

# Specialties for adhesives & sealants

High-quality ranges for  
strength & flexibility



# Global partner for adhesive performance

As a leading global producer of high-performance essentials and specialties, we offer you an extensive range of raw materials including polyols, isocyanate monomers, dispersing monomers, isocyanate cross-linkers and more – all dedicated to the formulation and differentiation of a full range of adhesives and sealants. Whether your area of interest lies in the automotive, footwear, furniture or floor industry, just to name a few, Perstorp will be able to supply you with the right raw materials adjusted to meet your specific requirements and applications.

Over the last years we have completed a number of key acquisitions that have significantly enhanced our offering to the polyurethane chain and to adhesives and sealants

manufacturers. In our portfolio you will find products that offer excellent and long-lasting adhesion, fast bonding times, low VOC content, non-yellowing qualities and many other desirable properties needed to make your adhesives or sealants stand out in a competitive market.

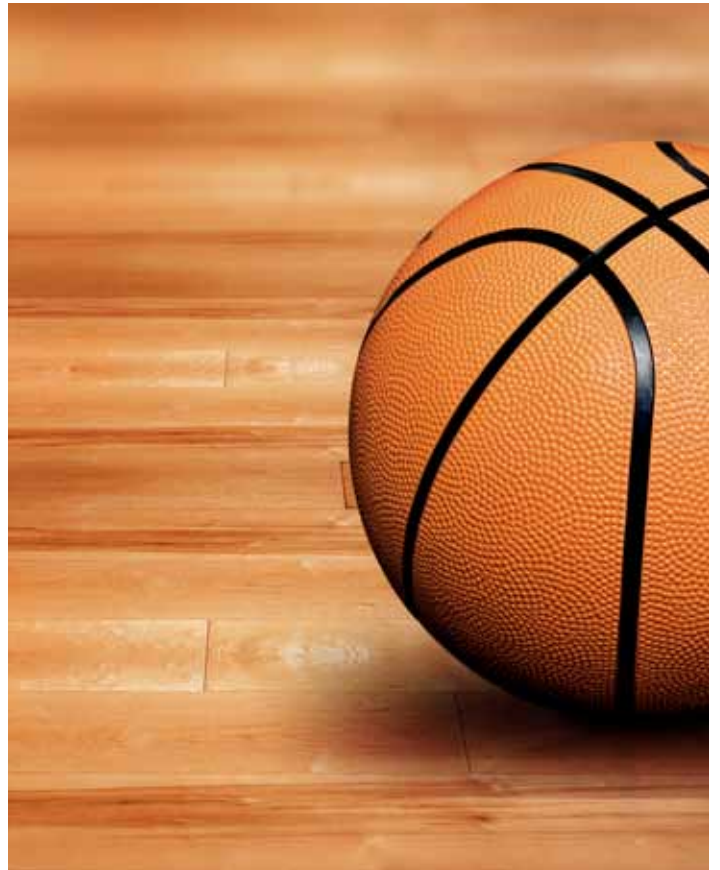
Our sales offices and production sites worldwide give us the resources and global network for short lead times and local support and service. With Perstorp as your partner, you can be sure to get performance you can trust, wherever you are in the world.



## Specialties for high-quality adhesives & sealants

Perstorp's offer includes a range of specialty products, focused on some key segments for adhesives and sealants manufacturers:

- ➔ Solvent-based polyurethanes adhesives and sealants
- ➔ Thermoplastic and reactive hot-melt adhesives
- ➔ Waterborne polyurethane adhesives
- ➔ Expandable sealants



	Solvent-based polyurethane adhesives & sealants	Thermoplastic & reactive hot-melt adhesives	Waterborne polyurethane adhesives	Expandable sealants
Capa™ polyols	•	• <sup>1)</sup>	•	
Capa™ thermoplastics		•		
Isocyanate monomers (HDI, IPDI, TDI: Scuranate™)	•	• <sup>2)</sup>	•	
Dispersing monomers: Bis-MPA, Ymer™			•	
Tolonate™ polyisocyanates	•			
Easaqua™ polyisocyanates			•	
Alkoxylates	•			
Oxymer™ carbonate diols			•	
Charmor™ polyols				•

• = Recommended use

<sup>1)</sup> binder for non-woven adhesives, scatter coat interlining adhesives and toe and heel counters

<sup>2)</sup> for structural adhesives, textile bonding, bookbinding and shoes

Our offer for:

# Solvent-based polyurethane adhesives & sealants

## Finding solutions with solvent-based adhesives

Solvent-based adhesives and sealants need to meet demands on bond strength and flexibility in application. For example, they should demonstrate a good creeping and an open time that is easy to calculate to allow a perfect positioning of the joints. They should also provide good adhesion on several substrates with an acceptable bonding time.

