-123 - Marking for Shipment (Civil Agencies)

MILITARY

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-298 - Visual Inspection Guide for Rubber Extruded Goods
MIL-STD-407 - Visual Inspection Guide for Rubber Molded Items
MIL-STD-413 - Visual Inspection Guide for Elastomeric O-Rings
MIL-STD-1190 - Minimum Guidelines for Level C Preservation, Packing & Marking

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

(Activities outside the Federal Government may obtain copies of Federal specification, standards, and commercial item descriptions as outlined under General Information in the Index of Federal Specifications, Standards and Commercial Descriptions. The index, which includes cumulative bimonthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification, and other Federal Specifications and commercial item descriptions required by activities outside the Federal Government for bidding purposes are available without charge from General Services Administration Business Service Centers in Boston, MA; New York, NY; Philadelphia, PA; Washington, DC; Atlanta, GA; Chicago, IL; Kansas City, MO; Fort Worth, TX; Houston, TX; Denver, CO; San Francisco, CA: Los Angeles, CA; and Seattle, WA.

(Federal Government activities may obtain copies of Federal standardization documents and the Index of Federal Specifications, Standards and Commercial Item Descriptions from established distribution points in their agencies.)

2.2 Non-Government publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D297 - Rubber Product - Chemical Analysis
ASTM D395 - Rubber Property - Compression Set
ASTM D412 - Rubber Properties in Tension
ASTM D471 - Rubber Property-Effect of Liquids
ASTM D573 - Rubber-Deterioration in an Air Oven
ASTM D624 - Rubber Property - Tear Resistance
ASTM D797 - Rubber Property - Young's Modulus at Normal and Subnormal Temperatures

ASTM D813 - Rubber Deterioration - Crack Growth
ASTM D1053 - Rubber Property - Stiffening at Low Temperatures: Flexible Polymers and Coated Fabrics
ASTM D1414 - Rubber, Testing O-Rings
ASTM D2137 - Rubber Property - brittleness Point of Flexible Polymers and Coated Fabrics
ASTM D2240 - Rubber Property - Durometer Hardness
ASTM D2632 - Rubber Property - resilience by Vertical Rebound
ASTM D3951 - Packaging, Commercial

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103-1137)

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

AS 568 - O-Rings, Aerospace Size, Standard for

(Application for copies should be addressed to SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

3. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection (see 6.3) in accordance with 4.2.1.

3.2 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheets. In the event of any conflict between the requirements of this document and the specification sheet, the latter shall govern.

3.3 Material. The material shall be silicone rubber formulated and processed to meet the requirements of this specification (see 4.1.1). When applicable, formulation approval shall be obtained from the appropriate medical activity (see 6.5).

3.4 Physical and mechanical properties. Unless otherwise specified in the applicable specification sheet, the silicone rubber shall meet the physical and mechanical properties specified in Table I for the applicable Class and Grade. The tests shall be conducted in accordance with 4.2.2.1.3.

3.5 Form. The silicone rubber shall be in the form of sheets, strips, or tape, extruded shapes or tubing, or molded shapes (see 6.2), or the specified tolerance (see 4.2.2.1.2.2) or specification sheets (see 6.8) as applicable.

3.6 Dimensions and Tolerances. Dimensions and tolerances shall be in accordance with the applicable part drawing or as indicated in the contract or purchase order (see 6.2). If no tolerances are specified, A-3 commercial tolerances of the Rubber Manufacturer's Association (RMA) Rubber Handbook as shown in table II, shall apply for molded solid rubber products and the commercial tolerances of the RMA Rubber Sheet Packing Handbook, as shown in table III, shall apply for sheet packing. Commercial tolerances as shown in table IV, V, and VI shall apply for extruded shapes, extruded tubing and calendered sheet, respectively. Dimensions and tolerances for O-Rings shall be as specified in AS 568, or in accordance with the applicable part drawing for non-standard sizes (see 6.2).

3.7 Extruded tubing.

3.7.1 Length of tubing. Unless otherwise specified in the contract or purchase order (see 6.2), the silicone rubber tubing shall be furnished in coils containing 100, 200, 500 or 1,000 feet per coil. Each coil shall contain not more than three individual lengths of tubing per 100 feet, and no individual length of tubing shall be less than 15 feet.

TABLE I. Physical and mechanical properties of silicone rubber.

| Physical property | Classes 1A and 1B | | | | |
|---|---|---|---|---|---|
| | Grade 40 | Grade 50 | Grade 60 | Grade 70 | Grade 80 |
| Unaged: | | | | | |
| Hardness, ± 5, Shore-A-durometer | 40 | 50 | 60 | 70 | 80 |
| Tensile strength, minimum MPa (psi) | 4.83 (700) | 4.83 (700) | 4.48 (650) | 4.14 (600) | 3.45 (500) |
| Elongation, minimum percent | 250 | 225 | 175 | 150 | 125 |
| Compression set, maximum percent 1/ | 35 | 35 | 35 | 40 | 45 |
| After oven aging: 2/ | | | | | |
| Hardness change, durometer, maximum | ±15 | ±15 | ±15 | ±15 | ±15 |
| Tensile strength change, maximum percent | -30 | -30 | -30 | -30 | -30 |
| Elongation change, maximum percent | -50 | -50 | -50 | -50 | -50 |
| Low temperature requirements: | | | | | |
| Young's modulus in flexure, 24 hours at -75°C (-103°F), maximum MPa (psi) 3/ | 34.5 (5,000) | 34.5 (5,000) | 69.0 (10,000) | 69.0 (10,000) | 69.0 (10,000) |
| Brittle point, minimum °C (°F) 4/ | -75(-103) | -75(-103) | -75(-103) | -75(-103) | -75(-103) |
| Torsional stiffness ratio, 72 hours at -75°C (-103°F), maximum ratio | 15 | 15 | 15 | 15 | 15 |
| Specific Gravity | Pre-production value ± 0.03 | | | | |

