

## METH/E - METH/ES

### Norbornene Methyl Anhydride (NMA)

#### Description

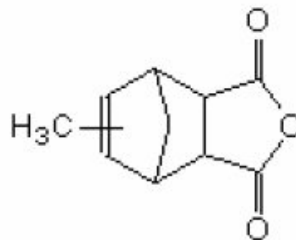
METH-E/ES is mainly used as a curing agent for epoxy resins and raw materials for UPR formulations. It is produced by Polynt SpA. As a curing agent for epoxy resins, METH/E can be easily mixed with various liquid resins, providing stable, low viscosity mixtures with long pot lives. Because of the low exothermic behavior and norbornene bridge, it is recommended for casting and impregnation of large parts that require a high Tg. Due to its unique bi-cyclic structure, when compared with other organic liquid anhydrides, the resins cured with METH/E have superior thermal and electrical properties and a much higher Tg. A suitable curing cycle at high temperature is necessary to achieve the best performances.

Chemical Name: Methyl-endomethylene Tetrahydrophthalic Anhydride (aka: Norbornene Methyl Anhydride)

Molecular Formula: C<sub>10</sub>H<sub>10</sub>O<sub>3</sub>

Molecular Weight: 178.2

CAS Number: 25134-21-8



#### Typical Applications

- Military composites
- Filament wound bearings
- High HDT electrical parts
- High performance composites

#### Specifications

Appearance	Clear Liquid
Viscosity @25°C	230.0 cps
Density @ 25°C	1.239 g/ml
% Acid Content	1.0 Max.
% Purity	98.0 Min.
Vapor Pressure @120°C	1.7 mmHg
Refractive Index n <sub>D</sub> <sup>25</sup>	1.5048
Toluene Solution (1:20)	Clear or slightly opalescent

#### Typical Formulation

Liquid Epoxy Resin (EEW = 185-195)	100
Meth-E	88
BDMA of BV7	1.75

Cure 1 hr at 80°C + 4 hrs @ 150°C + 2 hrs @ 180°C



**Properties**

HDT, °C	165
Tensile Strength, psi @ 25°C	11,000
Modulus of Elasticity, psi @ 25°C	4.5 X 10 <sup>5</sup>
Elongation at break, @ 25°C	1.9%

Tensile Strength, PSI @ 150°C	5,500
Modulus of Elasticity, PSI @ 150°C	0.8 X 10 <sup>5</sup>
Elongation at break, @ 150°C	31%

**ELECTRICAL PROPERTIES @25°C**

Volts per Mil Applied	Dissipation Factor 60 Hz	Volume Resistivity Megohm/cm	Arc Resistance, seconds (ASTM D495)
443	0.003	4.7 x 10 <sup>10</sup>	110

**Product Range**

METH/E

General purpose grade.  
Better stability at low temperature (lower risk of crystallization).  
Better wetting properties and better adhesion to glass fibres.  
Particularly suitable for “filament winding” techniques.

METH/ES

Similar to METH/E, but with better color retention and lower carbon dioxide formation in the presence of basic accelerators.

**Packaging:**

Galvanized steel drums, 485 lbs (220 kg)  
5 gallon pails, 45 lbs each

**Storage:**

The product must be stored away from open flames or other potential ignition sources. METH/E and METH/ES is sensitive to humidity. This causes acid formation, which crystallizes only when high acid content is reached.

**Shelf Life:**

12 months to production date.

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