

# PRODUCT DATA SHEET

## NEMA MW 15 and MW 18

Class 105° - Copper and Aluminum - Round, Square and Rectangular Conductors - Polyvinyl Acetal coated magnet wire / winding wire.

### APPLICATION

Formvar is a synthetic film insulation containing polyvinyl acetal and phenolic resins. It has been in general use in the electrical industry as a Class 105°C wire for over fifty years.

Formvar is recommended, but not limited to the following applications:

- Oil filled transformers
- Motors
- Random wound coils
- Solenoids

### ENGINEERING HIGHLIGHTS

#### 1. THERMAL CLASSIFICATION

Formvar magnet wire is a Class 105°C material when measured in accordance with the ASTM D 2307 test procedure.

#### 2. HEAT SHOCK

Formvar easily passes 175°C heat shock.

#### 3. WINDABILITY

Flexibility and adhesion properties of Formvar magnet wire film, because of its unique construction, excel in wire winding and roll flattening applications.

#### 4. ELECTRICAL

Formvar magnet wire insulation exhibits high dielectric strength.

#### 5. CHEMICAL

Formvar is unsurpassed in its resistance to mineral oils. It is the best magnet wire coating available for these applications.

#### 6. TERMINATION

Formvar magnet wire is a non-solderable product and must be mechanically stripped before soldering, or terminated by means of insulation piercing terminals.

#### 7. NORMAL AVAILABILITY

- Round Copper Sizes:
    - 8-23 AWG, Single Build
    - 4-23 AWG, Heavy Build
  - Square and Rectangular, Copper
- Please consult Magnet Wire Marketing for additional size (including metric) and build information

### THERMAL PROPERTIES

#### HEAT SHOCK RESISTANCE

##### TYPICAL PERFORMANCE:

20%, 2xD, no cracks (CU), 15%, 2xD, no cracks (AL)

##### REQUIRED PERFORMANCE:

20%, 3xD, no cracks† (CU), 15%, 3xD, no cracks† (AL)

#### THERMAL STABILITY

##### TYPICAL PERFORMANCE: 113°C (CU), 125°C (AL)

##### REQUIRED PERFORMANCE:

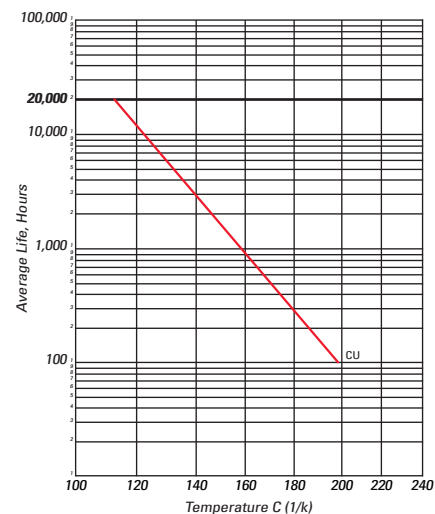
105°C, minimum† (CU), 105°C, minimum† (AL)

#### THERMOPLASTIC FLOW

##### TYPICAL PERFORMANCE: 263°C (CU)

##### REQUIRED PERFORMANCE: 180°C, minimum† (CU)

18 AWG Heavy Build Copper Formvar Thermal Stability



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Performance data is representative of 18 AWG heavy build copper and aluminum (where applicable).\*\*

## PHYSICAL PROPERTIES

### ABRASION RESISTANCE - UNIDIRECTIONAL

**TYPICAL PERFORMANCE: 1890 g., avg. (CU), 1200 g., avg. (AL)**

**REQUIRED PERFORMANCE:**

1150 g., minimum avg.† (CU), 690 g., minimum avg.† (AL)

### ADHESION AND FLEXIBILITY

**TYPICAL PERFORMANCE:**

20%, 1xD, no cracks (CU), 15%, 1xD, no cracks (AL)

**REQUIRED PERFORMANCE:**

20%, 3xD, no cracks† (CU), 15%, 3xD, no cracks† (AL)

### COEFFICIENT OF FRICTION

**TYPICAL PERFORMANCE: Oil: 0.14-0.17\* (CU & AL)**

### CONDUCTOR ELONGATION

**TYPICAL PERFORMANCE: 38% (CU), 23% (AL)**

**REQUIRED PERFORMANCE:**

32%, minimum† (CU), 15%, minimum† (AL)

### SPRINGBACK

**TYPICAL PERFORMANCE: 49° (CU)**

**REQUIRED PERFORMANCE: 58°, maximum† (CU)**

## ELECTRICAL PROPERTIES

### CONTINUITY

**TYPICAL PERFORMANCE: 1 fault/100 ft. (CU), 1 fault/100 ft. (AL)**

**REQUIRED PERFORMANCE:**

5 faults/100 ft. max.† (CU), 10 faults/100 ft. max.† (AL)

### DIELECTRIC BREAKDOWN VOLTAGE

**ROOM TEMPERATURE**

**TYPICAL PERFORMANCE:**

11,300 volts, avg. (CU), 11,400 volts, avg. (AL)

**REQUIRED PERFORMANCE:**

5,700 volts, minimum† (CU), 5,700 volts, minimum† (AL)

### DIELECTRIC BREAKDOWN VOLTAGE (CONT'D)

**RATED TEMPERATURE**

**TYPICAL PERFORMANCE:**

9,200 volts, avg. (CU), 8,600 volts, avg. (AL)

**REQUIRED PERFORMANCE: 4,275 volts, minimum† (CU),**

**4,275 volts, minimum† (AL)**

## CHEMICAL PROPERTIES

### COMPLETENESS OF CURE

**TYPICAL PERFORMANCE: Passes (CU & AL)**

**REQUIRED PERFORMANCE: No swelling or blisters† (CU & AL)**

### CRAZE HEAL

**TYPICAL PERFORMANCE: Passes (CU & AL)**

**REQUIRED PERFORMANCE: No crazing\* (CU & AL)**

### SOLVENT RESISTANCE

**TYPICAL PERFORMANCE: Passes all NEMA Solvent Resistance**

**Requirements† (CU & AL)**

### TRANSFORMER OIL RESISTANCE

**DIELECTRIC BREAKDOWN VOLTAGE**

**TYPICAL PERFORMANCE: 10,500 volts (CU & AL)**

**REQUIRED PERFORMANCE: 5,700 volts† (CU & AL)**

### FLEXIBILITY

**TYPICAL PERFORMANCE: Passes (CU & AL)**

**REQUIRED PERFORMANCE:**

20% Elongation, 3X wrap - No cracks† (CU & AL)

\* Tests not indicated as NEMA are Essex® Standards.

\*\* The values shown represent typical average results and are not intended to be used as design data or specification limits.

† Requirements of NEMA MW 1000; Section MW 15-A and MW 15-C, as applicable.

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