TABLE I. Physical and mechanical properties of silicone rubber. (Continued)

| Physical property | Classes 2A and 2B | | | | | |
|---|---|---|---|---|---|---|
| | Grade 25 | Grade 40 | Grade 50 | Grade 60 | Grade 70 | Grade 80 |
| Unaged: | | | | | | |
| Hardness, maximum Shore-A-durometer | 25 + 5,-10 | 40 ± 5 | 50 ± 5 | 60 ± 5 | 70 ± 5 | 80 ± 5 |
| Tensile strength, minimum MPa (psi) | 4.83 (700) | 4.83 (700) | 4.83 (700) | 4.48 (650) | 4.48 (650) | 4.48 (650) |
| Elongation, minimum percent | 400 | 240 | 200 | 2A 2B<br>150 100 | 2A 2B<br>125 80 | 2A 2B<br>100 60 |
| Compression set, maximum percent 1/ | 2A 2B<br>35 25 | 2A 2B<br>35 25 | 2A 2B<br>35 25 | 2A 2B<br>40 25 | 2A 2B<br>40 25 | 2A 2B<br>45 30 |
| After oven aging: 2/ | | | | | | |
| Hardness change, maximum Shore-A -durometer | ±10 | ±10 | ±10 | ±10 | ±10 | ±10 |
| Tensile strength change, maximum percent | -20 | -20 | -20 | -20 | -25 | -25 |
| Elongation change, maximum percent | -40 | -40 | -40 | -40 | -40 | -40 |
| Low temperature requirements: | | | | | | |
| Brittle point, minimum °C (°F) 4/ | -62.2(-80) | -62.2(-80) | -62.2(-80) | -62.2(-80) | -62.2(-80) | -62.2(-80) |
| After water immersion: 5/ | | | | | | |
| Volume change, maximum percent | +10 | +10 | +5 | +5 | +5 | +5 |
| Specific Gravity | Pre-production value ± 0.03 | | | | | |

TABLE I. Physical and mechanical properties of silicone rubber. (Continued)

| Physical property | Class 3A | | |
|---|---|---|---|
| | Grade 30 | Grade 50 | Grade 60 |
| Unaged: | | | |
| Hardness, maximum Shore-A-durometer | 30 + 5,- 10 | 50 ± 5 | 60 ± 5 |
| Tensile strength, minimum MPa (psi) | 5.86(850) | 8.28(1,200) | 7.59(1,100) |
| Elongation, minimum percent | 500 | 500 | 400 |
| Tear resistance, minimum KNm (ppi) | 14.00(80) | 30.63(175) | 26.25(150) |
| Compression set, maximum percent 1/ | 40 | 40 | 40 |
| After oven aging: 2/ | | | |
| Hardness change, maximum Shore-A-durometer | +10 | +10 | +10 |
| Tensile strength change, maximum percent | -25 | -40 | -35 |
| Elongation change, maximum percent | -25 | -50 | -35 |
| Low temperature requirements: | | | |
| Young's modulus in flexure, 24 hours at -75°C (-103°F), maximum MPa (psi) 3/ | 13.8(2,000) | 34.5(5,000) | 34.5(5,000) |
| Brittle point, minimum °C (°F) 4/ | -90(-130) | -90(-130) | -90(-130) |
| Torsional stiffness ratio, 72 hours at -75°C (-103F), maximum ratio | 15 | 15 | 15 |
| After water immersion: 5/ | | | |
| Volume change, maximum percent | +5 | +5 | +5 |
| Other requirements: | | | |
| Flex resistance, (crack growth), cycles 6/ | 40,000 | 10,000 | 10,000 |
| Specific Gravity | Pre-production value ± 0.03 | | |

TABLE I. Physical and mechanical properties of silicone rubber. (Continued)

