Thermo-Lag® 3000

Epoxy Intumescent Fireproofing
Thermo-Lag 3000 is an Advanced Flexible Epoxy Intumescent Fireproofing System

It’s the most efficient epoxy intumescent passive fire protection material in the industry based on Underwriter’s Laboratories, Inc. (UL) & offshore certification. Specifically designed to provide 1-4 hour hydrocarbon fire protection for structural steel in petrochemical environments.

Benefits of Thermo-Lag 3000

› Inherent flexibility & elongation based on advanced polysulfide technology
› Crack resistant during construction and in service
› High flexural and tensile strength
› Lowest thickness and applied weight per fire rating of any exterior rated epoxy intumescent
› Best application characteristics of any epoxy intumescent: 1:1 mix ratio and easy batch-mix for single component and trowel application
› Listed & certified to UL 1709
› Offshore certification by Lloyd’s Register (LR) & Det Norske Veritas (DNV)
› Resistant to torch / hose stream impingement per NFPA, Annex H
› Explosion resistant

Applications

› Refineries
› Petrochemical plants
› Gas plants
› LNG facilities
› Power plants
› Commercial buildings, 4-hour ratings
Thermo-Lag 3000 Material and Weight Savings

<table>
<thead>
<tr>
<th>PROPERTIES</th>
<th>THERMO-LAG 3000</th>
<th>COMPETITOR 1</th>
<th>COMPETITOR 2</th>
<th>COMPETITOR 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>XR618</td>
<td>XR625</td>
<td>XR647</td>
<td>XR612</td>
</tr>
<tr>
<td>Fire Rating</td>
<td>2 Hour</td>
<td>2 Hour</td>
<td>2 Hour</td>
<td>2 Hour</td>
</tr>
<tr>
<td>Thickness</td>
<td>310 mils</td>
<td>416 mils</td>
<td>424 mils</td>
<td>480 mils</td>
</tr>
<tr>
<td>Applied Weight</td>
<td>2.02 lb/ft²</td>
<td>2.48 lb/ft²</td>
<td>2.53 lb/ft²</td>
<td>2.87 lb/ft²</td>
</tr>
<tr>
<td>*Weight Savings</td>
<td>Lowest</td>
<td>+18%</td>
<td>+20%</td>
<td>+29%</td>
</tr>
</tbody>
</table>

All thicknesses are shown in inches and are based on a W10X49 column size

*Thermo-Lag 3000 based on 1.25 g/cm³ density
*Competitive products based on 1.15 g/cm³ (typical applied density)

Plural component application only

NOTE: All competitive epoxy intumescent products that are applied by single component application, have similar spray applied densities approximately 1.25 g/cm3.

Off-site Speed and Durability

- Fast application and shop throughput
- Hard, durable, highly flexible material resistant to damage
- High quality finish in less time
- Connections and block-outs are easily fireproofed on-site

SHOP APPLICATION OF THERMO-LAG 3000, INSTALLATION OF FIBERGLASS MESH REINFORCEMENT

THERMO-LAG 3000 SYSTEM INSTALLED, READY FOR TRANSPORT TO SITE

FIELD CONNECTIONS (BLOCK-OUTS) INSTALLED ON-SITE
Thermo-Lag 3000 – Advanced High Flexibility Polysulfide Technology

Thermo-Lag 3000’s unique combination of inherent flexibility, high tensile strength, and high adhesion strength can outperform competitive rigid epoxy systems in severe climatic conditions. Rigid epoxy systems are prone to embrittlement and cracking when exposed to severe cold conditions.

Thermo-Lag 3000 can resist severe cold climate cracking based on its advanced, highly flexible polysulfide technology. The flexible properties of Thermo-Lag 3000 make it a more resilient epoxy intumescent passive fire protection system able to withstand:

- Severe temperature swings & climatic extremes
- Vibration damage during transport from application site to project site
- Explosions and steel deformation
- Impact damage

Performance Testing

Thermo-Lag 3000 has been successfully tested and is in compliance with the following third party test programs:

- 19 MM FLEX OVER 127 MM SPAN
  FLEXURAL STRENGTH: 2,253 PSI (15.5 MPa)

- HOSE STREAM ENDURANCE (NFPA 58, ANNEX H)

- EXPLOSION RESISTANCE

INTRODUCED IN 1999
NO COLD WEATHER CRACKING OR DISBONDMENT IN PRODUCT HISTORY
Thermo-Lag 3000 Severe Cold Cyclic Temperature Testing

Thermo-Lag 3000 has passed the most rigorous thermal cyclic testing program in the industry based on NACE TM0304 Section 9. This testing was conducted to establish performance of epoxy PFP materials at extreme temperature ranges.

