

Product Bulletin

supresta™
BUILT-IN DEFENSE

Fyrol® HF-4

Fyrol®
Flame Retardants

Chemical Name: Proprietary non-halogen phosphorus ester

Structural Formula: Proprietary non-halogen phosphorus ester

Description: Non-halogen phosphorus ester

CAS #: Proprietary

Overview

Fyrol® HF-4 is an all-phosphorus additive flame retardant recommended for use in the Automotive MVSS302 and furniture California Technical Bulletin 117 flammability tests. Its superiority is demonstrated in low discoloration. Foams containing this product exhibit good compression set and IFD properties. This additive has low volatility and good processing characteristics.

Key Applications

Fyrol® HF-4 is a non-halogen, phosphorus-based flame retardant commercially used in flexible polyurethane foams. It is a clear transparent, non-viscous liquid with low scorch properties. Its superiority is demonstrated in low discoloration, excellent hydrolytic stability, low volatility, low fogging and processing characteristics which enable its incorporation into foam formulations with little or no effect on foam processing.

Fyrol Product Selector

| | Key polyurethane foam application | Key characteristic |
|------|-----------------------------------|--|
| 6 | Rigid, flexible—flame lamination | Reactive flame retardant. |
| 38 | Flexible | Low scorch. |
| FR-2 | Flexible | Excellent hydrolytic stability, low volatility, low fogging, and processing characteristics. |
| FR-7 | Flexible | Good compression set, IFD and scorch properties, low volatility, low scorch, and good processing characteristics. |
| HF-4 | Flexible | Halogen-free, low scorch with good compression set and IFD properties. Recommended for Cal 117 and MVSS 302 foams. |
| PCF | Rigid, flexible—BS5852 | Excellent hydrolytic stability. |
| PNX | Flexible | Highly efficient halogen-free flame retardant. |
| TEP | Rigid | Halogen-free flame retardant, excellent viscosity reducer for high viscosity polyols. |

Typical Properties

| | | |
|-----------------------------|---------------------------|------|
| Physical appearance | Clear, transparent liquid | |
| Phosphorus content, wt. % | 8.1 | |
| Specific gravity, 20°C/20°C | 1.182 | |
| Density @ 20°C, lbs/gal | 9.85 | |
| | kg/m ³ | 1182 |
| Viscosity @ 25°C, mPa.s | 70 | |
| | @ 38°C, mPa.s | 32 |
| Acidity, mg KOH/g | 0.10 | |
| Water content, wt. % | 0.10 | |
| Color, APHA | 100 | |

Levels of FR needed in a typical formulation to meet CAL 117 requirements

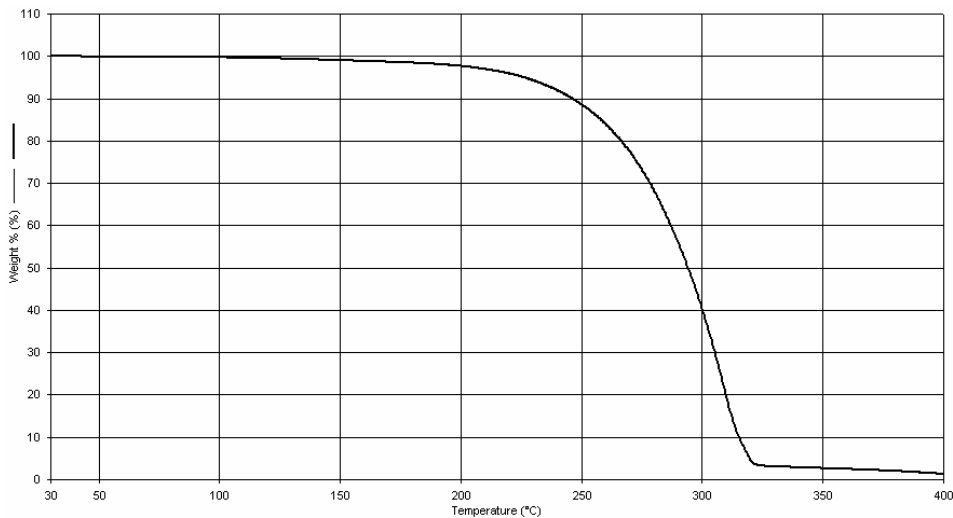
| FR | 1.0 pcf | 1.5 pcf | 1.8 pcf |
|-------------|---------|---------|---------|
| Fyrol® HF-4 | 20 | 15 | 15 |
| Fyrol® FR-2 | 16 | 15 | 12 |

Levels of FR needed in a typical formulation to meet MVSS302 SENBR requirements

| FR | 1.0 pcf | 1.5 pcf | 1.8 pcf |
|-------------|---------|---------|---------|
| Fyrol® HF-4 | 19 | 15 | 15 |
| Fyrol® FR-2 | 16 | 15 | 7 |

The term 'flame retardant' is a relative one and is not intended to indicate the hazard of materials containing flame retardants under actual fire conditions.

Thermogravimetric Analysis: Fyrol® HF-4 (10°C rise/minute in nitrogen)



| | |
|--------------|-------|
| 2% wt. Loss | 193°C |
| 5% wt. Loss | 226°C |
| 10% wt. Loss | 246°C |

Safety & Handling

Consult the Material Safety Data Sheet for this product.

Shipping Information

Available in bulk tank trucks, isocontainers, 2,550 lb totes, and 520 lb drums.

For more information about our products and to place an order, please contact one of Supresta's regional sales offices.

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