| Physical property | Class 3B | | | | |
|---|---|---|---|---|---|
| | Grade 30 | Grade 50 | Grade 60 | Grade 70 | Grade 80 |
| Unaged: | | | | | |
| Hardness, maximum Shore-A-durometer | 30 ± 5 | 50 ± 5 | 60 ± 5 | 70 ± 5 | 80 ± 5 |
| Tensile strength, minimum MPA (psi) | 6.90 (1,000) | 8.28 (1,200) | 8.28 (1,200) | 7.59 (1,100) | 5.52 (800) |
| Elongation, minimum percent | 500 | 500 | 400 | 350 | 200 |
| Tear resistance, minimum KNm (ppi) | 26.25 (150) | 26.25 (150) | 26.25 (150) | 26.25 (150) | 12.25 (70) |
| Compression set, maximum percent 1/ | 25 | 20 | 25 | 25 | 40 |
| After oven aging: 2/ | | | | | |
| Hardness change, maximum Shore-A-durometer | ±5 | ±10 | ±10 | ±10 | ±10 |
| Tensile strength change, maximum percent | -20 | -25 | -30 | -30 | -25 |
| Elongation change, maximum percent | -35 | -30 | -35 | -45 | -40 |
| Low temperature requirement: | | | | | |
| Brittle point, minimum °C (°F) 4/ | -70(-94) | -70(-94) | -70(-94) | -70(-94) | -70(-94) |
| After water immersion: 5/ | | | | | |
| Volume change, maximum percent | +5 | +5 | +5 | +5 | +5 |
| Other requirements: | | | | | |
| Impact resilience, minimum percent | 40 | 45 | 35 | 35 | 35 |
| Flex resistance (crack growth), cycles 6/ | 500,000 | 140,000 | 50,000 | 2,500 | -- |
| Specific Gravity | Pre-production value ± 0.03 | | | | |

1/ The aging period shall be as follows: class 1A, 22 hours at 100°C (212°F); class 1B, 2A and 2B, 70 hours at 150°C (302°F); class 3A and 3B, 70 hours at 100°C (212°F).

2/ For classes 1A, 1B, 2A and 2B, 70 hours at 225°C (437°F); for class 3A and 3B, 70 hours at 200°C (392°F).

3/ Both specimens shall meet this value. For class 3A, the requirement shall be used as a referee only, if a dispute arises over the brittle point results. The requirement does not apply to class 3B.

4/ All test specimens shall not fail after single-impact blow, at the temperature specified.

5/ 70 hours at 100°C (212°F).

6/ No specimen shall show a crack in excess of 1/2 inch in length when flexed the specified number of cycles.

TABLE II. RMA A3 dimensional tolerances for molded solid rubber products.[1/]

| Size (Millimeters) | | Fixed dimension tolerance [2/] (millimeters) | Closure dimension tolerance [3/] (millimeters) | Size (Inches-approx.) | | Fixed dimension tolerance [2/] (inches) | Closure dimension tolerance [3/] (inches) |
|---|---|---|---|---|---|---|---|
| Above | Incl. | | | Above | Incl. | | |
| 0 - | 9.99 | ± 0.20 | ± 0.32 | 0 | 0.399 | ± 0.008 | ± 0.013 |
| 10 - | 15.99 | 0.25 | 0.40 | 0.40 | 0.629 | 0.010 | 0.016 |
| 16 - | 24.99 | 0.32 | 0.50 | 0.63 | 0.999 | 0.013 | 0.020 |
| 25 - | 39.99 | 0.40 | 0.63 | 1.00 | 1.599 | 0.016 | 0.025 |
| 40 - | 62.99 | 0.50 | 0.80 | 1.60 | 2.499 | 0.020 | 0.032 |
| 63 - | 99.99 | 0.63 | 1.00 | 2.50 | 3.999 | 0.025 | 0.040 |
| 100 - | 159.99 | 0.80 | 1.25 | 4.00 | 6.299 | 0.032 | 0.050 |
| 160 & over - To find fixed dimensional tolerances multiply by 0.5%. | | | | 6.30 & over - To find fixed dimensional tolerances multiply by 0.5%. | | | |

1/ This table should be used only with common shaped, all rubber parts.

2/ Fixed dimension tolerances apply individually to each fixed dimension by its own size.

3/ Closure dimension tolerances are determined by the largest closure dimension and this single tolerance is used for all other closure dimensions. (Closure dimension refers to any dimension in a place parallel to the plane traced when the mold closes).

TABLE III. RMA commercial tolerances for rubber sheet packing.

| Thickness | | Tolerances | |
|---|---|---|---|
| Millimeters | Inches (approx.) | Millimeters | Inches |
| Under 0.80 | Under 0.031 | ± 0.25 | ± 0.010 |
| 0.80 to 1.59 | 0.031 to 0.059 | 0.30 | 0.012 |
| 1.60 to 3.19 | 0.060 to 0.124 | 0.40 | 0.016 |
| 3.20 to 4.79 | 0.125 to 0.186 | 0.50 | 0.020 |
| 4.80 to 9.49 | 0.187 to 0.374 | 0.80 | 0.031 |
| 9.50 to 14.29 | 0.375 to 0.561 | 1.20 | 0.047 |
| 14.30 to 19.19 | 0.562 to 0.749 | 1.60 | 0.063 |
| 19.20 to 25.39 | 0.750 to 0.999 | 2.40 | 0.093 |
| 25.40 and over | 1.00 and over | 10% | 10% |

TABLE IV. Commercial tolerances for special extruded shapes, except tubing.

| Dimensions | | Tolerance | |
|---|---|---|---|
| Millimeters | Inches (approx.) | Millimeters | Inches |
| 0 - 2.49 | 0 - 3/32 | ± 0.41 | ± 0.016 |
| 2.50 - 3.99 | 3/32 - 5/32 | 0.51 | 0.020 |
| 4.00 - 6.29 | 5/32 - 1/4 | 0.64 | 0.025 |
| 6.30 - 9.99 | 1/4 - 13/32 | 0.76 | 0.030 |
| 10.00 - 15.99 | 13/32 - 5/8 | 1.02 | 0.040 |
| 16.00 - 24.99 | 5/8 - 1 | 1.60 | 0.063 |
| 25.00 - 39.99 | 1 - 1-5/8 | 2.03 | 0.080 |
| 40.00 - 63.00 | 1-5/8 - 2-1/2 | 2.03 | 0.080 |

