



# Charmor<sup>®</sup>

Protecting people & property

## Our Charmor<sup>®</sup> range for intumescent coatings

- 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

# The elements of success

You need a partner who can see the big picture when it comes to your products, your processes and your customers. Our experience and expertise in the special niches of organic chemistry, process technology and application development are at your service, providing you with a complete chain of solutions to enhance quality and profitability at every step.

Our versatile intermediates, an essential element of your winning formula, are specifically designed to add value and enhance end-product performance. Your solution to meeting the increasing demands for safer, lighter, more durable and environmentally friendly end-user products, begins here.

## Innovation in everything we do

Innovation distinguishes every aspect of our business process. Developing smarter and safer solutions creates real value in new chemical applications. Focused innovation instills leadership and purpose in our business activities, improves internal processes and increases application and product competitiveness.

## Delivering our promises globally

Our global presence provides you with reliable solutions and processes, consistent high quality, security of production and supply and delivery with precision. This commitment also means rapid response when product or application support is required and the very best in technical support.

## Putting the care into chemicals

We take our responsibilities to heart and are committed to attentive, sustainable business practices. We minimize risks for our customers, our employees and the environment by working proactively to ensure safe products and processes.



# Protecting people & property

## Enhancing intumescent coatings

Intumescent coatings protect people and property from fire. In airports, sports arenas, schools, hospitals and production plants the protective power of Charmor® products facilitates safe evacuation of people and limits structural damage when fire breaks out.

This is particularly important in response to the serious health hazards posed by asbestos and the ever-increasing use of structural steel in construction projects. At very high temperatures, steel profiles distort and become weaker, which could lead to collapse. Intumescent coatings applied to surfaces within a building win crucial time and the Charmor® range has been developed to ensure the very best in performance and protection.

## Largest global production capacity

Our production of Penta and Di-Penta is carried out on a global level and constitutes the largest production capacity in the world. Milling involving modern manufacturing technology is installed in Germany to produce superior micronized and supermicronized Charmor® polyols. This ensures a constant and uninterrupted supply of high-quality micronized polyols to help fulfill your manufacturing commitments. Having our own production plants allows us to take charge of the total quality chain from sensitive raw materials, through manufacturing and milling, to bagging and distribution.

## Safer handling & storage

Charmor® products are easy to handle. The polyols are non-toxic and present minimal risks for personnel and the working environment. The products are non-hygroscopic and can be conveniently stored in a cool warehouse with virtually no caking.

In addition, we have recently developed supermicronized versions of Charmor® PM and Charmor® DP. These give thicker expanded foam, extra thermal insulation, and the possibility to formulate clear coats for other applications such as on wooden panels and colored walls. Our technical service involves R&D support and other hands-on activities to help you find the right Charmor® products for your particular intumescent coatings.

### *Our Charmor® products:*

#### **Charmor® PM**

Penta mono micronized for use in waterborne and solvent borne coatings

#### **Charmor® DP**

Di-Penta micronized for use in solvent borne coatings, especially for outdoor applications

#### **Charmor® PT**

Penta/Di-Penta mix micronized, an alternative for waterborne or solvent borne coatings



We welcome your questions. More detailed information and specifications of each product are available on [www.perstorp.com](http://www.perstorp.com) or through your Perstorp sales representative.

# Designed to protect

The extra minutes provided by Charmor® compared to competitor products could be crucial to taming the ravages of fire. Improve fire protection with our high purity micronized polyol products that improve the insulation effect of intumescent coatings. The carbon in Charmor® forms a thick fire-resistant char barrier that helps to prevent the substrate from catching fire or distorting when a coating is exposed to temperatures over 250°C. The intumescent process starts at 250°C. Steel loses its strength at about 550°C.

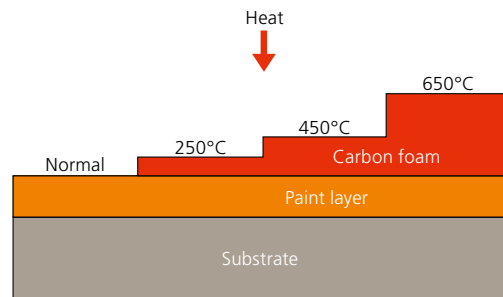
## Improves fire protection with thick char barrier

When a layer of intumescent coating, circa 1 mm thick, is exposed to heat of 250°C and above, it will swell up 10 to 100 times its size to build a foam char barrier that insulates the underlying substrate.

