



# Products for polyurethane foams & elastomers

Essentials & specialties driving processing, comfort & durability

# 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.



# Driving processing, comfort & durability

## Your complete polyurethane partner

Our complete and continually expanding range of products for formulating high performance polyurethanes combines with our expertise in differentiating and tailoring them, to make polyurethanes our largest product and development field. Our dedicated polyurethane team supports you in developing and tailoring new polyurethane technology and applications.

## Enhancing polyurethanes

The unique properties and virtually endless design possibilities of polyurethane foams and elastomers have ensured widespread use in many industrial and domestic applications. These include automotive seating, upholstery and bedding foam, high performance elastomers, various insulation material for buildings and refrigerated goods, packaging, electrical and electronic equipment, shoe soles in footwear, leisure and sports equipment and rollers in industrial and office equipment.

The main application areas where our products are ideal for polyurethane formulations and pre-polymers are:

- Foams – flexible to rigid foams and microcellular foams
- Elastomers – versatile cast elastomers, reaction injection molding and thermoplastic polyurethanes (TPU)

Polyurethanes are formed by the reaction of a polyol with a diisocyanate or polyisocyanate with suitable catalysts and additives, yielding products with a broad range of physical and chemical properties. They are among the most important classes of specialty polymers.

## Our wide range of polyurethane essentials & specialties

### Isocyanates:

Scuranate® TDI (Toluene Diisocyanate) – essential aromatic isocyanate monomers

Tolonate® – aliphatic isocyanates HDI and IPDI and polyisocyanate derivatives for light-stable end products

### Polyols:

Capa® – high performance, low viscosity polyols

Oxymer® – our latest innovation, liquid polycarbonate diols for outstanding durability

Robrac® – affordable polyester polyols for rigid foam

### Performance enhancers:

Boltorn® – high firmness, low compression set foam

Cross-linkers – TMP (Trimethylolpropane), Glycerine tech, trifunctional and tetrafunctional liquid polyethers and caprolactone polyols

Chain-extenders – specialty diols MPD (Methyl Propanediol), Neo (Neopentyl Glycol), BEPD (Butyl Ethyl Propanediol), Trimethylpentanediol, polyether and caprolactone liquid diols

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.



# The essential polyurethane foam components

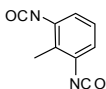
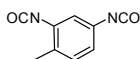
## Scuranate® T80 & Scuranate® T65 – essential building blocks for flexible foam

TDI is an essential isocyanate used in the production of polyurethanes for flexible foam applications. TDI applications range from furniture, bedding and carpet underlay to transportation and packaging. We are a leading global supplier of TDI with responsible, reliable, innovative production at one of the safest TDI production units in the world, our Pont-de-Claix site in France. And we offer a complete range of TDI products for producing polyurethane foams.

Scuranate® T80 is a mixture of 80% 2,4-toluene diisocyanate and 20% 2,6-toluene diisocyanate and is the most reliable TDI grade.

Scuranate® T65 is a mixture of 2,4-toluene diisocyanate and 2,6-toluene diisocyanate isomer with high content of the 2,6-isomer. It is ideal for high load bearing and improved tear resistance, providing both improved sag factor and a latex feel.

Scuranate®, 2,4 and 2,6 toluene diisocyanate



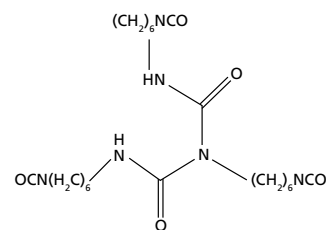
## IPDI, HDI & Tolonate® aliphatic polyisocyanates – for light-stable, non-yellowing foams

The aliphatic structure of IPDI, HDI and polyisocyanates is ideal for producing durable, non-yellowing foam that stands up to UV light exposure. This keeps outdoor and visible foam, looking and performing like new for longer. HDI provides good flexibility while IPDI provides improved hardness thanks to its alicyclic structure.