TABLE V. Commercial tolerances for extruded tubing.

| Sizes | | Tolerances of mandrel cured items | | Tolerances of other cured items | |
|---|---|---|---|---|---|
| | | I.D. | | I.D. | O.D. |
| Millimeters | Inches (approx.) | mm | (in.) | + mm (in.) | + mm (in.) |
| 0 - 9.99 | 0.0 - 0.399 | +0, -0.25 | (0.010) | 0.51 (0.020) | 0.78 (1/32) |
| 10 - 15.99 | 0.40 - 0.629 | +0, -0.31 | (0.012) | 0.78 (1/32) | 1.19 (3/64) |
| 16 - 24.99 | 0.63 - 0.999 | +0, -0.40 | (0.016) | 0.78 (1/32) | 1.19 (3/64) |
| 25 - 39.99 | 1.00 - 1.599 | +0, -0.50 | (0.020) | 1.19 (3/64) | 1.69 (1/16) |
| 40 - 62.99 | 1.60 - 2.499 | +0. -0.63 | (0.025) | 1.19 (3/64) | 1.69 (1/16) |
| 63 - 100.00 | 2.50 - 4.000 | +0, -0.80 | (0.032) | | |

TABLE VI. Commercial tolerances for calendered sheet.

| Dimensions | | Tolerances | |
|---|---|---|---|
| Millimeters | Inches (approx.) | Millimeters | Inches |
| 0 to 0.99 | 0 to 0.039 | ± 0.18 | ± 0.007 |
| 1.00 to 1.74 | 0.04 to 0.069 | 0.30 | 0.012 |
| 1.75 to 3.39 | 0.07 to 0.134 | 0.43 | 0.017 |
| 3.40 and over | 0.135 and over | 0.56 | 0.022 |

3.8 Color. Unless otherwise specified (see 6.2),or specification sheets as applicable (see 6.6), the color of the silicone rubber shall be the natural color of the compound furnished.

3.9 Marking. Unless otherwise specified (see 6.2), sheet material and strips (cut from sheet) shall be marked with the following information: Specification number, class, grade, designations, and the supplier's designations. The class and grade designations separated by a dash, shall be enclosed within parentheses. The markings shall be legible and placed in rows of constantly recurring symbols from one end of the sheet to the other, spaced approximately 5 inches apart. The supplier's designation (compound number) shall appear immediately below the constantly recurring specification symbols. The symbols shall be legible and shall be not less than 3/8 inches high. The symbols shall be applied by suitable means, using a black colored marking fluid to mark white colored silicones and a white colored marking fluid to mark other than white colored silicones. The marking shall not be obliterated by normal handling or by the action of petroleum-base oils.

3.10 Workmanship. The end product shall be clean, smooth finished, free from dirt, flash or rough edges to the extent permitted by the acceptable quality levels in section 4.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order (see 6.2), the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, 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 supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

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

a. First article (i.e., preproduction) inspection (see 4.2.1)
b. Quality conformance (i.e., lot acceptance inspection) (see 4.2.2)

4.2.1 First article inspection. When specified (see 6.2), first article inspection shall consist of all tests as noted in table I. A certificate of compliance report showing conformance to the applicable specification is required. The government reserves the right to check items to determine certification. An original test report must be kept on file at all times with a test date not to exceed three years.

4.2.2 Quality conformance inspection. Quality conformance inspection shall consist of the tests and examinations specified in paragraph 4.2.2.1 through 4.2.2.1.3.2.

4.2.2.1 Inspection. Sampling for inspection shall be performed in accordance with MIL-STD-105, except where otherwise indicated hereinafter. Quality conformance tests are required for all production lots of material. A lot shall be defined as consisting of all material of the same identity, cured in the same production run, from the same batch, and submitted at the same time for inspection. A batch shall be defined as the quantity of material compounded on a mill or mixer at one time (see 6.4).

4.2.2.1.1 Inspection of materials and components. In accordance with 4.1, materials and components shall be inspected and tested in accordance with all the requirements of referenced specifications, drawings and standards unless otherwise excluded, amended, modified or qualified in this specification or applicable purchase document.

4.2.2.1.2 Examination of the end item. The end item shall be examined in accordance with 4.2.2.1.2.1, 4.2.2.1.2.2 and 4.2.2.1.2.3. The lot size, for purposes of determining the sample size in accordance with MIL-STD-105, shall be expressed in units of rubber sheets, strips, shapes, or yards of tubing, as applicable.

4.2.2.1.2.1 Examination of the end item for defects in appearance and workmanship. The sample unit for the examination specified in Table VII shall be one sheet, strip (see 6.5), molded shape, or 1 yard of tubing or extruded shape, as applicable.

