

# Magnet Wire Insulation Guide

| THERMAL CLASS | INSULATION TYPE                    | MWS PRODUCT CODE | NEMA STANDARD (MW1000)       | IEC STANDARD (60317)               | FEDERAL SPECIFICATION (JW 1177)        |
|---------------|------------------------------------|------------------|------------------------------|------------------------------------|--|
| 105°C         | Plain Enamel                       | PEI              | NONE                         | NONE                               | NONE                                   |
|               | Formvar                            | F                | MW 15 (RD) MW 16 (SQ & RECT) | 60317-1 (RD) 60317-17 (SQ & RECT)  | JW 1177/4 (RD) JW 1177/16 (SQ & RECT)  |
|               | Formvar Bondable                   | FB               | MW 19                        | NONE                               | JW 1177/6                              |
| 130°C         | Polyurethane Bondable - 130        | PB130            | MW 130                       | 60317-2                            | NONE                                   |
|               | Polyurethane Nylon Bondable - 130  | PNB130           | MW 135                       | NONE                               | NONE                                   |
| 155°C         | Polyurethane - 155*                | P155             | MW 79                        | 60317-20                           | JW 1177/41                             |
|               | Polyurethane Nylon - 155*          | PN155            | MW 80                        | 60317-21                           | JW 1177/42                             |
|               | Polyurethane Bondable - 155        | PB155            | MW 131                       | 60317-35                           | NONE                                   |
|               | Polyurethane Nylon Bondable - 155  | PNB155           | MW 136                       | NONE                               | NONE                                   |
|               | Dacron Glass - 155                 | DGLASS155        | MW 45 (RD) MW 46 (SQ & RECT) | NONE                               | JW 1177/20 (RD) JW 1177/25 (SQ & RECT) |
| 180°C         | Polyurethane - 180*                | P180             | MW 82                        | 60317-51                           | NONE                                   |
|               | Polyurethane Nylon - 180*          | PN180            | MW 83                        | 60317-55                           | NONE                                   |
|               | Polyester-imide                    | PT               | MW 30                        | 60317-8                            | JW 1177/12                             |
|               | Polyester Nylon*                   | PTN              | MW 76                        | 60317-22                           | JW 1177/38                             |
|               | Solderable Polyester*              | SPT              | MW 77                        | 60317-23                           | JW 1177/39                             |
|               | Solderable Polyester Nylon*        | SPTN             | MW 78                        | NONE                               | JW 1177/40                             |
|               | Polyester-imide Bondable*          | PTB              | NONE                         | 60317-37                           | NONE                                   |
|               | Polyester-amide-imide Bondable*    | APTB             | MW 102                       | 60317-38                           | NONE                                   |
|               | Solderable Polyester Bondable      | SPTB             | NONE                         | 60317-36                           | NONE                                   |
|               | Dacron Glass High Temp             | DGLASS HT        | MW 51 (RD) MW 53 (SQ & RECT) | NONE                               | JW 1177/24 (RD) JW 1177/26 (SQ & RECT) |
| 200°C         | Polyester - 200*                   | PT200            | MW 74                        | 60317-42                           | JW 1177/43                             |
|               | Polyester A/I Topcoat*             | APT              | MW 35                        | 60317-13 (RD) 60317-29 (SQ & RECT) | JW 1177/14 (RD) JW 1177/13 (SQ & RECT) |
|               | Polyester A/I Polyamideimide       | APTIG            | MW 73                        | 60317-13                           | NONE                                   |
|               | Polytetrafluoroethylene (Teflon**) | TEFLON           | NONE                         | NONE                               | NONE                                   |
| 240°C         | Polyimide - ML*                    | ML               | MW 16 (RD) MW 20 (SQ & RECT) | 60317-46 (RD) 60317-47 (SQ & RECT) | JW 1177/15 (RD) JW 1177/18 (SQ & RECT) |