## The effect of heat on intumescent coating

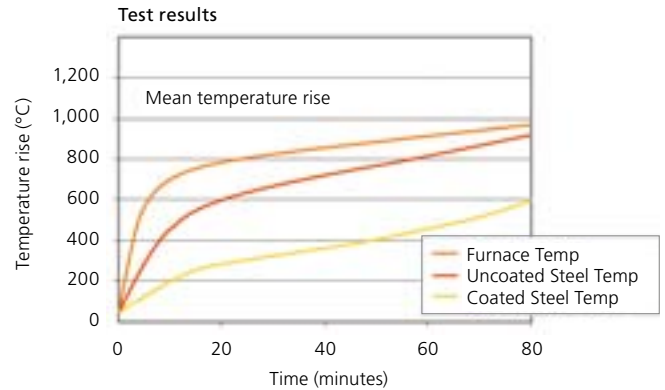
1. Mowilith® DM230 dispersant/binder melts to allow further chemical reactions to take place in a soft matrix.
2. Exolit® AP 422 acid donor decomposes to form polyphosphoric acid.
3. Polyphosphoric acid reacts with the Charmor® carbon donor to form polyphosphoric acid esters.
4. The esters decompose to form a foamable carbon matrix.
5. Melamine blowing agent releases gases that cause the carbon matrix to create a foam that hardens to form a tough insulating char barrier that adheres to the substrate.

Product name	Polyol	Micronized to
Charmor® PM40	Penta mono	40 µm
Charmor® PT40	Penta/Di-Penta mix	40 µm
Charmor® DP40	Di-Penta	40 µm
Charmor® PM15	Penta mono	15 µm
Charmor® DP15	Di-Penta	15 µm

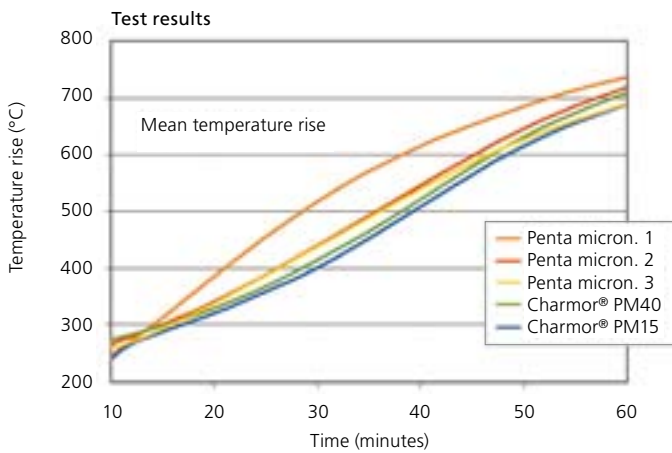


## High performance polyols

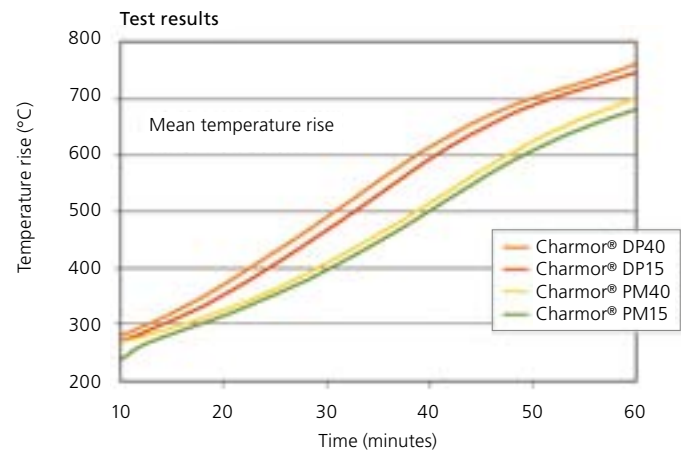
Charmor® polyols are high performers. Minor changes in individual compounds contained in intumescent coatings can lead to significant improvement in end-product performance. The Swedish National Testing and Research Institute, an independent organization, tested the performance of Penta and Di-Penta in paints with a dry film thickness (DFT) of 300 µm. The results show why our Charmor® polyols are recommended by leading suppliers for intumescent coatings.