TABLE VII. Examination of the end item for defects in appearance and workmanship.

| Examine | Defect |
|---|---|
| Appearance and workmanship: | |
| Sheet or strip material | Any defect as indicated in MIL-STD-289 (see Note 1). |
| Extruded shapes and tubing | Any defect as indicated in MIL-STD-298 (see Note 1). |
| Molded rubber shapes | Any defect as indicated in MIL-STD-407 (see Note 1). |
| Form | Not as specified. |
| Color | Not as specified. |
| Markings | Incomplete, illegible, omitted, or not as specified as to size, location, recurrence; not black or white as applicable. Markings are obliterated by normal handling, defined as rubbing the fingers under light pressure back and forth over the markings a minimum of five times. |
| O-Rings | Any defect as indicated in MIL-STD-413. |

Note 1: This standard is used as a guide to illustrate defects only. The classification of defects however, shall be as indicated in this specification.

4.2.2.1.2.2 Examination of the end item for defects in dimension. The sample unit for examination shall be one sheet, strip, molded shape, or one yard of tubing or extruded shape, as applicable. The end item shall be considered defective if the dimension is out of tolerance as specified in Table II, III, IV, V, or VI for the applicable end item.

4.2.2.1.2.3 Examination of preparation for delivery requirements. An examination shall be made in accordance with Table VIII to determine that packaging, packing and markings comply with the requirements of section 5. The sample unit for this examination shall be one shipping container, fully packed, selected just prior to the closing operation. Shipping containers fully prepared for delivery shall be examined for closure defects.

TABLE VIII. Examination of preparation for delivery.

| Examine | Defect |
|---|---|
| Packaging: | Not in accordance with contract requirements. |
| Sheets and strips | Not level specified.<br>Paper separator sheets omitted or not extending over full area of contact between sheets. |
| Tubing | Not tied, coiled, or packaged as specified. |
| Extruded shapes | Each shape not wrapped full length, protected, or as otherwise specified. |
| Molded shapes | Not individually wrapped, boxed, or protected against abrasion, deformation or as specified. |
| Packing | Not level specified.<br>Arrangement of units per shipping container not in accordance with contract requirements.<br>Container not as specified; closures not accomplished by specified or required methods or materials.<br>Inadequate application of components, such as; incomplete closures of case liners, container flaps; improper taping; loose or inadequate strapping.<br>Bulged or distorted container. |
| Weight | Weight of contents exceeds specified requirements. |
| Count | Less than specified or indicated quantity of items in container. |
| Markings | Interior or exterior markings (as applicable) omitted, illegible, incorrect, incomplete, or not in accordance with contract requirements. |

4.2.2.1.3 Test methods. Testing of the silicone rubber shall be in accordance with methods specified in table IX.

TABLE IX. Test methods for physical properties.

| Physical Property | ASTM test method |
|---|---|
| Hardness | D2240 |
| Tensile strength | D412 |
| Elongation | D412 |
| Volume change | D471 |
| Compression set | D395 |
| Young's modulus in flexure | D797 |
| Tear resistance | D624 |
| Brittle point | D2137 |
| Torsional stiffness ratio | D1053 |
| Oven aging | D573 |
| Water immersion | D471 |
| Flex resistance | D813 |
| Impact resilience | D2632 |
| Specify gravity | D297 |
| Rubber O-Rings | D1414 |

4.2.2.1.3.1 Lot acceptance. The sample unit shall be 3 square feet of sheet or strip, or 4 linear feet of tubing or shapes as applicable (see Note 2). The lot size, for purposes of determining the sample size for test purposes, shall be the entire visual examination lot and shall be expressed in units of silicone rubber sheets, strips, shapes, yards of tubing, as applicable. For those characteristics wherein test results are reported as pass or fail, there shall be no evidence of failure of any test specimen to meet the requirements as specified.

Note 2: If the end items in the inspection lot are unsuitable for use as test samples, the supplier shall test sample units consisting of six, 6 by 6 by 0.075 inch slabs and one, 6 by 6 by 1/2 inch slab identical in composition and cured to the state of that of the inspection lot represented. The O-Ring sizes that are suitable for testing are as shown in table X. The samples selected for lot tests shall be suitably marked and dated for identification with the examination lot. (Samples for testing may be selected from the stock material from which the end item is made at the time of manufacture). O-Rings may be deemed unsuitable test specimens, if the values do not reflect these values on 6 x 6 x 0.075 inch slabs.

TABLE X. Suitable size test table.

| Spool Size | O-Ring Thickness | Dash Size (AS568) |
|---|---|---|
| 1/8" Spool | | |
| CS* | .070 | -011 to -014 |
| 1/4" Spool | | |
| CS* | .070 | -015 to -021 |
| | .103 | -113 to -119 |
| | .139 | -211 to -213 |
| 1/2" Spool | | |
| CS* | .070 | -022 to -050 |
| | .103 | -120 to -163 |
| | .139 | -214 to -258 |
| | .210 | -319 to -361 |
| | .275 | -425 to -437 |

*CS - cross-section

4.2.2.1.3.2 Quality conformance tests. The following test shall be conducted on each lot of material, (as defined in Section 4.2.2.1).

| Original Properties | Compression Set |
|---|---|
| Hardness | % original deflection |
| Tensile | |
| Elongation | |
| Specific Gravity | |

4.3 Test procedures.

4.3.1 Number, form and dimensions. The number, form and dimensions of test specimens shall be as specified in the applicable test method. O-Rings shall be tested according to ASTM D1414.

