

 AEROSPACE MATERIAL SPECIFICATION	SAE AMS-DTL-23053/5		REV. A
	Issued	1999-07	
	Revised	2012-07	
Superseding AMS-DTL-23053/5			
(R) Insulation Sleeving, Electrical, Heat Shrinkable, Polyolefin, Flexible, Crosslinked			
FSC 5970			

RATIONALE

Revise to include comments received by the government and industry, update references, align specification with SAE guidelines, and review specification for known technical problems.

The requirements for acquiring the sleeving described herein shall consist of this specification sheet and the issue of the following specification listed in that issue of the Department of Defense Index of Specifications and Standards (DODISS) specified in the solicitation: MIL-DTL-23053.

REQUIREMENTS

Polymer Type: The base polymer used in formulating this sleeving shall be a polyolefin.

Continuous operating temperature range: Classes 1 and 2: -67 °F (-55 °C) to +275 °F (+135 °C);
Class 3: -13 °F (-25 °C) to +257 °F (+125 °C).

Classification: The heat shrinkable sleeving shall be furnished in the following classes, as specified (See 6.4a and 6.8)

Class 1 - Flame resistant

Class 2 - Flammable (clear only)

Class 3 - Highly flame resistant

Color: Class 2 shall be furnished in clear. Classes 1 and 3 shall be furnished in colors only. Colors shall conform to the requirements of Class 1 of MIL-STD-104 (See 1.2.1 and 3.4.2.1).

Longitudinal change: Classes 1 and 2: ±5% percent, Class 1 - overexpanded sleeving +5, -50 percent; Class 3: +1, -10 percent.

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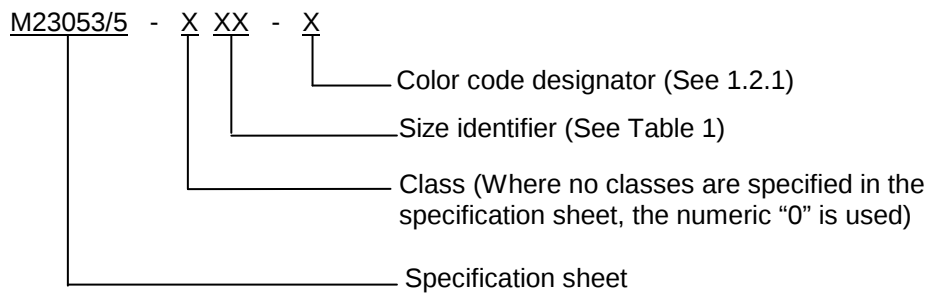
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Military part number: The Military part number shall consist of the basic number of this specification sheet and dash numbers as follows:



Example: Class 1, gray (slate), 0.250 inch (6.35 mm) as supplied ID sleeving shall be identified as M23053/5-106-8.

TABLE 1 - CONSTRUCTION DETAILS, INCH (MM) ^{1/}

Military Part Number <u>3/</u>	As Supplied ID minimum	After Unrestricted Shrinkage	
		ID maximum	Wall Thickness <u>2/</u>
<u>Class 1</u>			
M23053/5-101-*	0.046 (1.17)	0.023 (0.58)	0.016 ± 0.003 (0.406 ± 0.076)
M23053/5-102-*	0.063 (1.60)	0.031 (0.79)	0.017 ± 0.003 (0.432 ± 0.076)
M23053/5-103-*	0.093 (2.36)	0.046 (1.17)	0.020 ± 0.003 (0.508 ± 0.076)
M23053/5-104-*	0.125 (3.18)	0.062 (1.58)	0.020 ± 0.003 (0.508 ± 0.076)
M23053/5-105-*	0.187 (4.75)	0.093 (2.36)	0.020 ± 0.003 (0.508 ± 0.076)
M23053/5-106-*	0.250 (6.35)	0.125 (3.18)	0.025 ± 0.003 (0.635 ± 0.076)
M23053/5-107-*	0.375 (9.53)	0.187 (4.75)	0.025 ± 0.003 (0.635 ± 0.076)
M23053/5-108-*	0.500 (12.70)	0.250 (6.35)	0.025 ± 0.003 (0.635 ± 0.076)
M23053/5-109-*	0.750 (19.05)	0.375 (9.53)	0.030 ± 0.003 (0.762 ± 0.076)
M23053/5-110-*	1.000 (25.40)	0.500 (12.70)	0.035 ± 0.005 (0.889 ± 0.127)
M23053/5-111-*	1.500 (38.10)	0.750 (19.05)	0.040 ± 0.006 (1.016 ± 0.152)
M23053/5-112-*	2.000 (50.80)	1.000 (25.40)	0.045 ± 0.007 (1.143 ± 0.178)
M23053/5-113-*	3.000 (76.20)	1.500 (38.10)	0.050 ± 0.008 (1.270 ± 0.203)
M23053/5-114-*	4.000 (101.60)	2.000 (50.80)	0.055 ± 0.009 (1.397 ± 0.229)
Class 1 OVEREXPANDED			
M23053/5-115-*	1.000 (25.40)	0.275 (6.99)	0.045 ± 0.007 (1.143 ± 0.178)
M23053/5-116-*	2.000 (50.80)	0.550 (13.97)	0.045 ± 0.007 (1.143 ± 0.178)
M23053/5-117-*	3.000 (76.20)	0.810 (20.57)	0.045 ± 0.007 (1.143 ± 0.178)
M23053/5-118-*	4.000 (101.60)	1.050 (26.67)	0.045 ± 0.007 (1.143 ± 0.178)
M23053/5-119-*	1.000 (25.40)	0.462 (11.73)	0.045 ± 0.007 (1.143 ± 0.178)
M23053/5-120-*	2.375 (60.33)	0.680 (17.27)	0.045 ± 0.007 (1.143 ± 0.178)
M23053/5-121-*	3.000 (76.20)	0.840 (21.34)	0.045 ± 0.007 (1.143 ± 0.178)
M23053/5-122-*	3.750 (95.25)	0.930 (23.62)	0.045 ± 0.007 (1.143 ± 0.178)
M23053/5-123-*	4.500 (114.30)	1.450 (36.83)	0.045 ± 0.007 (1.143 ± 0.178)

