Delflam™
FLAME RETARDANT MASTERBATCHES

Presenting to the Italian market a new range of Halogen Free Flame Retardants for Engineering Polymers

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Delamin Ltd. (UK) is an independent manufacturer of specialty chemicals and minerals, designed for use in technical and innovative applications.

Its focus is solving technical issues to enable the clients to satisfy stringent demands encountered in flame retardant composites.

Working closely and in confidence with its clients allows Delamin to develop bespoke solutions.

Since the company’s foundation in 1991, Delamin has successfully applied this philosophy together with its technical expertise to assist clients in a wide range of technologies and industries, throughout the world.

FERRO-PLAST Srl is Delamin appointed distributor for the Italian Market.
New FR Technology for Engineering Polymers

In addition to effective performance in fire situations other considerations such as environmental impact, processing consideration and product afterlife are now influencing the choice of additives that are used to provide FR solutions in plastics.
Delflam™ is a range of zero halogen nitrogen flame retardant synergists manufactured from melamine resulting in homologues having higher thermal stability compared to pure melamine, melamine cyanurate, melamine polyphosphate and melamine formaldehyde.
Delflam™ enhances the performance of flame retarded polymer based composites in key areas such as reduced peak heat release and smoke density.
Delflam™ is co-reaction product primarily consisting of Melem with a minor Melam content.
Delflam™ – Physical Data

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form</td>
<td>Powder</td>
</tr>
<tr>
<td>Colour</td>
<td>White</td>
</tr>
<tr>
<td>Density</td>
<td>1.686 g/cm³ at 20 °C</td>
</tr>
<tr>
<td>pH values</td>
<td>5 - 6</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>1.70 - 1.80</td>
</tr>
<tr>
<td>Decomposition</td>
<td>&gt; 380 °C</td>
</tr>
</tbody>
</table>
Delflam™ 10 – Particle Size
Delflam™ 20 – Particle Size
Delflam™ NFR – Particle Size
Delflam™ - Properties

- High Thermal stability
- Insoluble in both organic solvents and water
- Non hygroscopic
- Zero Halogen
- Non Corrosive
- Compatible in electrical applications
- Lead Free
Delflam™ - Properties

- Optimized performance at low loading levels thus enabling enhanced physical properties of the finished composite
- UL94 @ 1,60mm & 0,8mm
- Compatible in GR and non GR polyamides
- Smoke suppressant
- Low heat release
- Compatible as synergist with organophosphate
- No «blooming»
Delflam™ – Performance
Fire testing

There is overall good synergistic performance at relatively low load levels. Optimization is around 2%-5%.

The biggest noticeable properties are observed in cone calorimetry where there is a marked effect on smoke performance and peak heat rate.
Delflam™ – Performance

(Test carried out in accordance with ISO 5660-. The ‘lower’ curve represents the better performance.)
Delflam™ – Performance

(Test carried out in accordance with ISO 5660-. The ‘lower’ curve represents the better performance.)
# Delflam™

## Guide Formulation for Tests

<table>
<thead>
<tr>
<th>Formulation</th>
<th>Ca.ZB.OP</th>
<th>L14-354-1-2</th>
<th>L14-354-1-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nylon (30% GF)</td>
<td>80%</td>
<td>80%</td>
<td>80%</td>
</tr>
<tr>
<td>Delflam™</td>
<td>3%</td>
<td>2.5%</td>
<td></td>
</tr>
<tr>
<td>Zinc Borate</td>
<td>0.5%</td>
<td>0.5%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Organo-Phosphate</td>
<td>8%</td>
<td>7%</td>
<td>2.5%</td>
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<tr>
<td>CaCO$_3$</td>
<td>11.5</td>
<td>9.5</td>
<td>9.5</td>
</tr>
</tbody>
</table>
Delflam™ Guide Formulation for Tests

UL performance is maintained. There are no detrimental effects when incorporating Delflam™ into polymer systems. The low loading characteristic of Delflam™ provides the ability to replace the overall flame retardant with a generic filler that may further improve the mechanical performance.
Delflam™
Guide Formulation for Tests

The formulations we have provided in this document are guides to express differences in specific performance criteria.

(Delflam™ can be incorporated as a low level synergist in wide range of existing formulations that will enhance performance, physical properties and production characteristics.)
Extrusion characteristics suggest improved flow particularly with glass filled in systems. Due to the high thermal stability of Delflam™ there are no detrimental effects.
Processing Characteristics
Injection Moulding

Systems containing Delflam™ showed improved flow characteristics demonstrating the high thermal stability of Delflam™. These easy set up characteristics also have no effect on screws and barrels after processing. Delflam™ is non corrosive.