

NEMA MW 1000

MAGNET WIRE

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Magnet Wire

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MW 6-C	Polyamide (Single and Heavy)	105	X	—	5
MW 9-C	Epoxy (Single, Heavy, and Triple)	130	X	—	6
MW 14-C	Epoxy (Heavy and Quadruple)	130	—	X	7
MW 15-A	Polyvinyl Acetal (Single and Heavy)	105	X	—	8
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MW 42-C	Glass fiber covered (Single and Double)	155	—	X	40
MW 43-C	Glass fiber covered silicone treated (Single and Double)	200	—	X	41
MW 44-C	Glass fiber covered silicone treated (Single and Double)	200	X	—	42
MW 45-C	Polyester glass fiber covered (Single and Double)	155	X	—	43
MW 46-C	Polyester glass fiber covered (Single and Double)	155	—	X	44
MW 47-C	Polyester glass fiber covered silicone treated (Single and Double)	200	X	—	45
MW 48-C	Polyester glass fiber covered silicone treated (Single and Double)	200	—	X	46
MW 50-C	Glass fiber covered, High Temperature organic varnish treated (Single and Double)	180	X	—	47
MW 51-C	Polyester glass fiber covered, High Temperature organic varnish treated (Single and Double)	180	X	—	48
MW 52-C	Glass fiber covered, High Temperature organic varnish treated (Single or Double)	180	—	X	49
MW 53-C	Polyester glass fiber covered, High Temperature organic varnish treated (Single and Double)	180	—	X	50
MW 60-A	Aromatic polyamide paper covered (Paper)	220	—	X	52–53
MW 60-C	Aromatic polyamide paper covered (Paper)	220	—	X	54–55
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Part 2 PROPERTIES AND REQUIREMENTS (continued)

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MW 80-C	Polyurethane overcoated with polyamide for solderable applications (Single, Heavy, Triple)	155	X	—	74
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105	Polyamide	-	MW 6-C	5
105	Polyvinyl acetal	MW 15-A	MW 15-C	8, 9
105	Polyvinyl acetal overcoated with polyamide	-	MW 17-C	18
105 Solderable	Polyurethane	-	MW 2-C	2
105 Solderable	Polyurethane and self-bonding overcoat	-	MW 3-C	3
105 Solderable	Polyurethane overcoated with polyamide and self-bonding overcoat	-	MW 29-C	29
105	Polyvinyl acetal and self-bonding overcoat	-	MW 19-C	21
130	Epoxy	-	MW 9-C	6
130 Solderable	Polyurethane overcoated with polyamide	MW 28-A	MW 28-C	27, 28
130 Solderable	Polyurethane	-	MW 75-C	67
155	Polyester	-	MW 5-C	4
155	Polyester (amide)(imide) overcoated with polyamide	MW 24-A	MW 24-C	23, 24
155 Solderable	Polyester (imide)	-	MW 26-C	25
155 Solderable	Polyester (imide) overcoated with polyamide	-	MW 27-C	26
155 Solderable	Polyurethane	-	MW 79-C	72
155 Solderable	Polyurethane overcoated with polyamide	MW 80-A	MW 80-C	73, 74
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180	Polyester (amide)(imide) overcoated with polyamide	MW 76-A	MW 76-C	68, 69
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180 Solderable	Polyester (imide)	-	MW 77-C	70
180 Solderable	Polyester (imide) overcoated with polyamide	-	MW 78-C	71
180 Hermetic	Polyester (amide)(imide)	-	MW 72-C	62
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FILM INSULATED RECTANGULAR AND SQUARE WIRE

Part 2
PROPERTIES AND REQUIREMENTS LISTING BY THERMAL CLASS, INSULATION, COATING AND FORM

Thermal Class	Insulation, Covering and Form	See Part 2, Section		
		Aluminum	Copper	Page No.
105	Polyvinyl acetal	MW 18-A	MW 18-C	19, 20
130	Epoxy	-	MW 14-C	7
200	Polyester (amide)(imide) overcoated with polyamideimide	-	MW 36-C	38
220	Polyester (amide)(imide) overcoated with polyamideimide	MW 36-A	-	37
240	Polyimide	-	MW 20-C	22
FIBROUS COVERED ROUND MAGNET WIRE				
90 or 105	Paper covered	-	MW 31-C	31
155	Glass fiber covered	-	MW 41-C	39
155	Polyester glass fiber covered	-	MW 45-C	43
180	Glass fiber covered, High temperature organic varnish treated	-	MW 50-C	47
180	Polyester glass fiber covered, High temperature organic varnish treated	-	MW 51-C	48
200	Glass fiber covered, silicone treated	-	MW 44-C	42
200	Polyester glass fiber covered, Silicone treated	-	MW 47-C	45
220	Aromatic polyamide paper covered	MW 61-A	MW 61-C	56-59
220	Aromatic polyimide tape covered	-	MW 63-C	61
FIBROUS COVERED RECTANGULAR & SQUARE MAGNET WIRE				
90 or 105	Double paper, Single cotton covered	-	MW 32-C	32-33
90 or 105	Paper covered	-	MW 33-C	34
155	Glass fiber covered	-	MW 42-C	40
155	Polyester glass fiber covered	-	MW 46-C	44
180	Glass fiber covered, High temperature organic varnish treated	-	MW 52-C	49
180	Polyester glass fiber covered, High temperature organic varnish treated	-	MW 53-C	50
200	Glass fiber covered, Silicone treated	-	MW 43-C	41
200	Polyester glass fiber covered, Silicone treated	-	MW 48-C	46
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Foreword

This publication supersedes NEMA Standards Publication MW 1000-1997. It is currently under review by ANSI for approval as an American National Standard.

