INCH-POUND

A-A-59588B
30 January 2012
SUPERSEDING
A-A-59588A
7 July 2005

COMMERCIAL ITEM DESCRIPTION

RUBBER, SILICONE

The General Service Administration has authorized the use of this commercial item description for all federal agencies.

1. SCOPE. This commercial item description (CID) covers six classes of silicone rubber, in various grades.

2. CLASSIFICATION. The silicone rubber shall be of the following classes and grades, as specified:

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

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

Class 2A - High temperature resistant.
Grades - 25, 40, 50, 60, 70, 80

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

Class 3A - Low temperature, tear and flex resistant.
Grades - 30, 50, 60

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

Comments, suggestions, or questions on this document should be addressed to: Defense Supply Center Philadelphia, ATTN: DSCP- NASA, 700 Robbins Avenue, Philadelphia, PA 19111-5096 or emailed to mailto:dscpg&ispecomments@dla.mil Since contact information can change, you may want to verify the currency of this information using the ASSIST Online database at https://assist.daps.dla.mil/

3. SALIENT CHARACTERISTICS

3.1 Materials and composition. The material shall be silicone rubber, formulated and processed to meet the performance of this CID.

3.2 Physical and mechanical properties. Unless otherwise specified, the silicone rubber shall meet the physical and mechanical properties specified in table I when tested in accordance with the standards in table I. Proof of compliance may be required (see 5.1.1).

3.3 Form. The silicone rubber shall be in the form of sheets, strips or tape; extruded shapes or tubing; or molded shapes, as specified in the contract or purchase order (see 7.2).

3.4 Dimensions and tolerances. Dimensions and tolerances shall be as indicated in the contract or purchase order (see 7.2). If no tolerances are specified, A-3 commercial tolerances of the Rubber Manufacturer's Association (RMA) Rubber Handbook shall apply for molded solid rubber products, as shown in table II, and the commercial tolerances of the RMA Rubber Sheet Packing Handbook shall apply for packing, as shown in table III. Commercial tolerances, as shown in tables IV, V, and VI shall be applied for extruded shapes, extruded tubing and calendered sheet, respectively. Dimensions and tolerances for o-rings shall be as specified in SAE-AS568 (see A-A-55801 for standard part numbers), or in accordance with the applicable part number for non-standard sizes.

3.5 Extruded tubing. Unless otherwise specified in the contract or purchase order (see 7.2), the length of extruded tubing shall be furnished in coils containing 100(30.48), 200(60.96), 500(152.4), or 1000(304.8) feet(m) per coil. Each coil shall contain not more than three individual lengths of tubing per 100 feet (30.48 m). No individual length of tubing shall be less than 15 feet (4.57 m).

3.6 Color. Unless otherwise specified (see 7.2), the color of the silicone rubber shall be the natural color of the compound furnished.

TABLE I. Physical and mechanical properties of silicone.

