



AEROSPACE MATERIAL SPECIFICATION

AMS-DTL-23053™

REV. A

Issued 1999-07
Cancelled 2018-12

Superseded by AS23053

Insulation Sleeving, Electrical, Heat Shrinkable,
General Specification For

FSC 5970

RATIONALE

AMS-DTL-23053 sleeves are qualified per self-certification by manufacturing sources. AS23053 was created to meet requests of users and government to implement the qualification by the QPL process. In order to effectively implement the qualification by QPL, AMS-DTL-23053 must be cancelled to prevent qualification by self-certification. Parts are identified with M23053/xx-xxx designation. Having both qualification methods available for the same part will create confusion and not meet the user/government requests.

Cancellation of this specification was delayed until the publication of QPL. The QPL to AS23053 has been published.

AS23053 totally replaces the requirements of AMS-DTL-23053.

CANCELLATION NOTICE

This Technical Report has been declared "CANCELLED" as of December 2018 and has been superseded by AS23053. By this action, this document will remain listed in the respective index, if applicable. Cancelled Technical Reports are available from SAE.

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NOTICE

This document has been taken directly from U.S. Military Specification MIL-DTL-23053E, Supplement 1A and contains only minor editorial and format changes required to bring it into conformance with the publishing requirements of SAE technical standards. The initial release of this document is intended to replace MIL-DTL-23053E, Supplement 1A. Any part numbers established by the original specification remain unchanged.

The original Military Specification was adopted as an SAE standard under the provisions of the SAE Technical Standards Board (TSB) Rules and Regulations (TSB 001) pertaining to accelerated adoption of government specifications and standards. TSB rules provide for (a) the publication of portions of unrevised government specifications and standards without consensus voting at the SAE Committee level, and (b) the use of the existing government specification or standard format.

Under Department of Defense policies and procedures, any qualification requirements and associated qualified products lists are mandatory for DOD contracts. Any requirement relating to qualified products lists (QPL's) has not been adopted by SAE and is not part of this SAE technical document.

1. SCOPE:

1.1 Scope:

This specification establishes the requirements for various types and colors of electrical insulating sleeving that will shrink to a predetermined size upon the application of heat. This specification includes provisions for demonstrating compliance with requirements through in process inspection and statistical process control (see 4.4.3.1). Continuous operating temperature ratings range from -80° to +250°C (-112° to +482°F) (see 6.1).

1.2 Classification:

The heat shrinkable sleeving class shall be of the applicable military specification sheet, as specified (see 6.2).

1.2.1 Color: The color shall be identified in accordance with the following:

<u>Designator</u>	<u>Color</u>	<u>Designator</u>	<u>Color</u>
0	Black	7	Violet (Purple)
1	Brown	8	Gray (Slate)
2	Red	9	White
3	Orange	C	Clear
4	Yellow	P	Pink
5	Green	T	Tan
6	Blue		

2. APPLICABLE DOCUMENTS:

The following publications, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

2.1 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

A-A-694	Sodium Chloride, Technical
MIL-H-5606	Hydraulic Fluid, Petroleum Base, Aircraft, Missile and Ordnance
MIL-T-5624	Turbine Fuel, Aviation, Grades JP-4, JP-5 and JP5/JP8 ST
MIL-L-7808	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base, NATO Code Number 0-148
MIL-A-8243	Anti-Icing and Deicing-Defrosting Fluid
MIL-L-23699	Lubricating Oil, Aircraft Turbine Engines, Synthetic Base NATO Code Number 0-156
MIL-F-46162	Fuel, Diesel, Referee Grade

2.1 (Continued):

