

# Thermalguard Technology

Fire and Thermal Safety through Coatings and Composites

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## TG-1001™ Laminating Resin Phenolic Alternative without Phenol

### ➤ Low Temperature Curing.

- ❖ No Voids or Brittleness – unlike typical Phenolic Resoles and Acid Catalyzed Phenolic Novolacs.
- ❖ Cure can be cured with comparatively low Heat (90 to 185 °F – 33 to 85 °C).
- ❖ Can be pultruded at higher temperatures.
- ❖ Flexible Pot Life and Cure Cycles. (3 minutes to 10 days).
- ❖ Long Storage Life at Room Temperature (six (6) months typical) – refrigeration is not normally required.

### ➤ Conventional or Non Acid, Non-Solvent Hardeners.

- ❖ **EU Class E1** Non-Formaldehyde Hardeners can be used resulting in less than 0.1 ppm “free-formaldehyde”.
- ❖ Fairly Neutral pH of 7.8 to 8.2 (typical): no need for costly Acid Resistant Tooling
- ❖ Water for clean-up.
- ❖ No solvents are used – no need for special Environmental Protection and Worker Safety precautions.

### ➤ Tailored to meet processing requirements

Open & Closed Moulding	Hand Lay-up	Filament Winding
Vacuum Forming	Foam	Pultrusion
Compression Moulding	RTM & VARTM	More....

### ➤ Thermally Enhanced with POSS® nanocomposite technology.

- ❖ Can also be nano-reinforced with Carbon Nanofibers, MMT, Polysiloxane and others.

#### Neat Novolac Resin Properties (resin only)

Non-Volatiles (Solids) @ 135°C (275°F):	64 to 68
Initial Resin Viscosity (cps):	500 - 800
RI @ 25°C (77°F):	1.54
Specific Gravity:	1.22
pH @ 25°C (77°F)	7.8 – 8.2
Water Solubility:	Infinite
Free Phenol (%)	0
Free Formaldehyde (%):	< 0.1
Storage Life @ 25°C (77°F)	6 months

#### Typical Initial Mixed Resin Properties (resin + hardener)

Initial Resin Viscosity (cps):	50 to 150
Specific Gravity:	1.18
pH @ 25°C (77°F)	7.8 – 8.2
Water Solubility:	Infinite
Free Phenol (%)	0
Free Formaldehyde (%):	< 0.1
Pot Life @ 22°C (72°F):	35 to 45 minutes

#### Typical Mechanical Properties (after proper curing)

Tensile (ASTM D638)	> 150 Mpa > 21,500 psi
Flexural (ASTM D790)	> 250 Mpa > 36,000 psi
Compression (ASTM D695)	> 190 Mpa > 27,500 psi
Barcol Hardness (ASTM D2583)	45 – 65

#### Typical Fire Resistance properties of cured laminates

- Typical ASTM E-84 Surface Burning Characteristics: **Flame Spread ≤ 5 & Smoke ≤ 5**
- Typical ASTM E-162 Surface Flammability: **Average Flame Spread Index = 0**
- Typical ASTM E-662 Smoke Density - Non-Flaming Mode: **Ds(1.5-min) = 0.7 Ds(4-min) = 2.4 Dm = 14.9**
- Typical ASTM E-662 Smoke Density - Flaming Mode: **Ds(1.5-min) = 1.5 Ds(4-min) = 3.3 Dm = 25.5**
- **UL-94** (Flammability of Plastic Materials) **Rating:** **UL 94V-0**
- **Non-Toxic By-Products of Combustion.**