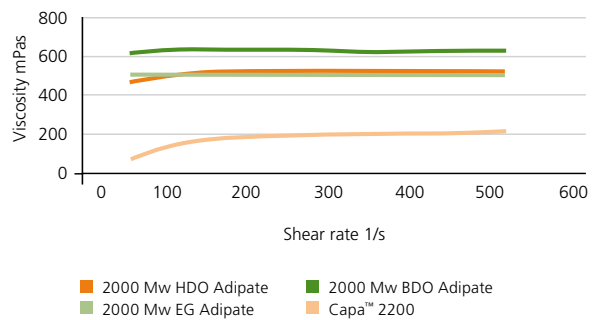
Perstorp's offer provides specialties to formulate successful solvent-based polyurethane adhesives with the use of Capa™ polyols, isocyanate monomers, Tolonate™ aliphatic isocyanates and alkoxyate liquid polyols.

## Capa™ polyols – spearheading solvent-based adhesive performance

Capa™ polyols are particularly useful due to their wide range of molecular weight. Typical end-uses include laminated packaging, 3D lamination, bonding shoe soles and uppers, textile bonding, magnetic tapes, adhesive tapes, automotive interiors and exteriors.

## Top benefits:

- ➔ Very good hydrolysis resistance
- ➔ Excellent low-temperature flexibility and wide working temperature range
- ➔ Excellent oil and UV stability
- ➔ Provides an excellent shear resistance
- ➔ Low viscosity for easy processing and reduced VOC





### Tolonate™ polyisocyanates – cross-linkers of 1K & 2K solvent-based formulations

Our Tolonate™ range includes Tolonate™ D2, a blocked polyisocyanate for 1K heat activated formulations, and HDI derivatives (trimers and biurets of various functionalities) for 2K applications. They are used in adhesives for a range of fields such as flexible packaging, wood and furniture, automotive applications, footwear and sports goods.

#### Top benefits:

- ➔ Versatility/exceptional ability to stick different materials together
- ➔ Outstanding durability/long-lasting adhesion
- ➔ Non-yellowing upon ageing
- ➔ High transparency
- ➔ Low viscosity

	Tolonate™ HDB types (HDI biuret)	Tolonate™ HDT types (HDI trimer)
Lower VOC	•	••
Stability to dilution	•	•
Compatibility with polyols	+ with polyesters	+ with acrylics
Durability	•	••
Adhesion	••	•

### Scuranate™ TDI & aliphatic isocyanate monomers – for durable & non-yellowing formulations

For the chemical synthesis of polyurethane pre-polymers, we offer Scuranate™ TDI grades with different mixtures of 2,4 and 2,6 isomers and the two main types of aliphatic isocyanates, HDI (Hexamethylene Diisocyanate) improving resin flexibility and IPDI (Isophorone Diisocyanate) offering superior hardness and chemical resistance.

### Alkoxyate polyether polyols – promoting superior end performance

Our polyether polyols, alkoxyates, comprise a range of liquid polyols that are mainly used as reactive diluents for radiation curing systems. Alkoxyates reduce the viscosity of the formulated system to obtain the desired processing conditions and required properties. Alkoxyates create opportunities for demanding adhesives manufacturers to achieve specific performance benefits including improved wetting and adhesion to difficult substrates.

Our offer for:

# Waterborne polyurethane adhesives

## When low VOC emission is essential

When you are working in an area where the use of solvent-based adhesives is unfavorable or a potential risk, for example in sustainable design interiors or explosive risk zones, waterborne adhesives can provide a good solution. Waterborne adhesives have the environmental advantage of being either VOC-free or with very low VOC, thus contributing to a healthy and safe indoor environment.

