



Charmor™

Protecting people & property

Our Charmor™ range for intumescent systems

- Improves fire resistance with thick char barrier
- Secures supply with largest global production capacity
- Ensures high and consistent performance and polyol purity
- Non-toxic to provide safe, easy handling and storage

Intumescent systems for fire protection

Growing demands on protecting people & property

Intumescent systems offer halogen-free fire protection for people and property. Today, the use of intumescent systems is growing thanks to their safe chemical profile in terms of handling and environment, as well as their efficient protection that meets stringent fire safety regulations.

Intumescent systems are ideal as protective coatings and sealants in the construction industry, for fire resistant plastics in electrical, electronics and transportation.

Intumescent systems work by forming a thick, stable carbon foam barrier when exposed to fire, and have three key components:

- ◆ Charmor™, the carbon source
- ◆ an acid donor such as APP (ammonium polyphosphate)
- ◆ a spumific/blowing agent such as melamine

In protective coatings, this char formation insulates steel structures, preventing early collapse. In expandable sealants, the char formation forms a fire stop and prevents gas and heat from spreading. In plastic and textile materials, intumescent slow combustion, cut heat and smoke release rates and reduce melt dripping.

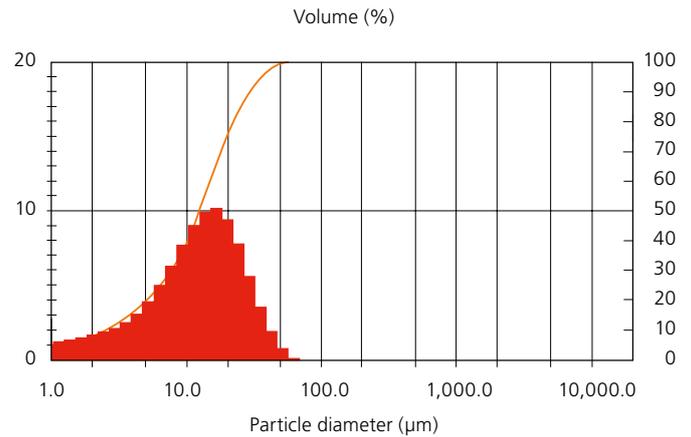


Charmor™ enhances intumescent systems

Charmor™ polyols are a rich carbon source for producing superior intumescent systems. Our production of Charmor™ is carried out at our plant in Germany with excellent global supply capability. High product quality is assured by ISO 9001 procedures, and our precise milling technology for polyol micronization and quality control procedures ensure that at least 98% of our Charmor™ products are below the stated particle size values, 40 µm and 15 µm.

Having our own production facilities allows us to tightly control the total quality chain from sensitive raw materials, through manufacturing and milling, to bagging and distribution. This ensures the consistent high polyol purity and narrow particle size distribution that are essential to achieving high and consistent performance every time. The absence of coarse particles also ensure homogeneous chars without cracks and craters.

The non-toxic and easy to handle Charmor™ polyols are delivered as low density, white powder with strictly controlled particle size. They are available in varying composition and particle size. Charmor™ products are also non-hygroscopic and can be conveniently stored with virtually no caking.



Particle size distribution of Charmor™ PM40
Typically 98% of particles are below 40 µm

Innovation & development in intumescent systems

Our technical service, R&D support and other hands-on activities help you discover the right Charmor™ product for your specific application.



Intumescent coatings win valuable time

Designed for the best performance & protection

Intumescent coatings and expandable sealants based on Charmor™ protect buildings and the people inside them, in the event of fire. Charmor™-based coatings and sealants slow the spread of fire, reduce heat and minimize dangerous smoke and fumes more effectively than any alternative products, facilitating safe evacuation and limiting structural damage. The Charmor™ range ensures the ultimate performance and protection on surfaces including steel and wood.

For example, in buildings with structural steel profiles, which are increasingly common, the very high temperatures cause steel profiles to distort and become weaker, potentially leading to collapse. Steel loses its strength at about 500°C. Here, the extra time provided by Charmor™ compared to alternative products slows and even potentially prevents this process.

Charmor™ offers a rich carbon source that forms a thick fire-resistant char barrier when the intumescent coating is exposed to high temperatures. When a layer of Charmor™-based intumescent coating, circa one millimeter thick, is exposed to 200°C heat or higher, it will swell up 10 to 100 times its size to build a foam char barrier that insulates the underlying material. And the high purity and consistency of Charmor™ improves the insulation effect of the intumescent coating and ultimately helps prevent the substrate from catching fire or distorting.

The intumescent process

When an intumescent coating is exposed to heat, the intumescent effect initiates at approximately 200°C. Esterification, swelling and carbonization create an effective insulating layer.



Development of the char barrier during the intumescent process

The intumescent reaction is activated by heat at approximately 200°C. It is an endothermic reaction that absorbs heat, emits inert gases and creates an effective insulation layer.

- ◆ Thermoplastic resin melts to allow further chemical reactions to take place in a soft matrix
- ◆ Acid donor (ammonium polyphosphate) decomposes to form polyphosphoric acid
- ◆ Polyphosphoric acid reacts with carbon donor (Charmor™) to form an inorganic/organic ester
- ◆ Blowing agent (e.g., melamine) releases gases causing the ester to create a foam that forms an insulating barrier which adheres to the substrate
- ◆ The ester decomposes to form a tough carbon matrix



High performance polyols

Charmor™ polyols are high performers. But to achieve reliable performance in intumescent formulations it is important to have high consistency regarding both chemical and physical properties. Minor changes in individual compounds contained in coatings can significantly influence end-product performance. Coarse carbon donor particles can cause the inhomogeneous distribution of reactants, risking problems such as cracking and loss of adhesion during the intumescent process.

