

INCH-POUND

A-A-59588A
7 July 2005
SUPERSEDING
A-A-59588
12 January 2001

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

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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, 200, 500, or 1000 feet per coil. Each coil shall contain not more than three individual lengths of tubing per 100 feet. No individual length of tubing shall be less than 15 feet.

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							
CLASS	GRADE	UNAGED					AFTER OVEN AGING <u>2/</u>		
		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 % <u>1/</u> 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 100°C (212°F)

Classes 1B, 2A, 2B – 70 hours at 150°C (302°F)

Classes 3A, 3B – 70 hours at 100°C (212°F)

2/ After oven aging: Classes 1A, 1B, 2A, 2B – 70 hours at 225°C (437°F)

Classes 3A, 3B – 70 hours at 200°C (392°F)

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

		PROPERTY VALUES AND RECOMMENDED ASTM TEST METHODS					
CLASS	GRADE	LOW TEMPERATURE REQUIREMENTS		AFTER WATER IMMERSIONS 4/	OTHER REQUIREMENTS		
		Brittle point, minimum °C (°F) 3/ ASTM D 2137	Torsional stiffness Ratio hours at -75°C, 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

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

4/ 70 hours at 100°C (212°F)

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)
	<u>Above</u>	<u>Inclusive</u>		<u>Above</u>	<u>Inclusive</u>		
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.)

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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

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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 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 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>

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

- a. Title, number, and date of this document.
- b. Class and grade required (see 2).
- 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 converted ZZ-R-765 slash sheet CIDs and their titles numerically by shape to allow cross reference to the slash sheets. The shape numbers that appear in the CID titles correspond directly to the former slash sheet numbers for ZZ-R-765 (e.g., ZZ-R-765/10, corresponds to CID A-A-55754, Rubber Silicone, Round Section, Shape 10 in table VII).

TABLE VII. Commercial item descriptions that replaced former ZZ-R-765 slash sheets, (see 7.3)

A-A-55450	Rubber, Silicone; Channel, Nonmetallic, Shape 1	A-A-55761	Rubber, Silicone; Strip, Shape 17
A-A-55449	Rubber, Silicone; Channel, Nonmetallic, Shape 2	A-A-55762	Rubber, Silicone; Strip Shape 18
A-A-55451	Rubber, Silicone; Channel, Nonmetallic, Shape 3	A-A-55763	Rubber, Silicon; Nonmetallic, Special Shaped Section, Shape 19
A-A-55452	Rubber, Silicone; Channel, Nonmetallic, Shape 4	A-A-55764	Rubber, Silicone; Nonmetallic, Special Shaped Section, Shape 20
A-A-55749	Rubber, Silicone; Channel, Nonmetallic, Shape 5	A-A-55765	Rubber, Silicone; Nonmetallic, Special Shaped Section, Shape 21
A-A-55750	Rubber, Silicone; Nonmetallic, Shape 6	A-A-55766	Rubber, Silicone; Nonmetallic, Special Shaped Section, Shape 22
A-A-55751	Rubber, Silicone; Channel, Nonmetallic, Shape 7	A-A-55767	Rubber, Silicone; Nonmetallic, Special Shaped Section, Shape 23
A-A-55752	Rubber, Silicone; Channel, Nonmetallic, Shape 8	A-A-55768	Rubber, Silicone; Nonmetallic, Special Shaped Section, Shape 24
A-A-55753	Rubber, Silicone; Tubing, Nonmetallic, Round, Flexible, Shape 9	A-A-55769	Rubber, Silicone; Nonmetallic, Special Shaped Section, Shape 25
A-A-55754	Rubber, Silicone; Round Section, Shape 10	A-A-55770	Rubber, Silicone; Nonmetallic, Special Shaped Section, Shape 26
A-A-55755	Rubber, Silicone; Packing Material, Shape 11	A-A-55771	Rubber, Silicone; Nonmetallic, Special Shaped Section, Shape 27
A-A-55756	Rubber, Silicone; Packing Material, Shape 12	A-A-55772	Rubber, Silicone; Nonmetallic, Special Shaped Section, Shape 28
A-A-55757	Rubber, Silicone; Gasket, Shape 13	A-A-55773	Rubber, Silicone; Nonmetallic, Special Shaped Section, Shape 29
A-A-55758	Rubber, Silicone; Gasket, Shape 14	A-A-55774	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 30
A-A-55759	Rubber, Silicone; Rubber Sheet Solid, Shape 15	A-A-55775	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 31
A-A-55760	Rubber, Silicone; Strip Shape 16	A-A-55776	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 32

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TABLE VII. Related commercial item descriptions. (Formerly ZZ-R-765 slash sheets) (Continued)

A-A-55777	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 33	A-A-55790	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 46
A-A-55778	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 34	A-A-55791	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 47
A-A-55779	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 35	A-A-55802	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 48
A-A-55780	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 36	A-A-55792	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 49
A-A-55781	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 37	A-A-55793	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 50
A-A-55782	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 38	A-A-55794	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 51
A-A-55783	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 39	A-A-55795	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 52
A-A-55784	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 40	A-A-55796	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 53
A-A-55785	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 41	A-A-55797	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 54
A-A-55786	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 42	A-A-55798	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 55
A-A-55787	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 43	A-A-55799	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 56
A-A-55788	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 44	A-A-55800	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 57
A-A-55789	Rubber, Silicone; Nonmetallic Special Shaped Section, Shape 45	A-A-55801	Rubber, Silicone; Packing Preformed, Shape 58

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 -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.

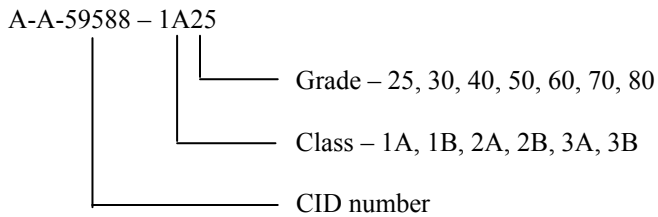
Class 3A - Where resistance to extreme low temperature to approximately -75°C (-103°F), and resistance to tearing and flexing are required. Class 3A material also possesses resistance to extreme high temperature to approximately 204°C (400°F).

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).

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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.



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-FSS

Preparing activity:
DLA – IS

(Project 9320-0051)

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