4.3.2 Aging. Test specimens shall be aged before test, when applicable, and as specified in Table I.

5. PREPARATION FOR DELIVERY

5.1 Packaging. Packaging shall be level A or C, as specified (see 6.2).

5.1.1 Level A.

5.1.1.1 Sheet form. Sheets of one class and grade only shall be stacked to form a neat and even bundle. The sheets shall be interleaved with 30-pound minimum basis weight kraft paper conforming to grade B of UU-P-268. The bundle shall be completely wrapped with the paper specified and the wrap secured with 2-inch minimum width gummed paper tape conforming to grade B of A-A-1492.

5.1.1.2 Extruded shape form. Each shape or a multiple of the same shape of one class and grade only shall be wrapped or bagged and secured with the kraft paper and gummed tape as specified in 5.1.1.1; or placed in a plastic bag. The opening of the plastic bag shall be secured with a mechanical tie (paper or plastic covered soft steel wire, aluminum band, etc.).

5.1.1.3 Molded shape form. Each shape shall be wrapped or bagged and secured as specified in 5.1.1.2. One or a larger quantity of the same shape of one class and grade only, when applicable, shall be placed in a snug-fitting folding paperboard box conforming to variety 1, style III, type G, class: group I of PPP-B-566; set-up paperboard box conforming to type I, variety 1, class A, style 4 of PPP-B-676; or metal-stayed paperboard class 1, box conforming to class 1, style A of PPP-B-665. Box closure shall be effected with 2-inch minimum width gummed paper tape conforming to grade B of A-A-1492.

5.1.1.4 Extruded tubing form. Each length of tubing, coiled as specified (see 3.7.1), shall be secured with a minimum of four equally spaced ties of cotton tape or twine passing through the center hole of the coil to the outside and knotted on the circumference of the coil. Each secured coil of tubing shall then be wrapped or bagged and secured as specified in 5.1.1.2.

5.1.2 Level C. Unless otherwise specified (see 6.2) the silicone rubber shall be packaged in accordance with the requirements of ASTM D 3951.

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

5.2.1 Level A. Silicone rubber of one class, grade, shape, and length packaged as specified in 5.1, shall be packed in a snug-fitting fiberboard shipping container conforming to style RSC-L, grade V2s of PPP-B-636. The inside of each fiberboard shipping container shall be fitted with a taped box liner conforming to type CF, class weather-resistant, variety DW, grade V15c of PPP-B-636. The fiberboard box liner is not required when molded shapes are packaged in paperboard boxes. Each fiberboard shipping container shall be closed, waterproofed, and reinforced in accordance with the appendix of PPP-B-636. Overpacking in accordance with MIL-B-43666 or MIL-L-35078 is required when PPP-B-636 is used. Alternatively, shipping containers may conform to overseas type, style A or I, type 2 load of PPP-B-601; or class 2, style 2 or 4 of PPP-B-621. Each wood shipping container shall be provided with a type I or II, grade C sealed case liner conforming to MIL-L-10547 and shall be closed and reinforced in accordance with the appendix of the applicable container specification. The weight of contents of each fiberboard container shall not exceed 65 pounds and the weight of the contents of each wood container shall not exceed 150 pounds.

5.2.2 Level B. Silicone rubber of one class, grade, shape, and length only, packaged as specified in 5.1, shall be packed in a snug-fitting fiberboard shipping container conforming to style RSC-L, type CF (variety SW) or SF, class domestic, grade 275 of PPP-B-636. The inside of each fiberboard shipping container shall be fitted with a taped box liner conforming to type CF, class domestic, variety DW, grade 275 of PPP-B-636. The fiberboard box liner is not required when molded shapes are packaged in paperboard boxes. Each fiberboard shipping container shall be closed in accordance with method II as specified in the appendix of PPP-B-636. Alternatively, shipping

containers may conform to style A or B, class 1, type 2 load of PPP-B-576; style A or I, class 1, of PPP-B-591; domestic type, style A or I, type 2 load of PPP-B-601; or class 1, style 2 or 4 of PPP-B-621. The weight of contents of each fiberboard container shall not exceed 65 pounds and the weight of the contents of each wood container shall not exceed 150 pounds.

5.2.2.1 When specified (see 6.2), the shipping container shall be a grade V3c, V3s, or V4s fiberboard box fabricated in accordance with PPP-B-636 and closed in accordance with the appendix of the box specification.

5.2.3 Level C. Unless otherwise specified (see 6.2) silicone rubber, shall be packed in accordance with the requirements of ASTM D3951. For Army use only, preservation, packing and marking for Level C shall be accomplished in accordance with MIL-STD-1190.

5.3 Marking.

5.3.1 Civil agencies. In addition to any special marking required by the contract or order, interior packages and shipping containers shall be marked in acordance with FED-STD-123.

5.3.2 Military requirements.

5.3.2.1 Level A. In addition to any special marking required by the contract or order, interior packages and shipping containers shall be marked in accordance with MIL-STD-129.

5.3.2.2 Level C. Marking shall be in accordance with ASTM D3951.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The silicone rubber covered by this specification is intended generally for use under the conditions listed below. However users should consider all the requirements of this specification when selecting a class and grade of silicone rubber.

Class 1 - Where resistance to extreme low temperature is required (to approximately -73°C (-100°F)). Class 1 material also possesses resistance to extreme high temperature (to approximately 219°C (425°F)) but length of service at high temperatures is less than that of the class 2 materials. The class 1B material also possesses low compression set at high temperature.