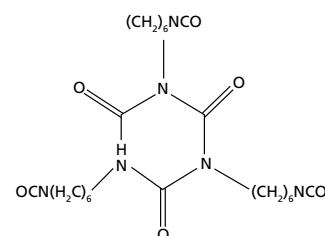
Solvent-free polyisocyanate biurets and trimers, with a higher safety profile than monomeric isocyanates, are also available. Tolonate® HDB LV offers a good compromise of viscosity, flexibility, and reactivity. And Tolonate® HDT gives higher rigidity thanks to its isocyanurate structure.

	General purpose	High load bearing & tear resistance	Light-stable foam
Scuranate® T80	•		
Scuranate® T65		•	
HDI, IPDI and Tolonate®			•

Tolonate® HDB



Tolonate® HDT





## Comfort additives for foam

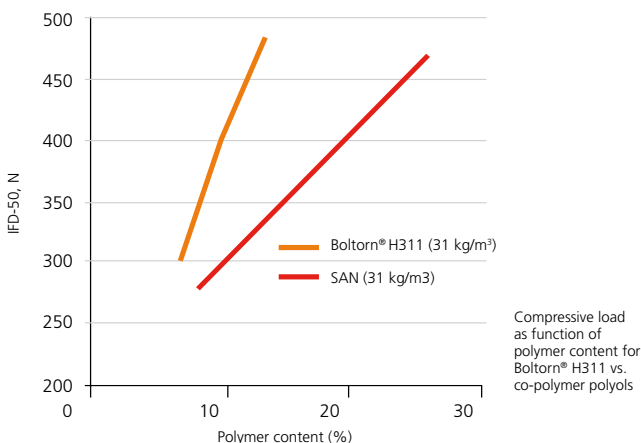
Achieve higher firmness and stability or lower compression set foam by replacing SAN-type co-polymer polyols with Boltorn® dendritic polymer polyols. And since Boltorn® is more efficient, a smaller amount is required to formulate the properties you demand, compared to SAN-type co-polymer polyols.

### Boltorn® H311 – for exceptional firmness & stability

This liquid polymer polyol provides exceptional compressive load-building characteristics in flexible foam at very low addition levels. It is used as an additive, partially replacing conventional cross-linkers or graft co-polymer polyols of SAN-type.

Compared to conventional technology, Boltorn® H311 offers considerable benefits, including:

- More than twice the efficiency in providing compressive loads (CFD or IFD) at low addition level
- Exceptional firmness, extending beyond current state-of-the-art technology
- Improved foam stability



### Boltorn® P500 – high firmness at low compression set

Our dendritic polymer polyol for foam is a liquid, water-free product that yields exceptionally low compression at high firmness when used with graft co-polymer polyols. The low compression set allows you to operate at reduced foam density and still meet the comfort specifications of end users.

Improved compression set at lower density with Boltorn® P500 when reducing density at IFD-25 ~380 N

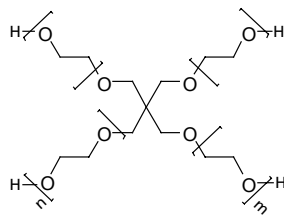
Formulation	Reference 40	Reference 35	Boltorn® P500
Density, kg/m³	40	35	35
SAN, %	35	35	29
Boltorn® P500, %	0	0	7.5
IFD-25%, N	388	372	363
IFD-65%, N	1,133	1,028	960
Compression set, %	14	28	12.2

# Specialty foam polyols

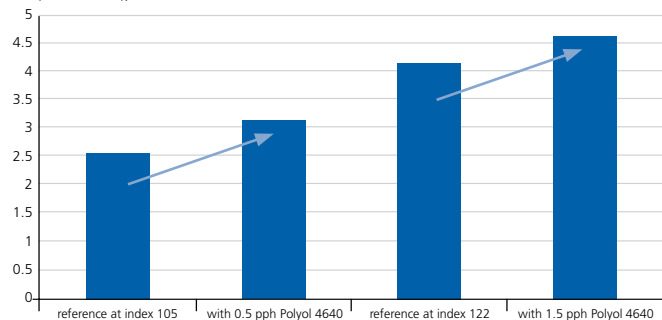
## Polyol 3610 & Polyol 4640 – specialty cross-linkers for building hardness

We offer a range of alkoxyated polyols, including Polyol 3610 and Polyol 4640, which boost hardness while maintaining high resilience in flexible foams.