\* UL Recognized Insulations

\*\* Registered trademark of E. I. duPont de Nemours and Company

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| INSULATION CHARACTERISTICS   | GENERAL APPLICATIONS   |
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| Plain Enamel, known as oleoresinous enamel, was one of the first film insulations developed more than 75 years ago and is still in use today in a variety of electronic components. Plain Enamel wires are manufactured to single-build dimensional standards. Stocked in sizes 41-43 AWG. Contact sales for additional AWG size requests.   | Relays and coils. Avoid using in presence of synthetic solvents.   |
| Formvar Enamel is made from vinyl acetal resins produced as a smooth uniform film. It has excellent mechanical properties such as abrasion resistance and flexibility. The film will withstand excessive elongation without rupture. When stressed during winding, Formvar has a tendency to craze upon contact with solvents such as toluol, naphtha, xylo, etc. Therefore, it should be given an annealing preheat prior to varnish application.               | Motors, random wound coils, oil filled and dry transformers, armature and generator winding where "tough" film may be required.                              |
| Bondable magnet wire with a 105°C Formvar insulated copper wire with a superimposed film of thermoplastic bonding material. The heat or solvent sensitivity of this material makes possible the winding of coils of unusual shapes since the wire may be bonded turn-to-turn. To obtain specific dimensional data on Bondable wires, see pages 8 and 9.  | Self-supporting coils, voice coils, encapsulated coils, relays, yoke coils.  |
| Bondable magnet wire with a 130°C Polyurethane or Polyurethane Nylon insulated copper wire with a superimposed film of thermoplastic bonding material. The heat or solvent sensitivity of this material makes possible the winding of coils of unusual shapes since the wire may be bonded turn-to-turn. To obtain specific dimensional data on Bondable wires, see pages 8 and 9.   | Self-supporting coils, voice coils, encapsulated coils, relays, yoke coils.  |
| Polyurethane-155 is a 155°C thermal class solder strippable insulation produced primarily 30 AWG and finer with quick soldering characteristics at 390°C.  | Motors, R.F. coils, relays, encapsulated coils, ignition coils, solenoids, low voltage transformers, layer and precision wound coils.                        |
| Polyurethane Nylon-155 is similar to the 155°C Polyurethane with an additional Nylon overcoat to improve the abrasion resistance and heat shock characteristics for coil and motor windings. Produced 10 AWG to 55 AWG, soldering temperatures are 430°C for 10-23 AWG, and 390°C for 24-55 AWG.   | Appliance motors, relays, timer and clock coils, encapsulated coils, solenoids, toroid coils, random wound coils.  |
| Same as the 130° Polyurethane and Polyurethane Nylon bondable magnet wires with the advantage of the 155°C temperature class base enamels. It is a insulated copper wire with a superimposed film of thermoplastic bonding material. The heat or solvent sensitivity of this material makes possible the winding of coils of unusual shapes since the wire may be bonded turn-to-turn. To obtain specific dimensional data on Bondable wires, see pages 8 and 9. | Self-supporting coils, voice coils, encapsulated coils, relays, yoke coils.  |
| Dacron glass is a served filament on the magnet wire conductor. It is available as unvarnished or varnished with organic or silicone varnishes. The fibers may be served over bare conductor or over film constructions. Dacron glass is a combination of glass and polyester fibers. The advantage of the dacron glass is its abrasion resistance and better flexibility than glass. The Dacron glass can be purchased fused and unvarnished.                   | Dry transformers, Class B motors.  |
| Polyurethane-180 combines the thermal properties of a class 180°C insulation, while offering low temperature solderability at 390°C (24 AWG and finer).  | Automotive relays, ignition coils, transformers and solenoids.   |
| Polyurethane Nylon-180 offers excellent abrasion resistance for ferrite core coils and transformers, while exhibiting high temperature thermal stress and low temperature solderability at 430°C (14-23 AWG ) and 390°C (24 AWG and finer).  | Relays, pulse transformers, toroid coils, small appliance motors.  |
| Polyester-imide magnet wire is insulated with a Class H modified polyester resin. It has excellent thermal endurance, solvent resistance and exhibits a low coefficient of friction to improve windability. It requires mechanical or chemical stripping.  | Appliance and tool motors, continuous operation coils, sub-fractional instrument and servo motors solenoids.   |
| Polyester Nylon is a film insulation with a modified polyester basecoat and a nylon topcoat. Typical of a dual coat construction, advantage is taken of the high thermal properties of the polyester and the mechanical properties of the nylon.   | Fractional and integral horsepower motors, coils and relays, control and dry transformers, encapsulated coils, D.C. field coils.                             |
| Solderable Polyester magnet wire is an ester-imide insulated wire which solders at 470°C. Since thermoplastic flow values equal or exceed 280°C, the insulation has shown excellent promise in transfer molding applications.  | Special transformer coils, automotive coils, electronic coils.   |
| Solderable Polyester-Nylon magnet wire is a two-part insulation system in which ester-imide basecoat is overcoated with nylon. This wire solders at 455°C. The construction may be considered a substitute for applications where ester-imide insulation wire is used, with the added features of improved solvent resistance and improved windability.  | Shaded-pole motor coils, special control coils, automotive coils.  |
| Self-bonding polyester actually describes a number of possible constructions of polyester base insulation with a thermoplastic bond coat. The bond coat may be epoxy, polyester or polyamide. Keep in mind for design purposes that the addition of the bond coat does add one overall build level to the wire dimension. To obtain specific dimensional data on bondable wires, visit the MWS Wire website at mwswire.com.                                      | Television yoke coils, clutch and brake coils, helical and toroidal coils.   |
| Same as the DGLASS-155 with the advantage of a Polyester 180°C temperature class base enamel. Available in limited sizes. Contact our sales department for price and availability.   | Dry transformers, Class B motors.  |
| Polyester-200 is a modified theic-polyesterimide one-part system. It has high temperature thermal properties and good chemical resistance. Normally produced in sizes 34-56 AWG.   |  |
| Polyester-amide-imide magnet wire is a two-part insulation consisting of a modified polyester basecoat with a superimposed amide-imide outer coating. This wire exhibits exceptional windability, heat shock resistance, and ability to withstand overloads. Chemical resistance to most solvents and insulating varnishes is extremely good. It is not softened by refrigerants and extractions are essentially zero.   | Fractional and integral horsepower motors (hermetic and open), automotive and hand tool armatures, dry type transformers.                                    |
| For inverter duty applications, this insulation is designed for use in motors that may be subjected to high voltage spikes. Available in sizes 14-30 AWG.  | Rotating Machines, Fractional and Integral HP Motors, Hermetic Motors, DC Motors, Power Tools, Dry Transformers, Electronic coils.                           |
| Teflon** has high heat resistance and excellent resistance to most solvents, acids and corrosive chemicals and a high dielectric constant.   | Miniature rotating components and windings where severe environments are encountered.  |
| ML is a film insulation made of polyimide resins. It is a Class 240°C thermal rated insulation with exceptional resistance to chemical solvents and burnout. The outstanding thermoplastic flow of over 400°C and its ability to withstand excessive overloads extends the use of magnet wire in extreme conditions. ML is unaffected by prolonged exposure to varnish solvents and is compatible with virtually all systems.                                    | Fractional & integral horsepower motors, high temp continuous duty coils & relays, hermetic & sealed units, heavy-duty hand tool motors, encapsulated coils. |