Our offer for waterborne polyurethane adhesives includes our complete offer for the synthesis of aqueous polyurethane dispersions (PUDs), which includes Capa™ polyols as soft segments, Oxymer™ carbonate diols, HDI, IPDI, TDI monomers and the dispersion monomers Bis-MPA and Ymer™. In addition, we offer Easaqua™ WAT series of self-emulsifying polyisocyanates, which are used as cross-linkers of 2K waterborne polyurethane formulations. Applications for PUD adhesives include adhesives in footwear, wood products, furniture, automotive interiors and automotive exteriors.

## Capa™ in waterborne adhesives – improving strength & flexibility

Capa™ polyols are widely used as the soft segments in aqueous polyurethane dispersions.

## Top benefits:

- ➔ Good high-temperature resistance
- ➔ Controlled, consistent open time
- ➔ Wide temperature performance
- ➔ Good hydrolysis resistance
- ➔ Good bond strength

	Capa™ polyols	PTMEG	Butylene adipate
Compression set	+	--	-
Tensile strength	+	-	+
Hydrolysis resistance	+	++	-
Oil resistance	+	-	+
Effective temperature range high	+	--	-
Cold flex	+	+	-
Cut and tear	+	-	+
UV resistance	+	-	+
Viscosity	+	+	-
Polydispersity	++	-	-

\* NEO: Neopentyl glycol; BDO: Butane diol  
Performance benefits imparted to prepolymers and PUDs by soft segment polyols.



## Oxymer™ – peak performance polyols

Oxymer™ polycarbonates grades offer all the advantages of conventional polycarbonate diols, including superior hydrolytic stability and outdoor durability. The Oxymer™ C grade displays the same advantages as the Oxymer™ M grade but with improved flexibility and adhesive properties.

## Scuranate™ TDI, HDI & IPDI isocyanate monomers – essential building blocks for PU synthesis

TDI, HDI and IPDI monomers are widely used in PU prepolymer (including PUDs) synthesis. IPDI shows excellent light and weather resistance and HDI, in addition, is of special interest due to its extreme flexibility. TDI is preferred for its faster reactivity compared to aliphatic isocyanates and is used when light-fastness is not required.

## Bis-MPA & Ymer™ N120 dispersion monomers – easy formulation of waterborne PU resins

Perstorp offers dispersing monomers for both ionically and non-ionically stabilized PUDs. Bis-MPA is widely used in anionic

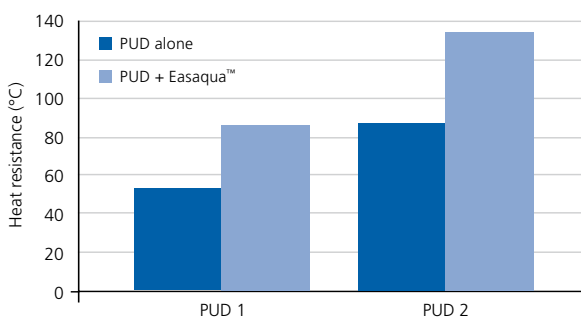
PUDs in adhesives and typically makes up 2-3 wt% of a PUD-formulation. Ymer™ N120 provides non-ionic stabilization and can be built in along the polymer backbone to provide efficient non-ionic stabilization.

## Easaqua™ series – easy waterborne solutions with aliphatic isocyanates

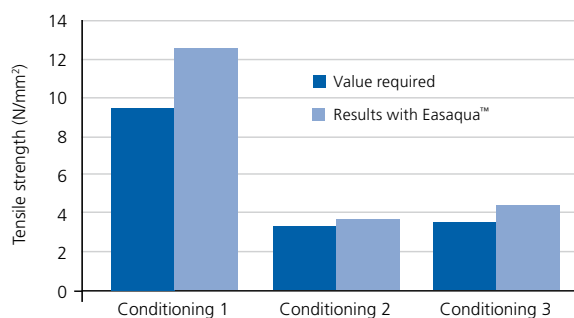
The Easaqua™ WAT series are self-emulsifying isocyanate cross-linkers for 2K waterborne polyurethane formulations or 1K waterborne stoving formulations (Easaqua™ WT 1000). Easaqua™ products are the environmentally-responsible choice for high performing, ultra low VOC and APEO-free formulations. Adhesives based on Easaqua™ can be used in for example wood and furniture, automotive applications, footwear and sports goods.