Tetrafunctional ethoxylated polyol



CFD (force at 40%), kPa



Hardness improvement in 20 kg/m<sup>3</sup> density TDI flexible foam with addition of 0.5 to 1.5 parts of Polyol 4640

## Robrac® – affordable polyester polyols

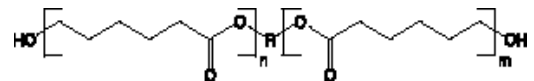
Competitively priced Robrac® polyester polyols meet market demand for lower cost while securing sufficient performance for rigid foam applications. Robrac® polyols replace conventional polyols in rigid foam applications and offer improved economy with maintained performance.

## Capa® polyols – for microcellular & integral skin foams

Caprolactone-based rigid foams combine the toughness and excellent physical properties normally associated with polyesters, including a hydrolytic stability approaching that of polyethers.

In microcellular foam, Capa® polyols offer good resistance to heat build up and fatigue under dynamic loading, low-temperature flexibility and good wear resistance. This offers added comfort and durability in end-products such as shoe soles and suspension equipment. In integral skin products, Capa® polyols enable foams with durable skins for excellent resistance to weathering, solvents and chemicals, as well as a good combination of heat distortion temperatures and impact strength. The low-viscosity materials also achieve good flow characteristics and mold reproduction.

Polycaprolactone



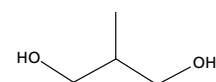
Products

Application	Capa® 3022	Capa® 7201A	Capa® 4101
Rigid foam	•		•
Integral skin foam	•		
Microcellular foam		•	

## MPD – for high comfort viscoelastic foam

Our MPD is ideal in the production of high comfort viscoelastic foam such as the foam used in exclusive high-density foam mattresses.

MPD





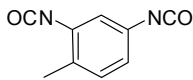
# Elastomer essentials

## Scuranate® T80 & Scuranate® T100 – essential elastomer building blocks

TDI is an essential isocyanate used in the production of pre-polymer for cast elastomers.

Scuranate® T100 contains more than 99% of 2,4-toluene diisocyanate, making it a pure 2,4 isomer with dual reactivity of the isocyanates groups. This allows the preparation of low free TDI monomer and well-controlled quality pre-polymers for cast elastomers for more reliable end-product consistency and quality.

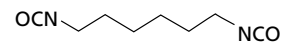
Scuranate® T100



## IPDI & HDI – for light-stable, non-yellowing elastomers

Thanks to the stable aliphatic structure of IPDI and HDI, they are ideally suited for producing durable, non-yellowing polyurethane elastomers that stand up to UV light exposure. This keeps end products such as elastomers in the automotive segment, standing up to the elements, so they stay durable and last longer. Choose HDI for greater flexibility, or IPDI for a pre-polymer for higher rigidity in end-products. HDI is also suitable for thermoplastic elastomers.

HDI



## Scuranate® T65 – for improved tear resistance

Our Scuranate® T65 provides elastomers with specific improved end-product properties, in particular, increased tear resistance.

## Aliphatic polyisocyanates

Our range of solvent-free aliphatic polyisocyanate biurets and trimers are ideal for producing light-stable polyurethane casting systems. These are suitable alternatives to polymeric MDI or monomeric TDI wherever safety and handling is a prime concern.





## Our offer for thermoplastic polyurethane elastomers

### Capa® polyols – easy processing & high performance

We supply a wide range of premium and standard grade linear polycaprolactone diols with consistent and tightly controlled molecular weight, narrow molecular weight distribution, consistent reactivity and low viscosity to meet the demands of thermoplastic polyurethane producers.

Our Capa® polyols have a wide working temperature range and their low viscosity enables easy processing. They also improve the performance of thermoplastic polyurethane elastomer end-products such as gaskets, o-rings and seals, with excellent low-temperature flex fatigue, good hydrolysis and chemical resistance, excellent oil and solvent resistance, low compression set, low odor and good paintability.

