FEDERAL SUPPLY CLASS
5970

RATIONALE

INNER MELTABLE WALL THICKNESS IS A REQUIRED CHARACTERISTIC REQUIRED ON THE DETAIL SPECIFICATION.

AS23053/4A HAS BEEN REAFFIRMED TO COMPLY WITH THE SAE FIVE-YEAR REVIEW POLICY.

NOTICE

THE COMPLETE REQUIREMENTS FOR PROCURING THE PRODUCT DESCRIBED HEREIN SHALL CONSIST OF THIS DOCUMENT AND THE LATEST ISSUE OF AS23053.

REQUIREMENTS:

1. DIMENSIONS AND PROPERTIES IN INCH/POUND UNITS AND THE FAHRENHEIT TEMPERATURES ARE PRIMARY; DIMENSIONS AND PROPERTIES IN SI UNITS AND THE CELSIUS TEMPERATURES ARE SHOWN AS THE APPROXIMATE EQUIVALENTS OF THE PRIMARY UNITS AND ARE PRESENTED ONLY FOR INFORMATION.

2. POLYMER TYPE: THE BASE POLYMER USED IN FORMULATING THE OUTER WALL OF THIS SLEEVING SHALL BE POLYOLEFIN.

3. CONTINUOUS OPERATING TEMPERATURE RANGE: -67 TO +230 °F (-55 TO +110 °C).

4. COMPOSITION: THE HEAT SHRINKABLE SLEEVING SHALL CONSIST OF A CROSSLINKED OUTER WALL WHICH SHRINKS AND AN INNER WALL WHICH FLOWS UPON THE APPLICATION OF HEAT.

5. COLOR: THE HEAT SHRINKABLE SLEEVING SHALL BE FURNISHED IN THE COLOR SPECIFIED BY THE ACQUISITION ACTIVITY (SEE 7.3.B); HOWEVER, BLACK SHALL BE CONSIDERED STANDARD. COLORS SHALL CONFORM TO THE REQUIREMENTS OF CLASS 1 OF MIL-STD-104 (SEE 1.3 AND 3.3.3).

6. CLASS: THE SLEEVING SHALL BE FURNISHED IN THE FOLLOWING CLASSES, AS SPECIFIED (SEE 7.3.A):

   CLASS 1 - SEMI-RIGID, NON-FLAME RETARDANT
   CLASS 2 - FLEXIBLE, FLAME RETARDANT
   CLASS 3 - FLEXIBLE, FLAME RETARDANT, HIGH EXPANSION

   NOTICE: CLASS 1 SLEEVING IS NOT INTENDED FOR AEROSPACE USE (SEE FLAMMABILITY SECTION BELOW).

7. LONGITUDINAL CHANGE:

   CLASS 1 - +1, -10%
   CLASS 2 - +1, -10%
   CLASS 3 - +1, -15%

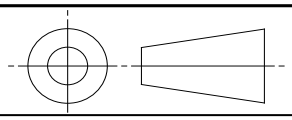
8. DIMNENSIONAL LIFE: THE DIMENSIONAL LIFE OF A PRODUCT APPLIES TO THE EXPANDED ID, RECOVERED ID, AND WALL THICKNESS DIMENSIONS OF THE PRODUCT AS SOLD BY THE MANUFACTURER, DISTRIBUTORS, AND REBRAND DISTRIBUTORS. AS23053/4 PRODUCTS CAN BE EXPECTED TO HAVE A MINIMUM DIMENSIONAL LIFE OF 3 YEARS WHEN STORED BETWEEN 32 TO 95 °F (0 TO 35 °C). PRODUCTS STORED ABOVE THESE CONDITIONS MAY NOT MEET THE MINIMUM EXPANDED ID REQUIREMENTS OF THE DETAIL SPECIFICATION. A PRODUCT MAY BE USED BY THE FINAL PURCHASER BEYOND THE EXPECTED MINIMUM DIMENSIONAL LIFE, AS LONG AS THE EXPANDED ID, RECOVERED ID AND WALL THICKNESS OF THE PRODUCT MEET THE REQUIREMENTS OF THIS SPECIFICATION AT THE TIME OF USE.