TABLE 1 - CONSTRUCTION DETAILS, INCH (MM) 1/ (CONTINUED)

Military Part Number <u>3/</u>	As Supplied ID minimum	After Unrestricted Shrinkage	
		ID maximum	Wall Thickness <u>2/</u>
<u>Class 2</u>			
M23053/5-201-C	0.046 (1.17)	0.023 (0.58)	0.016 ± 0.003 (0.406 ± 0.076)
M23053/5-202-C	0.063 (1.60)	0.031 (0.79)	0.017 ± 0.003 (0.432 ± 0.076)
M23053/5-203-C	0.093 (2.36)	0.046 (1.17)	0.020 ± 0.003 (0.508 ± 0.076)
M23053/5-204-C	0.125 (3.18)	0.062 (1.58)	0.020 ± 0.003 (0.508 ± 0.076)
M23053/5-205-C	0.187 (4.75)	0.093 (2.36)	0.020 ± 0.003 (0.508 ± 0.076)
M23053/5-206-C	0.250 (6.35)	0.125 (3.18)	0.025 ± 0.003 (0.635 ± 0.076)
M23053/5-207-C	0.375 (9.53)	0.187 (4.75)	0.025 ± 0.003 (0.635 ± 0.076)
M23053/5-208-C	0.500 (12.70)	0.250 (6.35)	0.025 ± 0.003 (0.635 ± 0.076)
M23053/5-209-C	0.750 (19.05)	0.375 (9.53)	0.030 ± 0.003 (0.762 ± 0.076)
M23053/5-210-C	1.000 (25.40)	0.500 (12.70)	0.035 ± 0.005 (0.889 ± 0.127)
M23053/5-211-C	1.500 (38.10)	0.750 (19.05)	0.040 ± 0.006 (1.016 ± 0.152)
M23053/5-212-C	2.000 (50.80)	1.000 (25.40)	0.045 ± 0.007 (1.143 ± 0.178)
M23053/5-213-C	3.000 (76.20)	1.500 (38.10)	0.050 ± 0.008 (1.270 ± 0.203)
M23053/5-214-C	4.000 (101.60)	2.000 (50.80)	0.055 ± 0.009 (1.397 ± 0.229)
<u>Class 3</u>			
M23053/5-301-*	0.046 (1.17)	0.023 (0.58)	0.016 ± 0.003 (0.406 ± 0.076)
M23053/5-302-*	0.063 (1.60)	0.031 (0.79)	0.017 ± 0.003 (0.432 ± 0.076)
M23053/5-303-*	0.093 (2.36)	0.046 (1.17)	0.020 ± 0.003 (0.508 ± 0.076)
M23053/5-304-*	0.125 (3.18)	0.062 (1.58)	0.020 ± 0.003 (0.508 ± 0.076)
M23053/5-305-*	0.187 (4.75)	0.093 (2.36)	0.020 ± 0.003 (0.508 ± 0.076)
M23053/5-306-*	0.250 (6.35)	0.125 (3.18)	0.025 ± 0.003 (0.635 ± 0.076)
M23053/5-307-*	0.375 (9.53)	0.187 (4.75)	0.025 ± 0.003 (0.635 ± 0.076)
M23053/5-308-*	0.500 (12.70)	0.250 (6.35)	0.025 ± 0.003 (0.635 ± 0.076)
M23053/5-309-*	0.750 (19.05)	0.375 (9.53)	0.030 ± 0.003 (0.762 ± 0.076)
M23053/5-310-*	1.000 (25.40)	0.500 (12.70)	0.035 ± 0.005 (0.889 ± 0.127)
M23053/5-311-*	1.500 (38.10)	0.750 (19.05)	0.040 ± 0.006 (1.016 ± 0.152)

1/ Diameter limits for object to be enclosed shall be as recommended in technical data.