The premium grades of Capa® go even further, with even lower viscosity, faster crystallization rate and narrow polydispersity as well as the performance benefits of increased hydrolytic stability, improved low-temperature flexibility and low fogging.

	Capa®	Polyether	Polyester adipate
Easy processing	•		
Hydrolytic stability	•	•	
Low and high temperature range	•		
UV resistance	•		•
Abrasion resistance	•		•
Resilience	•	•	
Compression set	•		•

% Resilience measured by lupke pendulum

Temp. °C	Capa® 2200/BD/MDI	Adipate/BD/MDI	Adiprene L100
20	62.5	57.5	48
40	67.5	63	58.5
60	70	66	64.5
80	71	67	65
100	70	66	60.5
120	66.5	63	

Comparative resilience of 90 shore A polyurethane systems

# Our offer for polyurethane cast elastomers

## Capa® polyols – low density & high durability

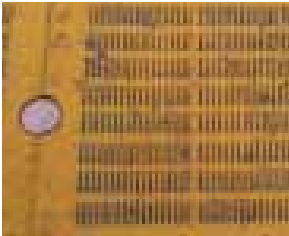
The low polyol viscosity of our Capa® polyols enable easy processing and since they possess all primary hydroxyl groups, they also ensure consistent and fast reactions. Polyurethane cast elastomers based on our Capa® polyols have lower density than those derived from polyadipates and outstanding resilience results in elastomers with low hysteresis properties.

In addition, Capa® polyols achieve very good low-temperature flex fatigue performance, excellent cut and tear properties, good hydrolysis resistance and high abrasion resistance in end products. We offer a complete range of premium and standard grade diols and triols that can be used with both aliphatic and aromatic isocyanates as main polyols or cross-linkers.

Comparative hydrolysis resistance at 100°C

Polyurethane system	Time required to halve tensile strength	Time required to reduce tensile strength to 100 Kg/cm <sup>2</sup>
Capa® 2200/BD/MDI	4.5 days	7 days
Capa® 2200A/BD/MDI	6.5 days	11 days
Polytetrahydrofuran (MW 2000)/BD/MDI	2 days	9.5 days
Polyethylene butylene adipate (MW 2000)/BD/MDI	3 days	5 days
Polyethylene adipate (MW 2000)/BD/MDI	2.7 days	4 days

## Enhancing durability with Capa®



Evidence of improved durability thanks to our Capa® polyols, in applications such as mining screens, shown above, where water resistance and abrasion resistance are required



Polyester adipate-based end products show less durability in withstanding a harsh environment and, as seen above, this can lead to rapid deformation



## Specialty elastomer cross-linkers

### TMP – versatile elastomer cross-linker

Our superior supply capacity makes us the global leader in manufacturing TMP. This highly versatile product is used as a cross-linker for cast elastomers in some applications, where it partially replaces 1,4-butanediol to improve the hardness to compression set ratio.

### Alkoxyated polyols – liquid cross-linkers for ease of handling

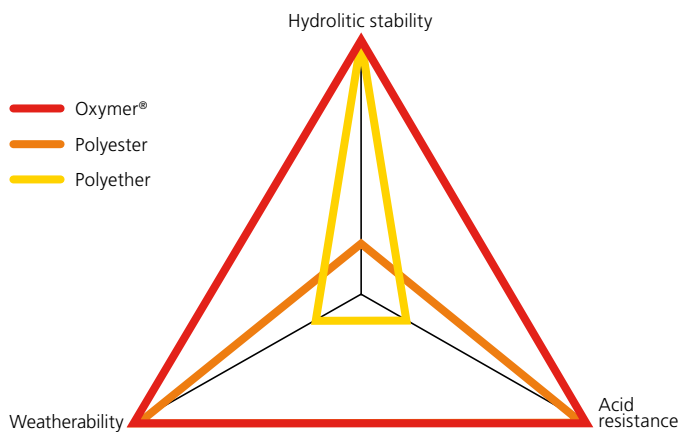
To facilitate the handling of TMP for our customers and improve the hardness to flexibility ratio of elastomers, we have developed a range of alkoxyated polyols with a low degree of alkoxylation. Polyol 3990, also called liquid TMP, has primary alcohol groups that need no heating, simplifying handling immensely. Polyol 3611 is a primary alcohol cross-linker facilitating good Shore A and resilience in elastomers. Polyol 3611 has lower water content and lower viscosity than Polyol 3990 and it is ideal for producing cast elastomers for roller applications. We offer a number of alternative alkoxyated polyalcohols of various functionalities (two to six) and reactivities to meet your requirements.