9. UNRESTRICTED SHRINKAGE: TEST METHOD 5.5.2; 392 °F ± 4 °F (200 °C ± 2 °C) FOR 10 MINUTES MAXIMUM.

NOTE: THE TERM “POLYOLEFIN” AS USED IN THIS DOCUMENT INCLUDES COPOLYMERS, BLENDS AND MODIFIED POLYOLEFINS.

For more information on this standard, visit
https://www.sae.org/standards/content/AS23053/4A/

THIRD ANGLE PROJECTION



ISSUED 2016-10 REVISED 2018-09 REAFFIRMED 2023-12

CUSTODIAN: AE-8/AE-8D

PROCUREMENT SPECIFICATION: AS23053

SAE INTERNATIONAL

AEROSPACE STANDARD

INSULATION SLEEVING, ELECTRICAL, HEAT SHRINKABLE, POLYOLEFIN 1/, DUAL-WALL, OUTER WALL CROSSLINKED

10. PART NUMBER: THE PART NUMBER SHALL BE AS LISTED BELOW:

M23053 /4 - X XX - X

- X: COLOR CODE DESIGNATOR (SEE REQUIREMENTS)
- XX: SIZE IDENTIFIER (SEE TABLE 1)
- X: CLASS (WHERE NO CLASSES ARE SPECIFIED ON THE DETAIL SHEET, THE NUMERIC "0" SHALL BE USED)
- /4: DETAIL SPECIFICATION SHEET
- M23053: PROCUREMENT SPECIFICATION

EXAMPLE: CLASS 1, BLACK SLEEVING .750 INCH (19.1 MM) AS SUPPLIED ID SLEEVING SHALL BE IDENTIFIED AS M23053/4-106-0.

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

PART NUMBER 3/	AS SUPPLIED ID MINIMUM	AFTER UNRESTRICTED SHRINKAGE		INNER MELTABLE WALL THICKNESS NOMINAL
		ID MAXIMUM	TOTAL WALL THICKNESS 1/ 2/	
CLASS 1				
M23053/4-101-*	.125 (3.2)	.023 (0.6)	.038 ± .006 (1.0 ± 0.2)	.020 (0.5)
M23053/4-102-*	.187 (4.7)	.060 (1.5)	.043 ± .006 (1.1 ± 0.2)	.025 (0.6)
M23053/4-103-*	.250 (6.4)	.080 (2.0)	.047 ± .007 (1.2 ± 0.2)	.027 (0.7)
M23053/4-104-*	.375 (9.5)	.135 (3.4)	.050 ± .007 (1.3 ± 0.2)	.030 (0.8)
M23053/4-105-*	.500 (12.7)	.195 (5.0)	.055 ± .007 (1.4 ± 0.2)	.035 (0.9)
M23053/4-106-*	.750 (19.1)	.313 (8.0)	.065 ± .007 (1.7 ± 0.2)	.040 (1.0)
M23053/4-107-*	1.000 (25.4)	.400 (10.2)	.075 ± .007 (1.9 ± 0.2)	.040 (1.0)
M23053/4-108-*	.300 (7.6)	.050 (1.3)	.100 ± .008 (2.5 ± 0.2)	.065 (1.7)
CLASS 2				
M23053/4-201-*	.238 (6.0)	.125 (3.2)	.029 ± .005 (0.7 ± 0.1)	.004 (0.1)
M23053/4-202-*	.355 (9.0)	.187 (4.7)	.029 ± .005 (0.7 ± 0.1)	.004 (0.1)
M23053/4-203-*	.475 (12.1)	.250 (6.4)	.030 ± .005 (0.8 ± 0.1)	.005 (0.1)
M23053/4-204-*	.712 (18.1)	.375 (9.5)	.035 ± .005 (0.9 ± 0.1)	.005 (0.1)
M23053/4-205-*	.950 (24.1)	.500 (12.7)	.042 ± .007 (1.1 ± 0.2)	.007 (0.2)
M23053/4-206-*	1.425 (36.2)	.750 (19.1)	.047 ± .008 (1.2 ± 0.2)	.007 (0.2)
CLASS 3				
M23053/4-301-*	.120 (3.0)	.040 (1.0)	.040 ± .010 (1.0 ± 0.3)	.020 (0.5)
M23053/4-302-*	.240 (6.1)	.080 (2.0)	.040 ± .010 (1.0 ± 0.3)	.020 (0.5)
M23053/4-303-*	.470 (11.9)	.160 (4.1)	.070 ± .014 (1.8 ± 0.4)	.030 (0.8)
M23053/4-304-*	.940 (23.9)	.320 (8.1)	.100 ± .020 (2.5 ± 0.5)	.040 (1.0)
M23053/4-305-*	1.570 (39.9)	.510 (13.0)	.100 ± .020 (2.5 ± 0.5)	.040 (1.0)

