Healthcare
Company overview

- PAN-European distribution company since 2002
- More than 200 employees
- 24 offices
- 30 warehouses

Main suppliers

- LyondellBasell
- Styrolution
- SABIC Innovative Plastics
- Aquafil
- Ascend Performance Materials
- Lanxess
- BASF
- Ravago

Headquarters
Ultrapolymers Group NV
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info@ultrapolymers.com
Ultrapolymers Group was founded in October 2002 in Belgium, to distribute polymers for major polymer producers in several countries in Europe. In the meantime the Ultrapolymers Group has grown to one of the biggest Pan-European polymer distributors.

With offices and warehouses in most of the European countries, Turkey and South Africa, Ultrapolymers established a commercial network with local presence to serve its customers and suppliers in the best possible way.

We offer a comprehensive product portfolio of raw materials covering commodities, engineering plastics, thermoplastic elastomers and synthetic rubbers. We can deliver any quantity from 1 bag to a full truck load.
• To be a “First In Class” distribution organisation for plastic and rubber raw materials, driven by quality of service to our customers.

• To provide our products and services in a reliable and technically proficient way.

• To conduct this business ethically, in a spirit of partnership with our suppliers and stewardship with our staff.
**Ultrapolymer**, in partnership with industry leading suppliers, can supply a wide range of materials for healthcare applications in combination with an excellent service and technical support based on years of experience.

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*Please note that not every supplier’s products are available in every country. Please contact our sales representatives for more information about our distribution portfolio in your country.*
Global leading company supplying high quality materials and services

Manufacturing
• Strive to keep long-term consistency of formulation
• Single-sourcing concept to maximise product consistency
• Back-up plant concept
• Dedicated resources and silo cleaning protocols
• Proactive, near-miss system

Logistics
• Dedicated cleaning procedures for trucks, railcars and containers
• Customer-specific delivery and storage concepts
• Pest control

Services
• Tailored selection of polyethylene and polypropylene grades used in healthcare applications
• Compliance with Ph. Eur., USP, ISO10993 and other regulations
• DMF registration for all products
• Prior notice if product changes occur
• Bio-burden surveillance
• Development of extractable profiles
• Long-term sample retention and documentation

Support
• Effective risk management tools
• Global asset base
• Dedicated business management team
• Local sales and technical service teams in all regions of the world
• Security stocks
• Access to innovative products

With offering 4 essential business domains (Manufacturing, Logistics, Services and Support) Ultrapolymers and LyondellBasell will be a valuable partner for every company.

This healthcare segment relates to applications mainly in the pharmaceutical, medical device, laboratory, cosmetic, syringe and diagnostics area. Without exception, any potential use of Purell products has to be discussed with the relevant Application Development and Business contacts in advance. Purell is a trademark owned or used by the LyondellBasell family of companies and is registered in the U.S. Patent and Trademark Office.

www.purell-polymers.com
Innovative resins for healthcare applications

High quality supplier of materials and services
Any company can claim that they provide quality resins used in healthcare products that address producers’ unique needs. However, to deliver products and services with a dedicated protocol in a meaningful way requires experience.
Since the 1980s, LyondellBasell has been serving the specialised needs of the healthcare industry, and has been supplying its innovative Purell polyethylene and polypropylene resins for the past ten years.

Dynamic Support of the Risk Management Process
Whether you require security of supply or the additive composition of Purell products, rely on LyondellBasell. As the original and unique healthcare concept in the polyolefins industry, Purell Medical Procedure exemplifies the spirit of pharmaceutical GMP – awareness, change control and documentation – while supporting your efforts to minimise risk. As a living concept that serves a dynamic market, Lyondellbasell actively continues to develop services that support this process, such as bioburden surveillance and extractable profiles.

Innovative resins
The Purell family of industry-defining products is based on LyondellBasell’s pioneering resin and manufacturing technology developments. Profit from our experience and know-how!