### Top benefits:

- ➔ Compatible with a wide range of waterborne resins
- ➔ Excellent initial bonding strength => high productivity
- ➔ Long-lasting adhesion
- ➔ Non-yellowing performance upon ageing/high aesthetics
- ➔ Best-in-class for heat and humidity resistance



PUD + 3% Easaqua™ WAT-1 for Wood  
HEAT RESISTANCE: adding Easaqua™ WAT products in PUDs greatly improves heat resistance.



Dispersion of VA homopolymer + 5% Easaqua™ X WAT-4  
HEAT & HUMIDITY RESISTANCE: D4 class is obtained by adding Easaqua™ WAT products in waterborne resins.

Our offer for:

# Thermoplastic & reactive hot-melt adhesives

## The fast bonding challenge

Hot-melt adhesives are either reactive (i.e. moisture-cured or 2K) or thermoplastic. Due to their typical characteristics, they are reactivated by heat and bond fast. As no solvent is needed these adhesives provide a key advantage over solvent-based adhesives in terms of VOC content (volatile organic compounds), which is reduced or even eliminated.

Thermoplastic and reactive hot-melt adhesives are essential for products of daily use, for example in footwear, textile, automotive, packaging, wood, electronic applications and in many other fast growing segments. Perstorp's offer for thermoplastics includes various grades of Capa™. Please see the product data summary on p.10 for further information.

## Capa™ thermoplastics – unique performance benefits for thermoplastic adhesives

Capa™ thermoplastic grades can be used either as 100% resin or combined with other polymers or fillers. Typical end-uses include hot-melt adhesives for non-wovens, binders for non-wovens, scatter coat interlining adhesives and toe and heel counters.

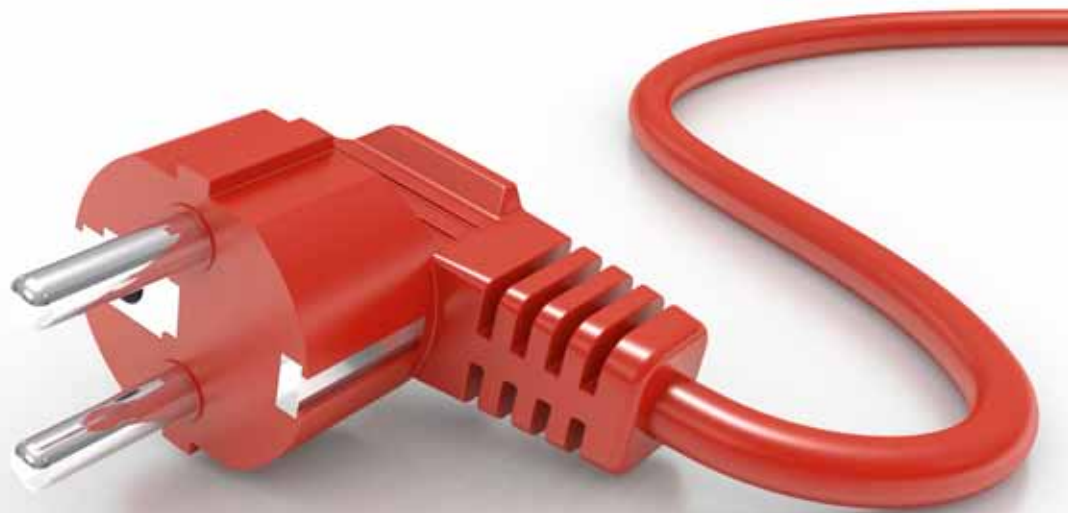
### Top benefits:

- ➔ Low melt viscosity for ease of application and penetration into substrate
- ➔ Low Tg (-60 °C) good low temperature performance
- ➔ Excellent adhesion to leather and other greasy substrates
- ➔ Crystalline (50%), rigid polymer with high elongation
- ➔ Biodegradable and non-toxic

Capa™ can also be used in laminating adhesive film and in reactive hot-melt adhesives.