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 1.3).

TABLE 2 - PHYSICAL PROPERTIES

CHARACTERISTIC	REQUIREMENT	TEST PROCEDURE AND CONDITION (SEE AS23053)
AS SUPPLIED:		
ID, MINIMUM	TABLE 1	5.3.1
COLD IMPACT	NO CRACKING	5.7.2; ASTM D746, -67 °F ± 4 °F (-55 °C ± 2 °C)
HEAT SHOCK	NO CRACKS, FLOWING, OR DRIPPING OF OUTER WALL	5.8; 482 °F ± 6 °F (250 °C ± 3 °C); 1/
SEALING EFFICIENCY (CLASSES 1 AND 3 ONLY)	NO OPENINGS ON REHEAT	2/
SECANT MODULUS, PSI (MPa) 5/	CLASS 1 – 25000 (172) MINIMUM CLASSES 2 AND 3 – 25000 (172) MAXIMUM	5.12.1; ASTM D882, 2% STRAIN
COLOR STABILITY	PASS	5.15; 347 °F ± 4 °F (175 °C ± 2 °C), 24 HOURS
AFTER UNRESTRICTED SHRINKAGE:		
ID, MAXIMUM	TABLE 1	5.3.2
WALL THICKNESS	TABLE 1	5.3.3
TENSILE STRENGTH, PSI (MPa), MINIMUM 5/	CLASSES 1 AND 2 – 1500 (10.3) CLASS 3 – 1300 (9.0)	5.13; ASTM D638 CLASS 1 – 2 INCHES/MINUTE CLASSES 2 AND 3 – 20 INCHES/MINUTE
ULTIMATE ELONGATION, PERCENT MINIMUM	CLASSES 1 AND 2 – 200 CLASS 3 – 250	5.13; ASTM D638 CLASS 1 – 2 INCHES/MINUTE CLASSES 2 AND 3 – 20 INCHES/MINUTE
DIELECTRIC STRENGTH, VOLTS/MIL (KV/MM), MINIMUM	CLASSES 1 AND 2 – 500 (19.7) CLASS 3 – 300 (11.8)	5.2; ASTM D2671
VOLUME RESISTIVITY, OHM-CM, MINIMUM	CLASS 1 – 1 X 10^{14} CLASSES 2 AND 3 – 1 X 10^{12}	5.2; ASTM D876
FLAMMABILITY	CLASS 1 – N/A; CLASS 2 AND 3 – OUTER JACKET SELF-EXTINGUISHING WITHIN ONE MINUTE, NO MORE THAN 25% OF INDICATOR FLAG BURNED OR CHARRED	5.14; PROCEDURE B ASTM D2671
CORROSION	NO CORROSION	5.10.1 AND 5.10.2; 250 °F ± 4 °F (121 °C ± 2 °C) FOR 16 HOURS

TABLE 2 - PHYSICAL PROPERTIES (CONTINUED)