Are you looking for...
• product consistency
• safe products in terms of production and usage
• A pre-warning service of 2 years if changes occur
Then Purell is the answer.
Purell® (PE/PP)

With an innovative portfolio of high added value resins LyondellBasell and Ultrapolymers can offer the healthcare industry, outstanding materials. The combination of being able to offer materials in compliance with all the necessary regulatory requirements and having a highly experienced team to give full support are just some of the reasons why LyondellBasell and Ultrapolymers can meet the healthcare needs in the market.

Purell polyolefins are available for all the conversion technologies and applications areas which are relevant in the healthcare industry.
Styrolution, global leader in styrenics

With combined pro forma sales of 6.4 billion Euros in 2010, Styrolution is the global leader in styrenics – it is the number one supplier of styrene monomers, polystyrene and copolymers, and the number two supplier of acrylonitrile butadiene styrene.

As a joint venture of BASF and INEOS, Styrolution is entirely dedicated to styrenics. Styrolution employs around 3,400 people, operate 17 manufacturing sites in ten countries, and has a broad customer base in over 100 countries worldwide serving all styrenics applications in a wide range of industries including automotive, electrical/electronics, building and construction, household appliances, toys, sports, leisure, packaging, healthcare and diagnostics.
Enhanced safety reduces costs and time demands for customers

Safety and reliability are amongst the most important factors of success in the medical sector. Styrolution therefore offers a service package which provides precisely that: long-term promises and high-quality raw materials, tested for example for chemical resistance or biocompatibility. The service package gives the Styrolution customer long-term certainty in their planning and also helps save time and money.

**THE SERVICE PACKAGE CONTAINS**

- The intention not to change the formulation* in the long term (with the exception of alterations required in the event of legal or regulatory changes).
- The promise to inform long-term customers in advance of any changes to resin formulation*.
- Styrolution suppliers are obliged to guarantee the purity of the substances supplied to Styrolution.
- Worldwide support with approvals for medical and pharmaceutical applications and for food contact.
- Testing of compatibility of plastic with specific chemicals
- Technical support for applications (processing, design, calculation)

* Formulations as defined in the Drug Master File (DMF)

**SHARED RESPONSIBILITIES**

**Customer**
- Ensure suitability for intended use
- Biocompatibility tests on final part
- Approval for final part

**Plastics Supplier**
- Constant product quality
- Basic suitability tests
- Long term supply
Terlux® (MABS)

Terlux® is the brand name of MABS polymers made by Styrolution. Terlux® can be used to create particularly brilliant visual effects such as very deep colours, pearlescent or sparkle effects. Terlux® is easy to process and can also be printed on without any problem. This combination of properties, which is quite extraordinary for impact-modified thermoplastics, makes Terlux® a specialty for upscale and design-oriented applications.

The key properties of Terlux®:
- Excellent transparency
- Brilliance
- High toughness
- Good resistance to chemicals
- Outstanding surface finish

Luran® (SAN)

Under its brand name Luran®, Styrolution offers SAN, a product that has been used for years now in many applications in the household and sanitary sectors, for packaging cosmetic products as well as for electronic and office articles. Luran®'s extraordinary properties include its excellent transparency and good resistance to chemicals. Moreover, Luran® stands out for its high stiffness, dimensional stability and resistance to fluctuating temperatures.

The outstanding properties of Luran® include:
- Excellent transparency
- Good resistance to chemicals
- High stiffness
- Dimensional stability
- Resistance to fluctuating temperatures

Terluran® (ABS)

Terluran®, Styrolution’s ABS, has set worldwide standards for cost-effectiveness and product quality. Styrolution makes its Terluran® Core Products using state-of-the-art technology in world-scale-plants in Europe, Asia and North America. In this manner, Styrolution ensures the global availability of Terluran®. Styrolution is the only manufacturer to offer two ABS grades (Terluran® GP-22 and Terluran® GP-35) with the same specification worldwide from regional production sites. Especially for medical technology products Styrolution offers Terluran HD-15. Owing to its very bright and consistent intrinsic colour, Terluran® is ideally suited for self-colouring, particularly when there is a need for brilliant colours. With its service brand Colourflexx®, Styrolution also provides an innovative and complete package for the self-colouring of plastics and can meet the requirements of customers efficiently and economically.