Formulation	Shore A	Ball rebound, %
BDO/TMP 4/0.3	50	50
Polyol 3990	58	45
Polyol 3610	56	49
Polyol 3165	53	61
Polyol 4800	60	45

# Specialties for ultimate performance

## Oxymer® – the premium choice for outstanding durability

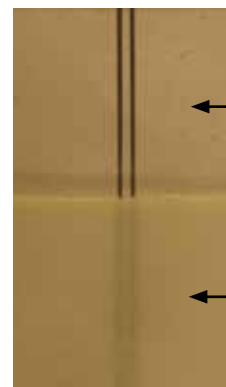
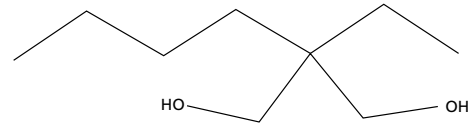
One of the most recent developments in our complete range for polyurethanes, are our Oxymer® polycarbonate liquid diols. They offer outstanding UV resistance in elastomers, in combination with both water repellency and acid resistance. Oxymer® is the premium macrodiol choice for top of the line durability and performance combining the hydrolytic resistance of polyethers with the acid resistance and UV resistance of polyesters.



## BEPD – chain-extender for increased clarity

BEPD is a hydrophobic and asymmetric glycol diol. As a chain-extender, it helps formulators increase the transparency of cast and thermoplastic elastomer parts and achieves outstanding hydrolytic resistance.