Class 2 - Where resistance to extreme high temperature is required (to approximately 219°C (425°F)). Class 2 material possesses low temperature resistance but only to about -62°C (-80°F). Class 2B material also possesses low compression set.

Class 3A - Where resistance to extreme low temperature (to approximately -75°C (-103°F)) and resistance to tearing and flexing are required. Class 3A material also possesses resistance to extreme high temperature, to approximately 204°C (400°F).

Class 3B - Where resistance to tearing and flexing are required, but the resistance to extreme low temperature requirement is less than that of the class 3A material. Temperature range for the class 3B material is approximately between -70°C (-94°F) and 204°C (400°F). Cost of the class 3B material should be less than that of the 3A material.

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 latest revision of this specification and applicable specification sheet.
b. Class and grade required (see 1.2).
c. Form, with dimensions, required (see 3.5).
d. If first article is required (see 3.1 and 4.2.1).
e. Length of tubing required (see 3.7.1).
f. Color required if other than natural color of compound furnished (see 3.8).
g. Marking if different (see 3.9).
h. Selection of applicable levels of packaging and packing (see 5.1 and 5.2)
i. When weather-resistant grade fiberboard shipping containers are required for level B packing (see 5.2.2.1).
j. Dimensions and tolerances (see 3.6).

6.3 First article inspection. When first article inspection is required, appropriate provisions should be included in the contract to allow the contracting officer to waive completely or in part the first article inspection and reduce the bid price accordingly if the successful bidder has previously performed any or all of the first article tests in recent procurement. When contract allows for the waiver of first article inspection, the contract should require that successful bidder seeking such waiver submit satisfactory evidence, including test and inspection reports that the inspection has been performed, and additional information such as contract identification, the procuring activity, the date, and other pertinent data deemed necessary by the contracting officer.

6.4 This specification is certified to be in compliance with current Army Materiel Command (AMC) policy for the elimination of AQL's/LTPD's (Acceptable Quality Levels/Lot Tolerance Percent Defectives) from military specifications. Sampling for inspection shall implement the policy to eliminate AQL's/LTPD's from military specifications. Guidelines have been established for zero acceptance policy.

6.5 Use of this material in items that may come in contact with human skin, food, or potable water is not recommended without prior approval of the appropriate medical service.

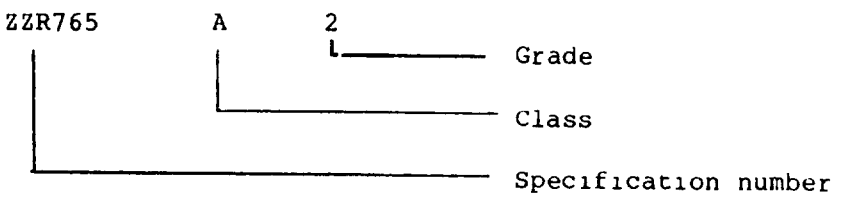
6.6 Strips. Strips shall be ordered in sheet form and then cut to desired width and length.

6.7 Military part number coding.

TABLE XI. Describes the military part number coding for silicone rubbers covered by this specification.

| Class | Code | Grade | Code |
|---|---|---|---|
| 1A | A | 25 | 2 |
| 1B | B | 30 | 3 |
| 2A | C | 40 | 4 |
| 2B | D | 50 | 5 |
| 3A | E | 60 | 6 |
| 3B | F | 70 | 7 |
| | | 80 | 8 |

Example - ZZR765A2




6.8 Subject term (key word) listing.

Brittle point
Coil
Elongation
Extruded shapes
Sheets
Strips
Tubing

6.9 Specification sheets. The following Federal specification sheets form a part of this document.

| Federal specification sheet | Title |
|---|---|
| ZZ-R-765/1 | Rubber, Silicone; Channel, Nonmetallic (Part No. ZZR765/1-001D6 to 1-002C6) |
| ZZ-R-765/2 | Rubber, Silicone; Channel, nonmetallic (Part No. ZZR765/2-001A7) |
| ZZ-R-765/3 | Rubber, Silicone; Channel, Nonmetallic (Part No. ZZR765/3-001F5) |
| ZZ-R-765/4 | Rubber, Silicone; Channel, Nonmetallic (Part No. ZZR765/4-001E2) |
| ZZ-R-765/5 | Rubber, Silicone; Channel, Nonmetallic (Part No. ZZR765/5-001C6) |
| ZZ-R-765/6 | Rubber, Silicone; Channel, Nonmetallic (Part No. ZZR765/6-001A4) |
| ZZ-R-765/7 | Rubber, Silicone; Channel, Nonmetallic (Part No. ZZR765/7-001C4) |
| ZZ-R-765/8 | Rubber, Silicone; Channel, Nonmetallic (Part No. ZZR765/8-001B6 to 8-003B6) |
| ZZ-R-765/9 | Rubber, Silicone; Tubing, Nonmetallic, Round, Flexible (Part No. ZZR765/9-001 to 9-300) |
| ZZ-R-765/10 | Rubber, Silicone; Round Section (Part No. ZZR765/10-001C7 to 10-003F6) |
| ZZ-R-765/11 | Rubber, Silicone; Packing Material (Part No. ZZR765/11-001A4) |
| ZZ-R-765/12 | Rubber, Silicone; Packing Material (Part No. ZZR765/12-001C7) |
| ZZ-R-765/13 | Rubber, Silicone; Gasket (Part No. ZZR765/13-001D4 to 13-005D4) |
| ZZ-R-765/14 | Rubber, Silicone; Gasket (Part No. ZZR765/14-001D4 to 14-005D4) |
| ZZ-R-765/15 | Rubber, Silicone; Rubber Sheet Solid (Part No. ZZR765/15-001D5 to 15-099B6) |
| ZZ-R-765/16 | Rubber, Silicone; Rubber Strip (Part No. ZZR765/16-001F5) |
| ZZ-R-765/17 | Rubber, Silicone; Rubber Strip (Part No. ZZR765/17-001E5) |