The characterizing properties of Terluran®:
- Very bright and consistent intrinsic colour
- Easy self-colouring
- High quality surface finish
- Good gloss
- Easy processing
- Short cycle times

Lustran® (ABS)

The chemical structure, based on the three starting components of acrylonitrile, butadiene and styrene, plus selected additives, constitutes a flexible modular system for creating product types to respond to specific market needs.

What makes our material different:
- Any colour already compounded
- High gloss products for brilliant surfaces
- Materials which fulfill stringent requirements as for medical or food contact purposes
NAS® (SMMA)

NAS: is an Acrylic Styrenic (SMMA) copolymer. The resins Styrolution offers within the NAS product portfolio are FDA compliant and are easy to colour. They are even available as precoloured resins. The SMMA copolymers mould as easy as crystal polystyrene and they have a UL 94 HB flame class. In addition they meet the USP class VI specifications.

NAS 21: blends with styrene butadiene copolymers (SBC’s i.e. K-Resin®) – maintains clarity, avoids warping, and gives stiffness to the part. The result is:
- A clear impact material with lower total cost.
- Used for toys, P-O-P, medical devices
- Best dishwasher resistance for drinkware
- Improves blend clarity

NAS 30: has best colour/clarity/lustre.
- Used in tap handles for its clarity, ease of processing and resistance to bathroom chemicals.
- Used in water filter pitchers, camera view-finders and housewares for its consistent clarity.
- Easy to mould in thick clear parts
- Less trouble with voids, sinks, and filling

NAS 36: has excellent indoor UV resistance.
- Internal lubricant for better mould release
- Material of choice for P-O-P
- E <3.0 after 300 hours (IBM protocol)

NAS 90: best for blending with styrene butadiene copolymers (SBC’s i.e. K-Resin®)-maintains clarity, avoids warping, and gives stiffness to the part. The result is:
- A clear impact material with lower total cost.
- Used in medical devices and hangers
- Maintains blend toughness

Zylar® (MBS)

With the Zylar product portfolio, Styrolution can offer a material which is: FDA compliant, easily colourable, available as precoloured, just as HIPS easily mouldable, UL 94 HB flame class and the Zylar resins meet the USP class VI specifications. In addition the Zylar resins have an excellent property retention after EtO and Gamma sterilisation.

Zylar 220 & 221: has exceptional clarity.
- Tougher than the notched Izod impact data shows, due to notch sensitivity.
- Good elongation and ductility.
- Easiest Zylar to process
- Used in toys, pool test kits and durable CD jewel boxes

Zylar 390: high clarity and toughness
- Best chemical resistance of the Zylars

Zylar 530 & 531: is the toughest Zylar.
- Used in commercial paper towel dispenser for toughness
- Good replacement when PC is over engineered
- More susceptible to weld line fracture compared to Zylar 220
- High transparency but has some haze

Zylar 533: is Zylar 530 with a UV stabiliser package.
- Used in long life office accessories and modular POP displays
- E <3.0 after 300 hours (IBM protocol)

Zylar 535: is Zylar 530 with an Anti-Static additive package.
- Reduces dust accumulation on parts

Zylar 631: best combination of clarity and toughness.
- The newest addition to the Zylar family
- NSF compliant
Innovative plastics
Healthcare resins

To support customers with changing requirements in the healthcare industry, SABIC Innovative Plastics continues to develop new materials and processing expertise. Their recent innovations address important trends, including higher autoclave temperatures; improved compatibility with blood and proteins; enhanced processing for large parts and difficult geometries; and extended offerings for compliance with environmental regulations.
SABIC Innovative Plastics

The broad and deep SABIC Innovative Plastics portfolio delivers diverse performance properties to support key healthcare requirements. The range of our materials and representative applications are shown below.