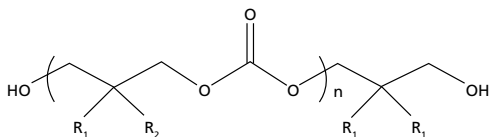
BEPD

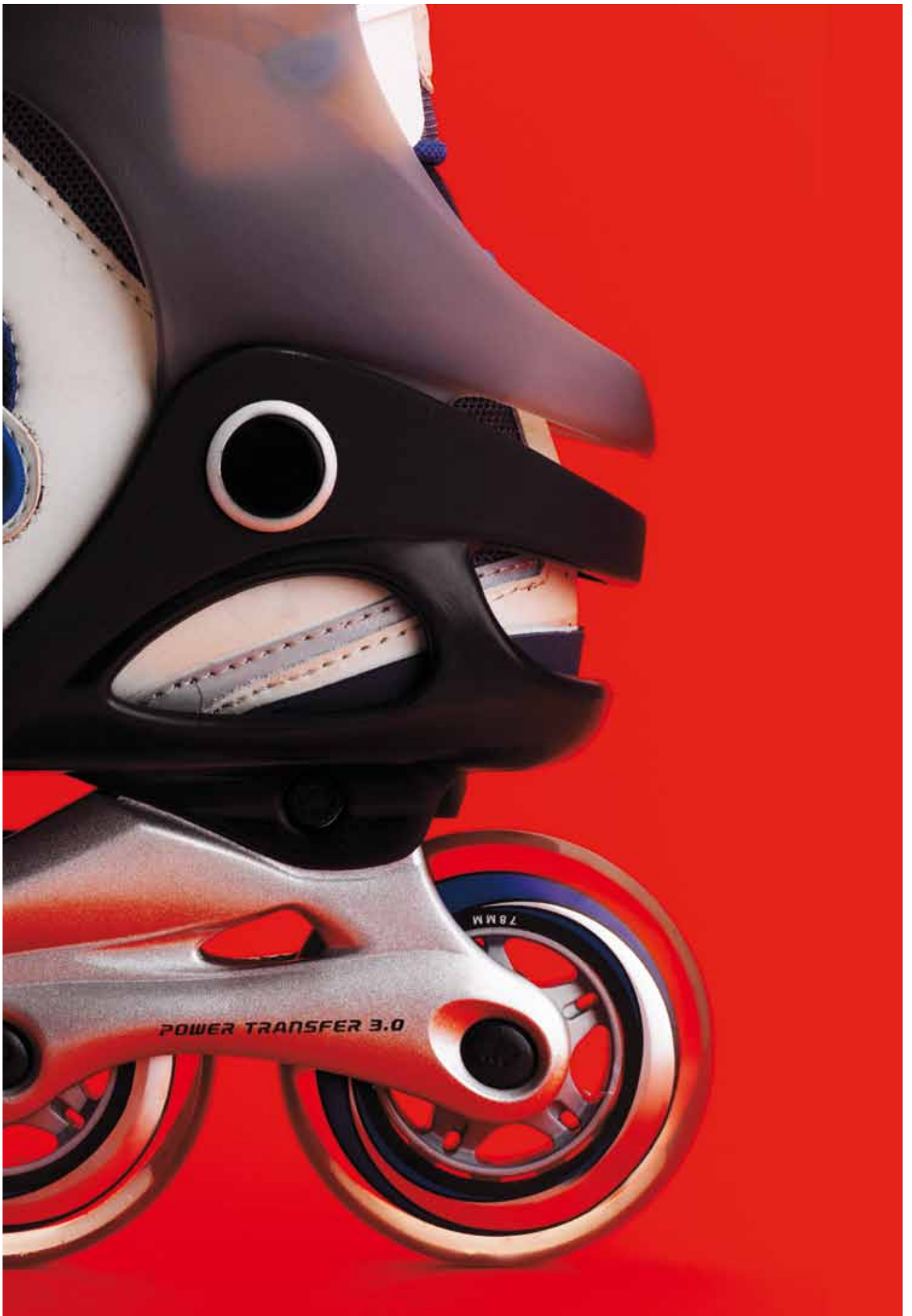


← Elastomer with BEPD as chain-extender

← Elastomer with BDO as chain-extender

Oxymer®





## Product data summary

### Isocyanate monomers

	Isocyanate type	Hydrolysable chlorine (ppm)	Total chlorine (ppm)	Assay (%)	NCO content (% , approx.)
Scuranate® T80 (Toluene diisocyanate, 80% 2,4 TDI)	Aromatic	< 70	< 300	> 99.5	48.1
Scuranate® T65 (Toluene diisocyanate, 68% 2,4 TDI)	Aromatic	< 100	< 300	> 99.5	48.1
Scuranate® T100 (Toluene diisocyanate, > 99% 2,4 TDI)	Aromatic	< 150	< 700	> 99.5	48.1
Scuranate® TX (Toluene diisocyanate, > 95% 2,4TDI)		< 100	< 1,000	> 99.5	48.1
HDI (Hexamethylene diisocyanate)	Aliphatic	< 350	< 1,000	> 99.5	50.0
IPDI (Isophorone diisocyanate)	Cycloaliphatic	< 200	< 400	> 99.5	37.6

### Solvent-free aliphatic polyisocyanates

	Viscosity (mPas, 25°C)	NCO (%)	Free monomer (%)	Flash point (°C)	Equivalent weight (g)
Tolonate® HDB-LV	2,000 ± 500	23.5 ± 1.0	< 0.3	> 120	179
Tolonate® HDT	2,400 ± 400	22.0 ± 0.5	< 0.2	> 120	191
Tolonate® HDT-LV	1,200 ± 300	23.0 ± 1.0	< 0.2	> 120	183
Tolonate® HDT-LV2	600 ± 150	23.0 ± 1.0	< 0.5	> 120	183