		PROPERTY VALUES AND RECOMMENDED ASTM TEST METHODS							
		UNAGED					AFTER OVEN AGING 2/		
CLASS	GRADE	Hardness, maximum Shore-A-Durometer ASTM D 2240	Tensile strength, minimum MPa (psi) ASTM D 412	Elongation minimum % ASTM D 412	Tear resistance, minimum kN/m (ppi) ASTM D 624	Compression set, maximum % 1/ ASTM D 395	Hardness change maximum durometer ASTM D 2240	Tensile strength change, maximum % ASTM D 412 & ASTM D 573	Elongation change, maximum % ASTM D 412 ASTM D 573
1A & 1B	40	40 ± 5	4.83 (700)	250	-	35	± 15	-30	-50
	50	50 ± 5	4.83 (700)	225	-	35	± 15	-30	-50
	60	60 ± 5	4.48 (650)	175	-	35	± 15	-30	-50
	70	70 ± 5	4.14 (600)	150	-	40	± 15	-30	-50
	80	80 ± 5	3.45 (500)	125	-	45	± 15	-30	-50
2A & 2B	25	25 + 5, -10	4.83 (700)	400	-	35-2A 25-2B	± 10	-20	-40
	40	40 ± 5	4.83 (700)	240	-	35-2A 25-2B	± 10	-20	-40
	50	50 ± 5	4.83 (700)	200	-	35-2A 25-2B	± 10	-20	-40
	60	60 ± 5	4.48 (650)	150-2A 100-2B	-	40-2A 25-2B	± 10	-20	-40
	70	70 ± 5	4.48 (650)	125-2A 80-2B	-	40-2A 25-2B	± 10	-25	-40
	80	80 ± 5	4.48 (650)	100-2A 60-2B	-	45-2A 30-2B	± 10	-25	-40
3A	30	30 +5, -10	5.86 (850)	500	14.00 (80)	40	+ 10	-25	-25
	50	50 ± 5	8.28 (1,200)	500	30.63 (175)	40	+ 10	-40	-50
	60	60 ± 5	7.59 (1,100)	400	26.25 (150)	40	+ 10	-35	-35
3B	30	30 ± 5	6.90 (1,000)	500	26.25 (150)	25	± 5	-20	-35
	50	50 ± 5	8.28 (1,200)	500	26.25 (150)	20	± 10	-25	-30
	60	60 ± 5	8.28 (1,200)	400	26.25 (150)	25	± 10	-30	-35
	70	70 ± 5	7.59 (1,100)	350	26.25 (150)	25	± 10	-30	-45
	80	80 ± 5	5.52 (800)	200	12.25 (70)	40	± 10	-25	-40

1/ Aging period shall be: Class 1A – 22 hours at 100ºC (212ºF)
Classes 1B, 2A, 2B – 70 hours at 150ºC (302ºF)
Classes 3A, 3B – 70 hours at 100ºC (212ºF)

2/ After oven aging: Classes 1A, 1B, 2A, 2B – 70 hours at 225ºC (437ºF)
Classes 3A, 3B – 70 hours at 200ºC (392ºF)

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

		PROPERTY VALUES AND RECOMMENDED ASTM TEST METHODS					
		LOW TEMPERATURE REQUIREMENTS		AFTER WATER IMMERSIONS 4/	OTHER REQUIREMENTS		
CLASS	GRADE	Brittle point, minimum ºC (ºF) 3/ ASTM D 2137	Torsional stiffness Ratio hours at -75ºC, maximum ratio ASTM D 1053	Volume change, maximum percent ASTM D 471	Flex resistance, (crack growth), cycles 5/ ASTM D 813	Specific gravity ASTM D 297 Variation from pre-production rate	Impact resilience, minimum percent ASTM D 2632
1A & 1B	40	-75 (-103)	15	-	-	± 0.03	-
	50	-75 (-103)	15	-	-	± 0.03	-
	60, 70, 80	-75 (-103)	15	-	-	± 0.03	-
2A & 2B	25, 40	-62.2 (-80)	-	+ 10	-	± 0.03	-
	50	-62.2 (-80)	-	+ 5	-	± 0.03	-
	60	-62.2 (-80)	-	+ 5	-	± 0.03	-
	70	-62.2 (-80)	-	+ 5	-	± 0.03	-
	80	-62.2 (-80)	-	+ 5	-	± 0.03	-
3A	30	-90 (-130)	15	+ 5	40,000	± 0.03	-
	50	-90 (-130)	15	+ 5	10,000	± 0.03	-
	60	-90 (-130)	15	+ 5	10,000	± 0.03	-
3B	30	-70 (-94)	-	+ 5	500,000	± 0.03	40
	50	-70 (-94)	-	+ 5	140,000	± 0.03	45
	60	-70 (-94)	-	+ 5	50,000	± 0.03	35
	70	-70 (-94)	-	+ 5	2,500	± 0.03	35
	80	-70 (-94)	-	+ 5	-	± 0.03	35

3/ All test specimens shall not fail after single-impact blow, at the temperature specified.
4/ 70 hours at 100ºC (212ºF)
5/ 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/

TOLERANCES FOR MOLDED SOLID RUBBER PRODUCTS – COMMON							
SIZE (millimeters)		Fixed dimension tolerance 2/ (millimeters)	Closure dimension tolerance 3/ (millimeters)	SIZE (inches – approximate)		Fixed dimension tolerance 2/ (inches)	Closure dimension tolerance 3/ (inches)
Above	Inclusive			Above	Inclusive		
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 size by 0.5 percent		6.30 & over		To find fixed dimensional tolerances, multiply size by 0.5 percent	

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 shall be used for all other closure dimensions. (Closure dimension refers to any dimension in a plane parallel to the plane traced when the mold closes.)