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- **Ultem** resin: Heat resistance, Compressive strength
- **LNP** specialty compounds: Inherent lubricity, strength, stiffness, conductivity -> wide polymer base
- **Valox** resin: Dielectric strength, Chemical resistance
- **Lexan** resin: Best impact resistance
- **Cycoloy** resin: Better impact resistance
- **Cycolac** resin: Good Impact resistance, Colorability and Visualfx
- **Noryl** resin: Impact resistance, Hydrolytic stability, Chemical resistance

1. Based on a general performance comparison of ABS, PC/ABS and PC resins.
## GENERAL MATERIAL CONSIDERATIONS

### Optical clarity, colourability
- View fluids/contents, rapid identification and visual appeal

### Impact resistance
- Ductility for practical use conditions
- Low- and high-temperature performance

### Dimensional stability
- Tight tolerance/low creep

### High flow and enhanced release
- Complex designs, low draft angles, thin wall and flow length capability

### High-performance specialisation
- Added strength, lubricity, shielding and anti-stat

### Flame retardance
- UL 94 - HB, V2, V1, V0, 5VB, 5VA
- No bromine/no chlorine flame-retardant systems for compliance with environmental standards such as Blue Angel and TCO’99

## TYPICAL HEALTHCARE REQUIREMENTS

### Sterilisation diversity
- Gamma, E-beam, autoclave and EtO

### Biocompatibility
- ISO 10993 or USP Class VI
- Advanced hemocompatibility
- Increased platelet retention
- Low protein binding

### Food contact compliance
- US FDA, European Union food contact, others

### Chemical resistance
- Disinfectants, cleaners, lipids and IV solutions

### Welding and bonding
- Ultrasonic, adhesive and solvent

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*a Biocompatibility: material evaluated based on ISO 10993 or USP Class VI protocol; supporting information available by Type I or Type II letter.

*b Advanced hemocompatibility and Low Protein Binding: Lexan® HPM resins demonstrate improved hemocompatibility vs standard polycarbonate across multiple biomarkers and test methods.
Lexan® PC resins
• Lexan® PC resins
• Polycarbonate resins+, ++
• Water-clear and colourable
• Excellent toughness and dimensional stability
• Flame-retardant and high flow/release grades
• Healthcare options:
  • BiocompatibleA
  • Lipid resistance, advanced hemocompatibilityB and low protein bindingB

Xylex® PC/Polyester resin blends
• Polycarbonate/amorphous polyester resin blends
• Water-clear and colourable
• Balance of chemical resistance and toughness
• Dimensional stability
• Healthcare options:
  • BiocompatibleA
  • Sterilisation: EtO, -Ray, and -Ray LC
  • Lipid resistance

Cycolac® ABS resins
• Acrylonitrile-butadiene-styrene resins++
• Excellent aesthetics - high-gloss options
• Good processability and practical impact
• Flame-retardant grades
• Healthcare options:
  • BiocompatibleA
  • Sterilisation: EtO, -Ray, and -Ray LC

Geloy® ASA and/or PC/ASA resins
• Acrylic-styrene-acrylonitrile terpolymer resins++
• Great aesthetics: bright whites and colourable
• UV-stable options:
  • Good chemical resistance
  • Flame-retardant grades

Xenoy® PC/PET, PC/PBT resin blends
• Polycarbonate/semi-crystalline polyester resin blends++
• Outstanding aesthetics: high gloss and colourable
• UV-stable options
• Good chemical resistance
• Excellent impact resistance and toughness
• Healthcare options:
  • BiocompatibleA
  • Enhanced resistance to certain disinfectants / cleaners