### Caprolactone polyols

	Appearance	Reactive group	Molecular weight (g/mol)	Polymer chemistry	Hydroxyl number (mg KOH/g)
Capa® 2043	Liquid	2 hydroxyl	400	Polyester	280
Capa® 2100	Paste/wax	2 hydroxyl	1,000	Polyester	112
Capa® 2101A	Paste/wax	2 hydroxyl	1,000	Polyester	112
Capa® 2161A	Wax	2 hydroxyl	1,600	Polyester	70
Capa® 2205	Wax	2 hydroxyl	2,000	Polyester	56
Capa® 2201A	Wax	2 hydroxyl	2,000	Polyester	56
Capa® 2302	Wax	2 hydroxyl	3,000	Polyester	37
Capa® 2302A	Wax	2 hydroxyl	3,000	Polyester	37
Capa® 2402	Wax	2 hydroxyl	4,000	Polyester	28
Capa® 2403D	Wax	2 hydroxyl	4,000	Polyester	28
Capa® 2803	Wax	2 hydroxyl	8,000	Polyester	14
Capa® 3022	Liquid	3 hydroxyl	240	polyester	540
Capa® 3031	Liquid	3 hydroxyl	300	Polyester	560
Capa® 3031A	Liquid	3 hydroxyl	300	Polyester	560
Capa® 3050	Liquid	3 hydroxyl	540	Polyester	310
Capa® 3201	Wax	3 hydroxyl	2,000	Polyester	84
Capa® 4101	Liquid	4 hydroxyl	1,000	Polyester	218
Capa® 7201A	Paste/wax	2 hydroxyl	2,000	Polyester: Polyether	56
Capa® 7203	Paste/wax	2 hydroxyl	2,000	Polyester: Polycarbonate	56

### Polycarbonate diols

	Appearance	Reactive group	Molecular weight (g/mol)	Hydroxyl number (mg KOH/g)	Viscosity Pas (°C)
Oxymer® M112	Viscous liquid	2 hydroxyl	1,000	112	20 (40)
Oxymer® M56	Viscous liquid	2 hydroxyl	2,000	56	65 (40)
Oxymer® C112	Viscous liquid	2 hydroxyl	1,000	112	30 (40)

## Product data summary

### Polyester polyols

	Appearance	Reactive group	Molecular weight (g/mol)	Hydroxyl number (mg KOH/g)	Viscosity Pas (°C)
Robrac® 650	Semi-solid	5 hydroxyl	480	700	35 (50)
Robrac® 1200	Liquid	4 hydroxyl	Blend	1,150	18 (23)

### Dendritic polymer polyols for foam

	Appearance	Molecular weight (g/mol)	Hydroxyl number (mg KOH/g)	Viscosity Pas (°C)
Boltorn® H311	Viscous liquid	5,700	245	40 (23)
Boltorn® P500	Viscous liquid	1,800	600	12 (23)

### Trifunctional polyether cross-linkers

	Appearance	Molecular weight (g/mol)	Hydroxyl number (mg KOH/g)	Viscosity (mPas, 23 °C)
TMP	Flakes	135.1	1,247	59
Glycerine tech	Liquid	92.1	1,800	Liquid
Polyol 3990	Liquid	170	990	4,500
Polyol 3610	Liquid	275	610	700
Polyol 3165	Liquid	1,014	165	350

### Polyether cross-linkers

	Appearance	Molecular weight (g/mol)	Hydroxyl number (mg KOH/g)	Viscosity (mPas, 23 °C)
Polyol 4800	Liquid	282	800	2,200
Polyol 4640	Liquid	355	640	1,100
Polyol 4525	Liquid	426	525	2,600
Polyol 4360	Liquid	629	360	1,300

### Chain-extenders

	Appearance	Molecular weight (g/mol)	Hydroxyl number (mg KOH/g)	Melting point (°C)
Neo	Flakes	104.2	1,077	129
BEPD	Semi-crystalline	161.0	695	44
Trimethylpentanediol	Semi-crystalline	146.2	765	50
Polyol R2490	Liquid	220	490	Liquid
MPD	Liquid	90.8	1,230	Liquid

Focused innovation  
for polyurethanes





## 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 over 125 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. Present in the aerospace, marine, coatings, chemicals, plastics, engineering and construction industries, they can also be found in 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. 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 safer products and sustainable processes that reduce environmental impact. This principle of 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)