› Testing performed with t-bar panel configuration (modified) NACE TM0304 - worse case
› Severe thermal shock per cycle [90ºC temperature swing]

Thermo-Lag 3000 Results

› Thermo-Lag 3000 has sufficient elongation, flexibility, and adhesion to withstand thermal cycling
› No cracking or disbondment after 225 cycles due to advanced polysulfide technology
› Thermo-Lag 3000 exhibited no cracking or disbondment at extreme cold temperatures due to the inherent flexibility of the product
› Thermo-Lag 3000 exhibited no cracking or disbondment at extreme cold temperatures due to the inherent flexibility of the product (in the both meshed and un-meshed samples)

Rigid Epoxy Intumescent System Results

› Exhibited cracking after first few cycles
› Cracked at leading edge
› Disbonded from primer at leading edge
› Cracked at web/flange radius (with both mesh and mesh-free samples)

(Modified) NACE TM0304 Section 9 Test Procedure

225 Cycles / Cycle Duration: < 7 Hours | Test Duration: 3 Weeks

HEATING UP FROM +68ºF TO +140ºF (+20°C TO +60°C)

HOLD AT +140ºF (+60°C)

COOLING DOWN FROM +140ºF TO -22ºF (+60°C TO -30°C)

HOLD AT -22ºF (-30°C)

HEATING UP FROM -22ºF TO +140ºF (-30°C TO +60°C)

HOLD AT +140ºF (+60°C)

✓ Modified to include T-bar test sample to evaluate worst case configuration
✓ All products were tested with both mesh and mesh-free samples
✓ Evaluation included Thermo-Lag 3000 and rigid epoxy PFP systems
Thermo-Lag 3000 System is an Easy-to-Apply Epoxy Intumescent Fireproofing System

Thermo-Lag 3000 has the best spray and trowel attributes of any passive fire protection material. It incorporates our proprietary fiberglass or carbon fiber reinforcing mesh (depending on design). Our Thermo-Lag 3000 mesh reinforced system resists cracking and provides maximum durability and resilience in extreme environments.

**APPLICATION PROPERTIES**

<table>
<thead>
<tr>
<th></th>
<th>THERMO-LAG 3000 P</th>
<th>THERMO-LAG 3000 P (THINNED 5%)</th>
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</thead>
<tbody>
<tr>
<td>Construction Phase</td>
<td>Off-site</td>
<td>On-site</td>
</tr>
<tr>
<td>Recoat Time</td>
<td>30 Min.</td>
<td>4 Hours</td>
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<tr>
<td>Volume Solids</td>
<td>100%</td>
<td>95%</td>
</tr>
<tr>
<td>Film Build (Per Coat)</td>
<td>160-200 mils (4-5 mm)</td>
<td>80-160 mils (2-4 mm)</td>
</tr>
<tr>
<td>Application Method</td>
<td>Plural Component / Trowel</td>
<td>Single Component / Trowel</td>
</tr>
</tbody>
</table>

**PERFORMANCE DATA**

<table>
<thead>
<tr>
<th></th>
<th>ASTM</th>
<th>Unit</th>
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<tbody>
<tr>
<td>Hardness</td>
<td>D2240</td>
<td>Shore D 50</td>
</tr>
<tr>
<td>Impact Resistance</td>
<td>D2794</td>
<td>288 inch-lb (3.31 kg-m)</td>
</tr>
<tr>
<td>Bond Strength</td>
<td>D4541</td>
<td>950 psi (6.55 MPa)</td>
</tr>
<tr>
<td>Compressive Strength</td>
<td>D695</td>
<td>2,190 psi (15.1 MPa)</td>
</tr>
<tr>
<td>Flexural Strength</td>
<td>D790</td>
<td>2,253 psi (15.5 MPa)</td>
</tr>
<tr>
<td>Surface Burning</td>
<td>E84</td>
<td>Class A</td>
</tr>
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Thermo-Lag 3000 Saves Lives and Assets
When exposed to a fire, Thermo-Lag 3000 intumesces or swells producing a heat blocking char which insulates the steel from exposure to high temperatures. This technology provides protection for assets against structural collapse and allows time for egress of personnel and firefighting measures.

Fire Resistance Certifications
Thermo-Lag 3000 has undergone extensive third-party fire performance testing and is certified to:

Underwriter’s Laboratories (UL)
UL 1709

Intertek
ASTM E119 / UL 263 / CAN/ULC S101-07

Lloyds Register (LR) / Det Norske Veritas (DNV)
IMO FTP Code Part 3 / IMO Res.A.754(18) hydrocarbon curve according to ISO 834-3

UL 1709 Environmental Testing
Thermo-Lag 3000 is in full compliance with the acceptance criteria for the UL Environmental Test Program which is the basis for exterior fireproofing product evaluation. Thermo-Lag 3000 is rated by UL and Intertek for both exterior and interior use.

<table>
<thead>
<tr>
<th>INDUSTRIAL ATMOSPHERE</th>
<th>HIGH HUMIDITY</th>
<th>WET/FREEZING/THAW CYCLING</th>
<th>UV EXPOSURE</th>
<th>SALT SPRAY</th>
</tr>
</thead>
</table>
| › Sulfur dioxide & carbon dioxide exposure for 30 days | › Subjected to high humidity exposure for 180 days | › Wet, freeze, thaw cycling  
  › 12 cycles:  
  › 72 hours rain  
  › 24 hours at -40°F [-40°C]  
  › 72 hours dry at 140°F [60°C] | › Subjected to accelerated UV aging for 270 days at 158°F [70°C] | › Subjected to salt spray for 90 days |