2/ Wall thickness values are less when shrinkage is restricted.

3/ The asterisk in the part number shall be replaced by color code designations (See 1.2.1).

Unrestricted shrinkage: Test method 4.6.5: 392 °F ± 4 (200 °C ± 2) for 3 minutes.

TABLE 2 - PHYSICAL PROPERTIES 1/

Characteristic	Requirement	Test Procedure and Condition
<u>As supplied:</u>		
ID, minimum	Table 1	4.6.3.1.1
Heat shock	No cracks, flowing or dripping	4.6.8 Classes 1 and 2: $482^{\circ}\text{F} \pm 6$ ($250^{\circ}\text{C} \pm 3$); Class 3: $437^{\circ}\text{F} \pm 6$ ($225^{\circ}\text{C} \pm 3$)
Secant modulus, psi (MPa), max.	25 000 (172.4)	4.6.12.1 2% strain, ASTM D882
Concentricity	70% minimum (50% minimum for over expanded sizes)	4.6.3.3
Color stability	Pass	4.6.15 $347^{\circ}\text{F} \pm 4$ ($175^{\circ}\text{C} \pm 2$), 24 hours
Clarity stability, Class 2	Pass	4.6.16 $347^{\circ}\text{F} \pm 4$ ($175^{\circ}\text{C} \pm 2$), 24 hours
Restricted shrinkage	No cracks	4.6.6 $347^{\circ}\text{F} \pm 4$ ($175^{\circ}\text{C} \pm 2$)
Voltage withstand	Pass	4.6.6.3
<u>After unrestricted shrinkage:</u>		
ID, maximum	Table 1	4.6.3.1.2
Wall thickness	Table 1	4.6.3.2
Tensile strength, psi (MPa), minimum	1500 (10.3)	4.6.13 ASTM D638, 20 inches/minute
Ultimate elongation, percent, minimum	200	4.6.13 ASTM D638, 20 inches/minute
Dielectric strength, volts/mil (Kv/mm), minimum	500 (19.7)	4.6.2 ASTM D2671
Volume resistivity, Ohm-cm, minimum	10^{14}	4.6.2 ASTM D876
Dielectric constant, maximum 3/	Class 1 & 3 – 3.1 Class 2 – 2.7	4.6.2 ASTM D150
Specific gravity, maximum	Class 1 – 1.35 Class 2 – 1.00 Class 3 – 1.50	4.6.2 ASTM D792
Water absorption, percent, maximum	0.5	4.6.2 ASTM D570, 24 hours at 73°F (23°C)

TABLE 2 - PHYSICAL PROPERTIES 1/ (CONTINUED)

Characteristic	Requirement	Test Procedure and Condition
Corrosion	No corrosion	4.6.10.1 and 4.5.10.2, 347 °F ± 4 (175 °C ± 2), 16 hours
Low temperature flexibility	No cracking	4.6.7.1 Classes 1 & 2: -67 °F ± 2 (-55 °C ± 1); Class 3: -13 °F ± 2 (-25 °C ± 1)
Flammability	Class 1 – self-extinguishing within 1 minute and no more than 25% of indicator flag burned or charred. No dripping, flowing or large sizes; Class 2 – N/A; Class 3 – 4/	4.6.14 Procedure B ASTM D2671 4.6.14 Procedure C ASTM D2671 4.6.9 for 168 hours, Classes 1 & 2: 347 °F ± 4 (175 °C ± 2) Class 3: 302 °F ± 4 (150 °C ± 2)
Heat resistance, properties after:		
Ultimate elongation, percent, minimum	100	
Fluid resistance, properties after:		4.6.11
Tensile strength, psi (MPa), minimum	1000 (6.9)	
Dielectric strength, volt/mil (Kv/mm), minimum	400 (15.8)	
Fungus resistance 2/	No Growth	4.6.2 ASTM G21
properties after:	or	4.6.17
Tensile Strength, psi (MPa), minimum	1500 (10.3)	
Ultimate elongation, percent, minimum	200	
Dielectric strength, volts/mil (Kv/mm), minimum	500 (19.7)	