CHARACTERISTIC	REQUIREMENT	TEST PROCEDURE AND CONDITION (SEE AS23053)
WATER ABSORPTION, PERCENT, MAXIMUM	CLASS 1 - 0.5 CLASS 2 - 0.5 CLASS 3 - 1.0	5.2; ASTM D570, 24 HOURS AT 73 °F (23 °C)
HEAT RESISTANCE, PROPERTIES AFTER:		5.9 3/
VISUAL INSPECT AND BEND TEST	NO DRIPPING, FLOWING OF OUTER WALL. NO CRACKS	
FLUID RESISTANCE, PROPERTIES AFTER:		5.11
TENSILE STRENGTH, PSI (MPa), MINIMUM 5/	CLASS 1 AND 2 - 1000 (6.9) CLASS 3 - 900 (6.2)	
DIELECTRIC STRENGTH, VOLTS/MIL (KV/MM), MINIMUM	CLASSES 1 AND 2 - 400 (15.8) CLASS 3 - 200 (7.9)	
FUNGUS RESISTANCE 4/	NO GROWTH OR	5.17; ASTM G21
PROPERTIES AFTER:		5.17; ISO 846
TENSILE STRENGTH, PSI (MPa), MINIMUM 5/	CLASSES 1 AND 2 - 1500 (10.3) CLASS 3 - 1300 (9.0)	
ULTIMATE ELONGATION, PERCENT, MINIMUM	CLASSES 1 AND 2 - 200 CLASS 3 - 250	
DIELECTRIC STRENGTH, VOLTS/MIL (KV/MM), MINIMUM	CLASSES 1 AND 2 - 500 (19.7) CLASS 3 - 300 (11.8)	

1/ USE MANDREL SIZES SPECIFIED IN FOOTNOTE 3/.

2/ SEALING EFFICIENCY: A 6-INCH LENGTH OF SLEEVING SHALL BE HEATED IN AN OVEN AT 392 °F ± 4 °F (200 °C ± 2 °C) FOR 3 MINUTES. A PAIR OF PLIERS SHALL BE PRE-CONDITIONED IN AN OVEN AT 392 °F ± 4 °F (200 °C ± 2 °C) FOR 10 MINUTES. WITHIN 5 SECONDS AFTER REMOVAL FROM THE OVEN, APPROXIMATELY .25 INCH (6.35 MM) OF ONE END OF THE SLEEVING SHALL BE PRESSED TOGETHER WITH SUFFICIENT PRESSURE FROM THE PAIR OF PLIERS SO THE SURFACES ARE IN FULL CONTACT AND THE PRESSURE HELD FOR 20 TO 40 SECONDS. ALLOW THE SLEEVING TO CONDITION AT ROOM TEMPERATURE FOR 10 MINUTES. REHEAT THE SLEEVING IN A 302 °F (150 °C) OVEN FOR 5 MINUTES. REMOVE FROM THE OVEN AND ALLOW THE SLEEVING TO CONDITION TO ROOM TEMPERATURE FOR A MINIMUM OF 10 MINUTES. SUBMERGE THE PRESSED TOGETHER PORTION OF THE SLEEVING 1 INCH (2.5 MM) MINIMUM IN ROOM TEMPERATURE WATER AND PRESSURIZE THE OPEN END OF THE SLEEVING AT 3 PSI MINIMUM FOR NO LESS THAN 5 SECONDS. ANY EMANATING AIR BUBBLES THROUGH THE PRESSED TOGETHER PORTION OF THE SLEEVING SHALL CONSTITUTE A FAILURE.

3/ 347 °F ± 4 °F (175 °C ± 2 °C) FOR 168 HOURS FOLLOWED BY A MANDREL BEND TEST AT ROOM TEMPERATURE. THE SLEEVING SHALL BE BENT THROUGH 360° IN 10 SECONDS ± 2 SECONDS. MANDREL SIZE SHALL BE AS FOLLOWS:

NOMINAL SLEEVING ID INCH (MM) MINIMUM, AS SUPPLIED	MANDREL DIAMETER INCH (MM)
.120 TO .250 (3.05 TO 6.35)	.438 (11.13)
OVER .250 TO .750 (6.35 TO 19.05)	.500 (12.70)
OVER .750 (19.05)	.563 (14.30)

4/ AS23053/4 MATERIALS DO NOT NORMALLY SUPPORT FUNGUS GROWTH. PERFORMANCE OF THIS REQUIREMENT IS ONLY WHEN SPECIFIED BY THE ACQUISITION ACTIVITY (SEE 7.3).

5/ TENSILE SHALL BE CALCULATED BASED UPON OUTER WALL THICKNESS.