The standards contained in this publication are periodically reviewed by the NEMA Magnet Wire Section for revisions considered to be necessary to keep them up to date with changes in technology. Proposed or recommended revisions should be submitted to:

Vice President, Engineering
National Electrical Manufacturers Association
1300 North 17th Street, Suite 1847
Rosslyn, Virginia 22209

These standards were developed by the Magnet Wire Section of NEMA, working closely with representatives of various industries that use magnet wire. At the time they were approved, the Magnet Wire Section had the following members:

Bridgeport Insulated Wire Company—Bridgeport, CT
Elektrisola, Inc.—Boscawen, NH
Magnekon—San Nicolas, NL, Mexico
Nexans—Markham, ON, Canada
Phelps Dodge Magnet Wire Company—Fort Wayne, IN
Rea Magnet Wire Company, Inc.—Fort Wayne, IN
Rea Algonquin Osceola Manufacturing Plant (formerly Southwire Company)—Osceola, AR
Essex Group, Inc.—Fort Wayne, IN
Universal Lighting Technologies—Gallman, MS

How to Use This Publication

Part 1 (blue, if in print) of this publication deals with information common to all types of magnet wire, that is, ordering information, general material requirements, general test conditions, definitions and manufacturing data in support of thermal rating. This part also includes dimensions with metric equivalents for all bare, minimum insulation increase, and overall dimensions for all Part 2 MW specification requirements. The exception to this is MW 16, where the dimensional and other requirements are provided in Part 2.

Part 2 (yellow, if in print) consists of product specifications requirements (other than dimensions) for magnet wire with different types of coatings and/or coverings. Insofar as possible, the product specifications are complete on one sheet since they are arranged to include only one insulation or covering per sheet. The title on each individual sheet identifies the product. (Example: MW 15-C, Polyvinyl Acetal Round Copper Magnet Wire. MW 15-A covers the aluminum version of the same generic product).

Part 3 (green, if in print) contains the test procedures to be followed and corresponding tables of specific test values to be attained in determining compliance with the requirements given in Part 2. The requirements are consolidated with the test procedures and testing parameters for a given property. An index of the main test paragraphs is given beginning on page viii of the Table of Contents.

Appendix A (green, if in print) provides a cross reference between test procedures in this Standards Publication and those published by the American Society for Testing and Materials (ASTM).

Appendix B (tan, if in print) consists of definitions, requirements, and recommended test procedures for reusable magnet wire packaging, standardized dimensions for spools and reels, and formatting for the labeling of magnet wire products.

First, review Part 1 for general information. Then in Part 2 locate the specification for the type of insulation and conductor of interest. Part 2 is arranged in numerical order as shown beginning on page ii. The dimensions for each Part 2 MW type are provided in Part 1 beginning with Table 1-1. The specification in Part 2 will indicate the requirements to be met and will refer to the test procedures and corresponding test values to be attained in Part 3.

Part 1 GENERAL

1.1 SCOPE

This publication is designed to present, in concise and convenient form, all of the existing NEMA Standards for magnet wire. This publication is classified as a NEMA Standard unless otherwise indicated. It contains standards for round, rectangular, and square film insulated and/or fibrous covered copper and aluminum magnet wire for use in electrical apparatus. Included are the definitions, type designations, dimensions, constructions, performance, and test methods for magnet wire generally used in the winding of coils for electrical apparatus.

1.2 NORMATIVE REFERENCES AND AUTHORIZED ENGINEERING INFORMATION (AEI)

The following references apply to Parts 1, 2 and 3 only. Reference is made to the current revision of each of the standards or AEI listed below:

American National Standards Institute

11 West 42nd Street
New York, NY 10036

American Society for Testing Materials

100 Barr Harbor Drive
West Conshohocken, PA 19428-2959

ASTM B 3	<i>Standard Specification for Soft or Annealed Copper Wire</i>
ASTM B 32	<i>Standard Specification for Solder Metal</i>
ASTM B 48	<i>Standard Specification for Soft Rectangular and Square Bare Copper Wire for Electrical Conductors</i>
ASTM B 193	<i>Standard Test Method for Resistivity of Electrical Conductor Materials</i>
ASTM D 149	<i>Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies</i>
ASTM D 1676	<i>Standard Methods for Testing Film-Insulated Magnet Wire</i>
ASTM D 1711	<i>Standard Terminology Relating to Electrical Insulation</i>
ASTM D 1932	<i>Standard Test Method for Thermal Endurance of Flexible Electrical Insulating Varnishes</i>
ASTM D 2307	<i>Standard Test Method for Relative Thermal Endurance of Film-Insulated Round Magnet Wire</i>
ASTM D 3353	<i>Standard Methods for Testing Fibrous-Insulated Magnet Wire</i>
ASTM D 5423	<i>Standard Specification for Forced-Convection Laboratory Ovens for Evaluation of Electrical Insulation</i>
ASTM E 8	<i>Standard Methods of Tension Testing of Metallic Materials</i>
ASTM E 29	<i>Standard Recommended Practice for Indicating Which Places of Figures Are to Be Considered Significant in Specified Limiting Values</i>

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ANSI/IEEE Std 1	<i>General Principles for Temperature Limits in the Rating of Electric Equipment and for the Evaluation of Electrical Insulation</i>
ANSI/IEEE Std 4	<i>Techniques for High Voltage Testing</i>