Our offer for:

# Expandable sealants

## Charmor™ – intumescent system for expandable sealants in fire protection

Intumescent systems are ideal as protective sealants in the construction industry and for fire resistant plastics in the electrical, electronics and transportation sectors. Expandable sealants based on Charmor™ form a char barrier to protect buildings and the people inside them. This barrier slows the spread of fire, reduces heat and minimizes 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. To learn more about Charmor™ for intumescent systems, please see the Charmor™ brochure.



Please discuss your requirements regarding formulations and properties with our specialists available on [www.perstorp.com](http://www.perstorp.com)

## Product data summary

### Capa™ for solvent-based systems

	Type	Initiator*	Approx. MW	OH value (mg KOH/g)	Acid value (mg KOH/g)	Viscosity at 60 °C	Melting range (°C)
Capa™ 2302	Diol	BDO	3,000	37	< 0.25	1,100	50-60
Capa™ 2302A	Diol	BDO	3,000	37	< 0.05	1,100	50-60
Capa™ 2304	Diol	DEG	3,000	37	< 0.25	1,050	50-60
Capa™ 2402	Diol	BDO	4,000	28	< 0.25	1,670	55-60
Capa™ 3050	Triol	TMP	540	310	< 1.00	160	0-10

\* BDO: Butane diol, DEG: Diethylene glycol, TMP: Trimethylpropane

### Capa™ in hot-melt & reactive hot-melt adhesives & laminating adhesive film

	Approx. MW	Delivery form	OH value (mg KOH/g)	Melt flow index*
Capa™ 6250	25,000	Granules	circa 5	9
Capa™ 6400	37,000	Granules	circa 4	40
Capa™ 6430	43,000	Granules	circa 5	13
Capa™ 6500	50,000	Granules	circa 2	7
Capa™ 6506	50,000	Powder	circa 2	7
Capa™ 6800	80,000	Granules	circa 1	3

\* Measured with 1 "PVC die, 2.16 kg, g/min, at 80 °C for Capa™ 6250, 6400 and 6430 and at 160 °C for the other grades

### Capa™ in waterborne systems

	Type	Initiator*	Approx. MW	OH value (mg KOH/g)	Acid value (mg KOH/g)	Viscosity at 60 °C	Melting range (°C)
Capa™ 2200A	Diol	NEO	2,000	56	< 0.05	480	40-50
Capa™ 2302	Diol	BDO	3,000	37	< 0.25	1,100	50-60
Capa™ 2402	Diol	BDO	4,000	28	< 0.25	1,670	55-60
Capa™ 3050	Triol	TMP	540	310	< 1.00	160	0-10

\* NEO: Neopentyl glycol, BDO: Butane diol, TMP: Trimethylolpropane

### Dispersing monomers

	Appearance	Functional groups	Hydroxyl number (mg KOH/g)	Molecular weight (g/mol)	Viscosity, mPas (°C)
Bis-MPA	Crystals	2 hydroxyl, 1 carboxyl	835	134.4	N/A
Ymer™ N120	Waxy	2 hydroxyl	110	1,000	60 (50)

### Aliphatic isocyanate monomers

	Appearance	Isocyanate type	Color, APHA	Hydrolysable chlorine, ppm	Total chlorine, ppm
IPDI (Isophorone Diisocyanate)	Liquid	Cycloaliphatic	≤ 30	< 200	< 400
HDI (Hexamethylene Diisocyanate)	Liquid	Aliphatic	≤ 15	< 350	< 1,000

### Aromatic isocyanate monomers

	Chemical description	Specific gravity 25 °C	Viscosity mPas 25 °C	Hydrolysable chlorides (%)	Total acidity (%)	Color APHA
Scuranate™ T80	TDI 80/20	1.22	3	< 0.007	< 0.0015	< 15
Scuranate™ T65	TDI 68/32	1.22	3	< 0.010	< 0.003	< 25
Scuranate™ T100	2,4 TDI	1.22	3	< 0.015	< 0.013	< 25
Scuranate™ TX	TDI 95/5	1.22	3	< 0.010	< 0.0010	< 30