FED-STD-228	Cable and Wire, Insulated, Methods of Testing
MIL-STD-104	Limit for Electrical Insulation Color
MIL-DTL-23053/1C	Insulation Sleeving, Electrical, Heat Shrinkable, Chlorinated Polyolefin, Crosslinked, Flexible
MIL-I-23053/2C	Insulation Sleeving, Electrical, Heat Shrinkable, Polyvinyl Chloride, Flexible, Crosslinked and Non-Crosslinked (Inactive for New Design)
MIL-I-23053/3A	Insulation Sleeving, Electrical, Heat Shrinkable, Polyvinyl Chloride, Semi-Rigid, Crosslinked and Non-Crosslinked (Inactive for New Design)
MIL-DTL-23053/4D	Insulation Sleeving, Electrical, Heat Shrinkable, Polyolefin, Dual-Wall, Rigid Outer Wall Crosslinked
MIL-DTL-23053/5C	Insulation Sleeving, Electrical, Heat Shrinkable, Polyolefin, Flexible, Crosslinked
MIL-DTL-23053/6D	Insulation Sleeving, Electrical, Heat Shrinkable, Polyolefin, Semi-Rigid, Crosslinked
MIL-DTL-23053/7C	Insulation Sleeving, Electrical, Heat Shrinkable, Polyethylene Terephthalate, Non-Crosslinked
MIL-DTL-23053/8C	Insulation Sleeving, Electrical, Heat Shrinkable, Polyvinylidene Fluoride, Semi-Rigid, Crosslinked
MIL-I-23053/9	Insulation Sleeving, Electrical, Heat Shrinkable, Fluorosilicone Rubber, Flexible (Cancelled)
MIL-DTL-23053/10D	Insulation Sleeving, Electrical, Heat Shrinkable, Silicone Rubber, Flexible
MIL-DTL-23053/11C	Insulation Sleeving, Electrical, Heat Shrinkable, Fluorinated Ethylene Propylene, Non-Crosslinked
MIL-DTL-23053/12C	Insulation Sleeving, Electrical, Heat Shrinkable, Polytetrafluoroethylene
MIL-DTL-23053/13B	Insulation Sleeving, Electrical, Heat Shrinkable, Fluoroelastomer, Flexible
MIL-DTL-23053/14B	Insulation Sleeving, Electrical, Heat Shrinkable, Ethylene-Tetrafluoroethylene Fluoropolymer, Semi-Rigid
MIL-DTL-23053/15B	Insulation Sleeving, Electrical, Heat Shrinkable, Polyolefin, Heavy Wall, Coated, Flexible, Outer Wall Crosslinked
MIL-DTL-23053/16B	Insulation Sleeving, Electrical Heat Shrinkable, Crosslinked, Elastomeric Polyolefin, Flexible
MIL-DTL-23053/17B	Insulation Sleeving, Electrical, Heat Shrinkable, Flame Retarded, Modified Polyolefin, Flexible Crosslinked
MIL-DTL-23053/18B	Insulation Sleeving, Electrical, Heat Shrinkable, Modified Fluoropolymer, Crosslinked

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor, West Conshohocken, PA 19428-2959.

ASTM D 149	Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies
ASTM D 150	A-C Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulating Materials
ASTM D 374	Insulation, Thickness of Solid Electrical, Standard Test Methods for
ASTM D 412	Rubber Properties in Tension, Standard Test Methods for
ASTM D 570	Plastic, Water Absorption of
ASTM D 638	Tensile Properties of Plastics
ASTM D 746	Plastics and Elastomers, Brittleness Temperature of by Impact
ASTM D 792	Plastics by Displacement, Specific Gravity (Relative Density) and Density of
ASTM D 876	Tubing, Nonrigid Vinyl Chloride Polymer, Used for Electrical Insulation
ASTM D 882	Tensile Properties of Thin Plastic Sheeting
ASTM D 2671	Tubing, Heat Shrinkable for Electrical Use, Standard Test Method for
ASTM G 21	Polymeric Materials, Synthetic, Recommended Practice for Determining Resistance of, to Fungi

2.3 Order of precedence:

In the event of a conflict between the text of this document and the references cited herein (except for related associated specifications, specification sheets, or MS standards), the text of this document takes precedence. Nothing in the document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS:

3.1 Specification sheets:

The individual item requirements shall be as specified herein and in accordance with the applicable specification sheet.

In the event of any conflict between the requirements of this specification and the specification sheet, the latter shall govern.

3.2 First article:

When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.3.

3.3 Dimensions and tolerances:

3.3.1 Inside diameter (ID):

3.3.1.1 As supplied: When determined in accordance with 4.6.3.1.1, the “as supplied” ID shall conform to the requirements of the applicable specification sheet.

3.3.1.2 After unrestricted shrinkage: When determined in accordance with 4.6.3.1.2, the sleeving ID after unrestricted shrinkage shall conform to the requirements of the applicable specification sheet.

3.3.2 Wall thickness: The wall thickness after unrestricted shrinkage shall be determined in accordance with 4.6.3.2 and shall conform to the requirement in the specification sheet.

3.3.3 Longitudinal change: When tested as specified in 4.6.4, the longitudinal change shall not exceed the value specified in the specification sheet.

3.3.4 Concentricity: When tested as specified in 4.6.3.3 the “as supplied” concentricity shall not be less than that specified in the specification sheet.

3.3.5 Unit of issue: Unit of issue for all sleeveings shall be feet (meters). The sleeving may be supplied as a straight piece, coiled, on reels or spools.

3.3.5.1 Straight pieces: Unless otherwise specified in the applicable specification sheet, the standard straight piece unit of issue shall be 4 feet plus/minus 1 inch (121.9 cm plus/minus 2.5cm).

3.3.5.2 Reels, spools and coils: Unless otherwise specified in the contract or order (see 6.2), sleeving length on reels shall be as specified in table I. Sleeving lengths on spools and coils shall be as specified by the acquisition activity.