Dramatic reduction in rate of temperature rise when applying intumescent coating to a steel plate compared to uncoated steel



Better insulation effects in intumescent coating formulations with both Charmor® PM40 and Charmor® PM15 vs. competitive products



Better insulation in waterborne coatings with Charmor® PM compared to Charmor® DP, with Charmor® PM15 yielding a slight advantage in insulation effect

Sample	DFT/µm	Expansion	Foam character
Charmor® DP40	1,000	20	Homogenous, soft, compact
Charmor® DP15	1,000	35	Homogenous, soft, relatively compact

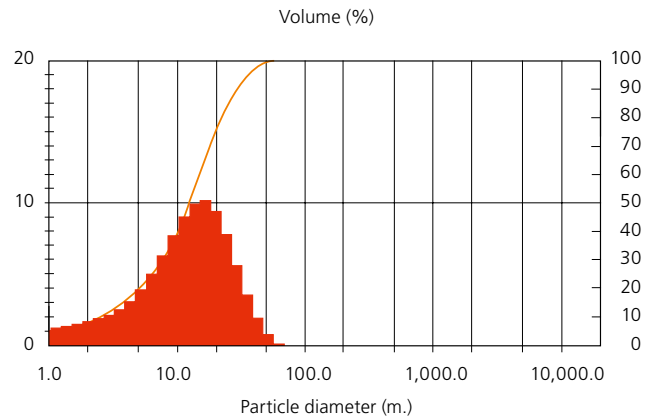
Foaming performance of Charmor® DP40 and Charmor® DP15

# Innovative performance

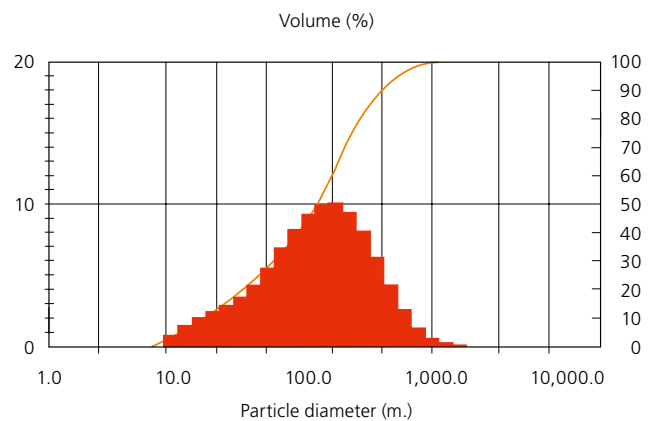
## Pure product quality

Our products give you the high polyol purity, small particle size and narrow particle size distribution that are essential for high and consistent end-product performance. Key suppliers for intumescent coatings recommend our products, which have a particle size of less than 40  $\mu\text{m}$  (micronized) and 15  $\mu\text{m}$  (super-micronized) respectively. The absence of coarse particles means fast incorporation rates into end products.

Our high product quality is assured by ISO 9001 procedures, and the performance of Charmor® products is well documented. Precise milling technology for polyol micronization puts us at the forefront of this demanding application area and our quality control procedures ensure that at least 98% of our Charmor® products are below the stated particle size values, 40  $\mu\text{m}$  and 15  $\mu\text{m}$ .



Particle size distribution of Charmor® PM40  
Typically 99% of particles are below 40  $\mu\text{m}$



Particle size distribution of Charmor® PM15  
Minimum 98% of particles are below 15  $\mu\text{m}$

Providing purity  
& quality for high  
performance



## Product data summary

Property	Charmor® PM	Charmor® PT	Charmor® DP
Melting point	260°C	250°C	222°C
Water solubility (% at room temperature)	5.25	4.70	0.22
Typical hydroxyl number mg KOH/g	1,645	1,615	1,325
Typical Mono Penta content	99%	91%	
Typical Di-Penta content		7%	95%
Density kg/m <sup>3</sup>	1,400	1,400	1,370
Heat of melting kJ/Kg	42.2		335
Heat of combustion kJ/mol	2,770		7,740
Boiling point	276°C at 4 kPa	276°C at 4 kPa	356°C
Micronized	Particle size <40 µm typ. 99%	Particle size <40 µm typ. 99%	Particle size <40 µm typ. 99%



## Your Winning Formula

The Perstorp Group is the world leader in several sectors of the specialty chemicals market. Few chemical companies in the world can rival its 125 years of success. Today we have a rich performance culture distilled from our long history and extensive knowledge in the chemical industry. That culture and knowledge base enables us to produce Winning Formulas for a wide variety of industries and applications.

Our products are used in the aerospace, marine, coatings, chemicals, plastics, engineering and construction industries. They can also be found in automotive, agricultural feed, food, packaging, textile, paper and electronics applications.

Our production plants are strategically located in Asia, Europe and North and South America and are supplemented by sales offices in all major markets. We can offer you a speedy regional support and a flexible attitude to suit your business needs.

If you want a chemical partner who can offer you focused innovation to enhance your product or application, which is delivered reliably and responsibly look no further. We have a winning formula waiting for you.