## Product data summary

### Tolonate™ for solvent-based & solvent-free PU formulations

	Colour <sup>1)</sup>	Viscosity <sup>2)</sup> (mPas)	NCO <sup>3)</sup> (%)	Free monomer (%)	Solids content (%)	Solvent type	Bulk density at 25 °C (kg/m <sup>3</sup> )	Flash point <sup>4)</sup> (°C)	Equivalent weight (g) (3)
Tolonate™ HDB	≤ 40	9,000±2,000	22.0±1.0	< 0.3	100	–	1,120	> 120	191
Tolonate™ HDB-LV	≤ 40	2,000±500	23.5±1.0	< 0.3	100	–	1,120	> 120	179
Tolonate™ X FD 90 B	≤ 60	2,000±1,000	17.4±0.6	< 0.5	90	B	1,130	48	240
Tolonate™ HDT	≤ 40	2,400±400	22.0±0.5	< 0.2	100	–	1,160	> 120	191
Tolonate™ HDT-LV	≤ 40	1,200±300	23.0±1.0	< 0.2	100	–	1,160	> 120	183
Tolonate™ HDT-LV2	≤ 40	600±150	23.0±1.0	< 0.5	100	–	1,131	> 120	182
Tolonate™ D2	≤ 40	3,250±750	11.2*	–	75±2	S	1,060	49	370

<sup>1)</sup> Hazen or APHA <sup>2)</sup> at 25 °C <sup>3)</sup> on delivery form <sup>4)</sup> in closed cup, S: Aromatic hydrocarbon, B: Butyl acetate, \* blocked NCO

### Waterborne aliphatic isocyanates

	Viscosity at 25 °C (mPas)	NCO (%)	Solid content (%)	APEO-free without nonyl phenol ethoxylate
Easaqua™ WT 1000	3,200	9.4	63	
Easaqua™ WAT	4,000	19.0	100	
Easaqua™ WAT-1	1,400	21.7	100	
Easaqua™ X WAT-3	1,150	21.5	100	•
Easaqua™ X WAT-4	4,000	18.6	100	•

### Alkoxylates

	Functionality	Hydroxyl number (mg KOH/g)	Molecular weight (g/mol)	Viscosity (mPas, 23 °C)	Recommended application		
					General	Radcure	Polyurethane
Polyol R2395	2	395	276	350		•	•
Polyol R2490	2	490	220	170		•	•
Polyol 3165	3	165	1,014	350	•		•
Polyol 3380	3	380	444	360	•	•	
Polyol 3610	3	610	275	700			•
Polyol 3611	3	611	275	700			•
Polyol 3940	3	940	179	4,000			•
Polyol 3990	3	990	170	4,500	•		•
Polyol R3215	3	215	795	340	•	•	
Polyol R3430	3	430	398	400		•	
Polyol R3530	3	530	308	2,000	•	•	•
Polyol R3600	3	600	275	700		•	

### Oxymer™ carbonate diols

	Appearance	Functional groups	Hydroxyl number (mg KOH/g)	Molecular weight (g/mol)	Viscosity, mPas (°C)	Polymer chemistry
<b>Polycarbonate diols*</b>						
Oxymer™ M112	Viscous liquid	2 hydroxyl	112	1,000	1,100 (75)	Polycarbonate
Oxymer™ C112	Viscous liquid	2 hydroxyl	112	1,000	1,500 (75)	Polycarbonate

\* Development and experimental products

### Charmor™ for expandable sealants

	Melting point (°C)	Water solubility (% at room temperature)	Typical hydroxyl number (mg KOH/g)	Density (kg/m <sup>3</sup> )	Particle size
Charmor™ PM	260	5.25	1,645	1,400	< 40 µm typ. 98%
Charmor™ PT	250	4.70	1,615	1,400	< 40 µm typ. 98%
Charmor™ DP	222	0.22	1,325	1,370	< 40 µm typ. 98%
Charmor™ PP100	170	0.2	1,050	1,320	< 250 µm



## 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](http://www.perstorp.com)