TABLE III. RMA commercial tolerances for rubber sheet packing.

TOLERANCES FOR RUBBER SHEET PACKING			
THICKNESS		TOLERANCES	
Millimeters	Inches (approximate)	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.

TOLERANCES FOR SPECIAL EXTRUDED SHAPES			
DIMENSIONS		TOLERANCES	
Millimeters	Inches (approximate)	Millimeters	Inches
0 to 2.49	0 to 3/32	± 0.41	± 0.016
2.50 to 3.99	3/32 to 5/32	± 0.51	± 0.020
4.00 to 6.29	5/32 to 1/4	± 0.64	± 0.025
6.30 to 9.99	1/4 to 13/32	± 0.76	± 0.030
10.00 to 15.99	13/32 to 5/8	± 1.02	± 0.040
16.00 to 24.99	5/8 to 1	± 1.60	± 0.063
25.00 to 39.99	1 to 1-5/8	± 2.03	± 0.080
40.00 to 63.00	1-5/8 to 2-1/2	± 2.03	± 0.080

TABLE V. Commercial tolerances for extruded tubing.

TOLERANCES FOR SPECIAL EXTRUDED SHAPES							
		TOLERANCES OF MANDREL CURED ITEMS		TOLERANCES OF OTHER CURED ITEMS			
SIZES		INSIDE DIAMETER		INSIDE DIAMETER		OUTSIDE DIAMETER	
Millimeters	Inches (approx.)	Millimeters	(Inches)	+ Millimeters	(Inches)	+ Millimeters	(Inches)
0 to 9.99	0.00 - 0.399	+0 -0.25	(+0 -0.010)	0.51	(0.020)	0.78	(1/32)
10 to 15.99	0.40 - 0.629	+0 -0.31	(+0 -0.012)	0.78	(1/32)	1.19	(3/64)
16 to 24.99	0.63 - 0.999	+0 -0.40	(+0 -0.016)	0.78	(1/32)	1.19	(3/64)
25 to 39.99	1.00 - 1.599	+0 -0.50	(+0 -0.020)	1.19	(3/64)	1.69	(1/16)
40 to 62.99	1.60 - 2.499	+0 -0.63	(+0 -0.025)	1.19	(3/64)	1.69	(1/16)
63 to 100.00	2.50 - 4.000	+0 -0.80	(+0 -0.032)				

TABLE VI. Commercial tolerances for calendered sheets.

TOLERANCES FOR CALENDERED SHEETS			
DIMENSIONS		TOLERANCES	
Millimeters	Inches (approximate)	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

3.7 Marking. Unless otherwise specified (see 7.2), sheet material and strips (cut from sheet) shall be marked with the following information: CID number, class and grade designation, 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 (127 mm) apart. The supplier's designation shall appear immediately below the constantly recurring CID symbols. The symbols shall be legible, and shall not be less than 3/8 inch (9.525 mm) high. Symbols shall be marked using white colored marking fluid for other than white silicones, and black colored marking fluid for white colored silicones. The markings shall not be obliterated by normal handling or by the action of petroleum-base oils.

3.8 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 5.

4. REGULATORY REQUIREMENTS

4.1 Health, safety, and environment. The rubber products shall adhere to all federal, state, and local health, safety, and environmental regulations. No environmentally prohibited material or components shall be used in manufacturing, finishing, or packaging of the products.

4.2 Recycled materials. The supplier or contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with paragraph 23.403 of the Federal Acquisition Regulation (FAR).

5. PRODUCT CONFORMANCE PROVISIONS

5.1 Product conformance. The products provided shall meet the salient characteristics of this commercial item description, conform to the producer's own drawings, specifications, standards, and quality assurance practices, and are the same products offered for sale in the commercial market. The Government reserves the right to require proof of such conformance.