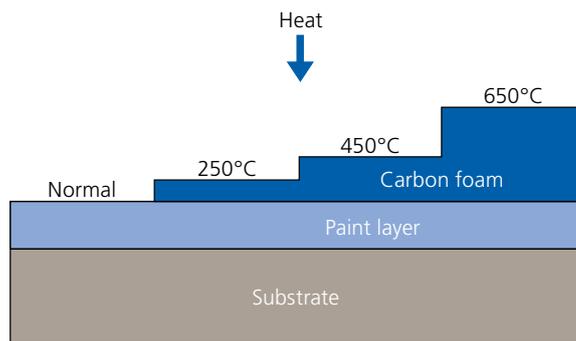
Fine-tuning particle size lets you customize the performance of an intumescent system with the precise structure of foam that best suits your application. For example, the standard grade Charmor™ PM40 creates foam with excellent swelling and robust properties for turbulent fire conditions. The finer particle size of Charmor™ PM15 creates foam with slightly higher volume and very good thermal insulation.

Derived from the Voxtar™ platform, the Charmor™ PM40 Care offers the exact same high quality and technical properties as the standard Charmor™ PM40 but with a sharpened sustainability profile as it is partially produced from renewable raw material and with renewable energy.

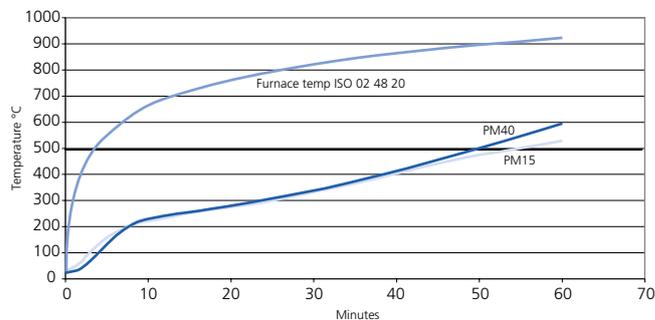
The Charmor™ DP grade is the least water sensitive grade and is particularly suited for outdoor applications.

Fundamental paint formulation

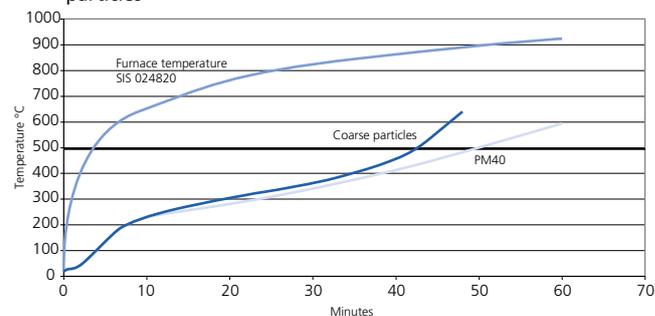
Raw material	Weight %
Thermoplastic resin (solid)	10-15
Charmor™	8-11
Ammonium polyphosphate (e.g., Exolit AP422)	20-30
Spumific, blowing agent (e.g., melamine)	8-11
Chlorinated paraffin (for solvent borne systems)	6-9
Titanium dioxide	6-8
Solvent (water or organic solvent)	30-40
Additives (thickener, dispersing agent, defoamer, etc.)	0.3-3



Charmor™ extends the time it takes for steel to reach the critical temperature of 500°C



Longer time obtained with Charmor™ compared to alternatives thanks to reduced cracking & loss of adhesion caused by coarse particles





	Coatings	Sealants
Charmor™ PM/PT	√√	√
Charmor™ DP	√	√√

Product data summary

Property	Charmor™ PM	Charmor™ PM Care	Charmor™ PT	Charmor™ DP
Melting point	260°C	260°C	250°C	222°C
Water solubility (% at room temperature)	5.25	5.25	4.70	0.22
Typical hydroxyl number mg KOH/g	1,645	1,645	1,615	1,325
Density kg/m ³	1,400	1,400	1,400	1,370
Particle size	Particle size <40 µm typ. 98%			



Your Winning Formula

The Perstorp Group, a trusted world leader in specialty chemicals, places focused innovation at your fingertips. Our culture of performance builds on 130 years of experience and represents a complete chain of solutions in organic chemistry, process technology and application development.

Matched to your business needs, our versatile intermediates enhance the quality, performance and profitability of your products and processes. This is how we enable you to meet market demands for safer, lighter, more durable and environmentally sound end-products – for the aerospace, marine, coatings, chemicals, plastics, engineering, and construction industries, as well as automotive, agricultural, food, packaging, textile, paper and electronics applications.

Our chemistry is backed by reliable business practices and a global commitment to responsiveness and flexibility. Consistent high quality, capacity and delivery security are ensured through strategic production plants in Asia, Europe and North America, as well as sales offices in all major markets. Likewise, we combine product and application assistance with the very best in technical support.

As we look to the future, we strive for the development of smarter and safer products and sustainable processes that reduce environmental impact and create real value in new chemical applications. This principle of proactive innovation and responsibility applies not only to our own business, but also to our work with yours. In fulfilling it, we partner with you to create a winning formula that benefits your business – as well as the people it serves.

Discover your winning formula at www.perstorp.com