| Federal specification sheet | Title |
|---|---|
| ZZ-R-765/18 | Rubber, Silicone; Rubber Strip (Part No. ZZR765/18-001C5 to 18-036F3) |
| ZZ-R-765/19 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/19-001A4 to 19-027D6) |
| ZZ-R-765/20 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/20-001B5) |
| ZZ-R-765/21 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/21-001F7) |
| ZZ-R-765/22 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/22-001B6) |
| ZZ-R-765/23 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/23-001B6) |
| ZZ-R-765/24 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/24-001A6 to 24-001B6) |
| ZZ-R-765/25 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/25-001E5) |
| ZZ-R-765/26 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/26-001C7) |
| ZZ-R-765/27 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/27-001C7) |
| ZZ-R-765/28 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/28-001C7) |
| ZZ-R-765/29 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/29-001A7) |
| ZZ-R-765/30 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/30-001F5) |
| ZZ-R-765/31 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/31-001F8) |
| ZZ-R-765/32 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/32-001A5 to 32-002E5) |
| ZZ-R-765/33 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/33-001F3 to 33-003F7) |
| ZZ-R-765/34 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/34-001F6) |

| Federal specification sheet | Title |
|---|---|
| ZZ-R-765/35 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/35-001C5 to 35-003F5) |
| ZZ-R-765/36 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/36-001D5) |
| ZZ-R-765/37 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/37-001F3) |
| ZZ-R-765/38 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/38-001F5) |
| ZZ-R-765/39 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/39-001F6) |
| ZZ-R-765/40 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/40-001F6) |
| ZZ-R-765/41 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/41-001A6 to 41-002B5) |
| ZZ-R-765/42 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/42-001B4 to 42-003B4) |
| ZZ-R-765/43 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/43-001A5) |
| ZZ-R-765/44 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/44-001F5) |
| ZZ-R-765/45 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/45-001F6) |
| ZZ-R-765/46 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/46-001F5) |
| ZZ-R-765/47 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/47-001F5) |
| ZZ-R-765/48 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/48-001F5) |
| ZZ-R-765/49 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/49-001F5) |
| ZZ-R-765/50 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/50-001A5 to 50-005C5) |
| ZZ-R-765/51 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/51-001A5) |

| Federal specification sheet | Title |
|---|---|
| ZZ-R-765/52 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/52-001E5) |
| ZZ-R-765/53 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/53-001F5) |
| ZZ-R-765/54 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/54-001E5) |
| ZZ-R-765/55 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/55-001D4) |
| ZZ-R-765/56 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/56-001F3) |
| ZZ-R-765/57 | Rubber, Silicone; Nonmetallic Special Shaped Section (Part No. ZZR765/57-001D4) |

MILITARY INTERESTS:

Custodians:
Army - MR
Navy - AS
Air Force - 11

Review activities:
Army - AR, CR, ER MI, MD, GL, ME, SM
Navy - SH, OS
Air Force - 82, 99
DLA - GS

User activities:
Navy - YD, OS, SH

CIVIL AGENCY COORDINATING ACTIVITIES:

COM - NIST
DC - DCG
GSA - FSS
HHS - SSA
NASA - MSF

Preparing activity:
Army - MR

Project 9320-1092

(KBWP# ID-7059A/DISC-0033A. FOR MTL USE ONLY).

# STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

*(See Instructions – Reverse Side)*

| 1. DOCUMENT NUMBER | 2. DOCUMENT TITLE |
|---|---|
| ZZ-R-765E/GEN | RUBBER, SILICONE (GENERAL SPECIFICATION) |

**3a. NAME OF SUBMITTING ORGANIZATION**

**b. ADDRESS (Street, City, State, ZIP Code)**

**4. TYPE OF ORGANIZATION (Mark one)**

- ☐ VENDOR
- ☐ USER
- ☐ MANUFACTURER
- ☐ OTHER (Specify) ____

**5. PROBLEM AREAS**

a. Paragraph Number and Wording:

b. Recommended Wording

c. Reason/Rationale for Recommendation

**6. REMARKS**

| 7a. NAME OF SUBMITTER (Last, First, MI) – Optional | b. WORK TELEPHONE NUMBER (Include Area Code) – Optional |
|---|---|
| c. MAILING ADDRESS (Street, City, State, ZIP Code) – Optional | 8. DATE OF SUBMISSION (YYMMDD) |

DD FORM 82 MAR 1426

PREVIOUS EDITION IS OBSOLETE.