5.1.1 Test data. The supplier or contractor shall provide test data or lab results, of meeting the salient characteristics and special requirements, when specified by the procuring activity in the contract or purchase order (see 7.2).

5.1.2 Warranty. The supplier or contractor shall provide a warranty of replacing defective items as a special requirement (see 7.2), when specified by the procuring activity in the contract or purchase order.

6. PACKAGING. Preservation, packing, and marking shall be as specified in the contract or order (see 7.2). When no special packaging requirements are specified, ASTM D 3951 packaging guidance applies.

7. NOTES

7.1 Source of documents.

7.1.1 ASTM Standards are available from the American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or http://www.astm.org

7.1.2 SAE Standards are available from the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or http://www.sae.org

7.1.3 RMA Specifications are available from the Rubber Manufacturers Association, 1400 K Street, NW, Suite 900, Washington, DC 20005 or http://www.rma.org

7.1.4 FAR. The FAR may be obtained from the Regulatory Secretariat, 1800 F Street NW, Washington DC 20405 or online at http://www.acqnet.gov.

7.2 Ordering data. The contract or order should specify the following:

a. CID document number, revision, and CID PIN.
b. Product conformance provisions.
c. Form, with dimensions, required (see 3.3).
d. Dimensions and tolerances (see 3.4).
e. Extruded tubing requirements (see 3.5).
f. Color required, if other than natural color of compound furnished (see 3.6)
g. Special marking requirements (see 3.7 and 6).
h. Test data requirements (see 5.1.1).
i. Warranty requirements (see 5.1.2).
j. Packaging requirements (see 6).

7.3 Cross reference data. Table VII lists related CIDs that use A-A-59588 silicone rubber.

TABLE VII. Related CIDs.

A-A-55450	Rubber, Silicone; Channel, Nonmetallic, Shape 1
A-A-55451	Rubber, Silicone; Channel, Nonmetallic, Shape 3
A-A-55757	Rubber, Silicone; Gasket, Shape 13
A-A-55759	Rubber, Silicone; Rubber Sheet Solid, Shape 15
A-A-55760	Rubber, Silicone; Strip Shape 16
A-A-55762	Rubber, Silicone; Strip Shape 18
A-A-55801	Rubber, Silicone; Packing Preformed (O-Ring)

7.4 Intended use. The silicone rubber covered by this specification is intended generally for use under the conditions listed below. Users should, however, 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 -73ºC (-100ºF). Class 1 material also possesses resistance to extreme high temperature (to approximately 219ºC (425ºF)), 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.

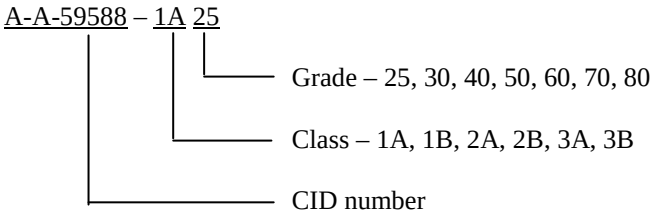
Class 2 - Where resistance to extreme high temperature is required to approximately 219ºC (425ºF). Class 2 material possesses low temperature resistance, but only to about -62ºC (-80ºF). Class 2B material also possesses low compression set.

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

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 -70ºC (-94ºF) and 204ºC (400ºF).

7.5 Part identification number (PIN). The following PIN procedure is for government purposes and does not constitute a requirement for the contractor.

The example describes a part numbering system for CID A-A-59588.



7.6 Key words.

Class
Flex resistant
Grade
Low composition

7.7 Changes from previous issue. The margins of this specification are marked with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

MILITARY INTERESTS:

Custodians
Army – MR
Navy – AS
Air Force – 11

Reviewers
Army – AR, CR, CR4, GL, MD, MI, SM
Navy – OS, SH
Air Force – 84, 99

CIVIL AGENCY COODINATION ACTIVITY:
GSA-FAS

Preparing activity:
DLA – IS

(Project 9320-2012-015)

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