3.4 Properties:

3.4.1 As supplied:

3.4.1.1 Heat shock: When tested as specified in 4.6.8, the sleeving shall show no sign of cracking, flowing, or dripping. After bending through 360 degrees, the sleeving shall show no sign of cracking except that side cracking of the flattened sleeving shall not be cause for rejection.

3.4.1.2 Restricted shrinkage: After testing as specified in 4.6.6, the shrunk sleeving shall fit snugly over the mandrel without cracking and shall withstand the voltage application specified in 4.6.6.3.

3.4.1.3 Modulus: See specification sheet for secant modulus or tensile stress requirement as applicable. Testing shall be as specified in 4.6.12.

3.4.1.4 Cold impact: When tested as specified in 4.6.7.2, the sleeving shall meet the requirement of the applicable specification sheet.

3.4.2 After unrestricted shrinkage: When tested as specified herein and the applicable specification sheet, the sleeving shall conform to the requirements of table II or the applicable specification sheet.

3.4.2.1 Color: The after unrestricted shrinkage color of the sleeving shall be in accordance with the requirements of MIL-STD-104. MIL-STD-104 does not include limits for pink and tan colors. Munsell color notations for these colors shall be as follows:

<u>Color</u>	<u>Light limit</u>	<u>Nominal</u>	<u>Dark limit</u>
Pink	3.75R 6.5/9.0	2.5R 6.0/7.0	1.25R 5.5/6.0
Tan	5YR 5.5/6.0	5YR 5.0/5.0	5YR 4.5/4.0

3.5 Storage Life:

3.5.1 Storage life: The product storage life shall not be less than the time specified in the applicable specification sheet, under the conditions therein. The storage life of the sleeving may be extended in accordance with 3.5.2. The storage life expiration date shall be identified on the product label. When the expiration date of the sleeving has been exceeded it shall be retested prior to being used (see 3.5.2). The sleeving, after storage, and at all retest dates shall conform to the “as supplied” and after unrestricted shrinkage inside diameter (ID) requirements and the wall thickness and longitudinal change requirements after unrestricted shrinkage (see 4.6.5).

3.5.2 Extension of Storage Life: Unless otherwise specified in the specification sheet, the storage life may be extended for a period of time equal to fifty percent (50%) of the original storage life of the sleeving for as many times as the dimensions are still within specification limits, however, no sleeving 12 years or older shall be extended. The extension of storage life shall be determined in accordance with in 4.6.17.

3.6 Clarity stability:

The clear sleeving shall not darken appreciably and the protected marking shall be readable through the sleeving, after the exposures specified in 4.6.17.

3.7 Workmanship:

When examined visually, the sleeving, both before and after shrinkage, shall be free from internal voids, blisters, lumps, dents, tears, pinholes, seams, cracks, foreign matter, or other defect that would be detrimental to fabrication, appearance, or performance. After shrinkage, the sleeving surface shall be smooth and uniform. When the sleeving is of a spirally wound construction or contains a single bonded seam, the overlaps and seams normally associated with these manufacturing techniques shall be acceptable.

4. VERIFICATION:

4.1 Classification of inspections:

The inspection requirements specified herein are classified as follows:

- a. First Article inspection (see 4.3).
- b. Conformance inspection (see 4.4).

4.2 Inspection conditions:

Unless otherwise specified in the test method, all inspections shall be performed in accordance with the test conditions specified in the applicable test method or test paragraph in this specification or specification sheet.

4.3 First article inspection:

First article inspection shall consist of all the tests and inspections specified in the applicable specification sheet. The number of determinations per first article sample shall be as specified in table III. The first article inspection shall be performed on the first lot or order of sleeving furnished under this specification and on any subsequent lot or order when specified by the acquisition activity (see 6.2).

4.3.1 Periodic reinspection: After delivery of a satisfactory first article sample (see 4.3), the manufacturer shall be required to perform the first article inspection once every three years provided the manufacturer is in continuous production on Government contracts. If the manufacturer is not in continuous production of these sleeveings, first article inspection may be requested at any time by the acquisition activity (see 6.2).

4.3.2 First article sample: Unless otherwise specified in the applicable specification sheet or by the acquisition activity, 50 feet of heat shrinkable sleeving of the class and size for which approval is desired shall constitute the first article sample. The sample shall be representative of the workmanship and material to be used during production. Approval of the sample will automatically extend first article approval to all sizes included in the size range. Table IV identifies the size ranges. The First Article sample shall be produced using the same plant facilities intended for the production run. Approval of the first article inspection sample or waiving of the first article inspection does not preclude the requirements for performing the conformance inspection. When required, the first article inspection samples shall be furnished to the Government as directed by the contracting officer (see 6.2).