Cycoloy® PC/ABS resin blends
• Polycarbonate/acrylonitrile-butadiene-styrene resin blends+, ++
• Excellent aesthetics colourable and UV-stable options
• Good balance of toughness/flow and chemical resistance
• Flame-retardant and high flow/release grades
• Healthcare options
  • BiocompatibleA
  • Enhanced resistance to certain disinfectants/cleaners
**Ultem® PEI resins**
- Polyetherimide resins+, ++
- Transparent and colourable
- High tensile and compressive strength
- Stiffness and dimensional stability
- Inherent FR, high heat stability, and chemical resistance
- Healthcare options:
  - Biocompatible A
  - Sterilisation: EtO, -Ray, and A-134-E

**Noryl® Modified PPE resins**
- Modified poly(phenylene ether) resin blends+, ++
- Good impact and resistance to acids and bases
- Thermal and electrical resistance
- Excellent hydrolytic stability
- Balanced strength, stiffness, and dimensional stability
- Healthcare options:
  - Biocompatible A
  - Sterilisation: EtO, -Ray, and A-134-E

**Valox® PBT and/or PET resins and blends**
- Polybutylene terephthalate (PBT) and/or polyethylene terephthalate (PET) resins++
- Outstanding electrical properties
- Chemical and high-heat resistance
- Healthcare options:
  - Biocompatible A
  - Formaldehyde-free
  - Sterilisation: EtO, -Ray, and A-134-L

**LNP® Lubricomp® and Lubriloy® compounds**
- Internally lubricated thermoplastics (>20 amorphous and crystalline base resins)
- Improved wear resistance and no need for external lubrication
- Friction management: reduced ‘slip-stick’, efficiency loss, and heat build-up
- High-modulus, high-strength options
- Silicone- and PTFE-free options (LNP Lubriloy)
- Healthcare options - sterilisation: EtO, -Ray and A-134-E

**LNP Thermocomp® compounds**
- Internally reinforced thermoplastics (>20 amorphous and crystalline base resins)
- Improved tensile strength and flexural modulus
- Heat and creep resistance
- High specific gravity selections
- Healthcare options:
  - Sterilisation: EtO, -Ray, and A-134-E
  - X-ray shielding compounds to replace lead

**LNP Colourcomp® compounds and Visualfx® resins**
- Addition of wide selection of pigments and effects to >20 amorphous and crystalline resins

**LNP Stat-Loy®, LNP Stat-Kon® and LNP Faradex® compounds**
- Electrically active compounds (>20 amorphous and crystalline base resins)
- Anti-stat (Stat-Loy), conductive (Stat-Kon), and EMI/RFI shielding (Faradex)
- Healthcare options - sterilisation: EtO, -Ray and A-134-E

**KEY**
- + FR (flame-retardant) package available without bromine or chlorine additives
- ++ RoHS-compliant options available
- EtO Ethylene Oxide
- y-Ray Gamma / E-Beam radiation
- y-Ray LC Gamma / E-Beam with clear Low Colour Shift option
- A-121-M Steam Autoclave @ 121ºC; options within 1-350 cycles
- A-134-M Steam Autoclave @ 134ºC; options within 1-350 cycles
- A-134-E Steam Autoclave @ 134ºC; options within 1-2500 cycles

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Healthcare | Sabic
Solvay Plastics is a leading world producer of specialty polymers and vinyls and has the widest plastics range. Solvay Plastics is continuously exploring new technologies, developing new products and serving new markets on all 5 continents.

Solvay offers more high-performance plastics for healthcare than any other company in the world. They deliver strong, lightweight performance along with exceptional design flexibility, ease of fabrication and the ability to differentiate products and brands using colours. Based on biocompatibility testing as defined by ISO 10993-1, Solvay healthcare plastics demonstrate no evidence of cytotoxicity, sensitization, intracutaneous reactivity or acute systemic toxicity. They can be sterilised using all conventional sterilisation methods, including steam, ethylene oxide, vaporized hydrogen peroxide and gamma radiation.
Ixef® (PARA)

Ixef polyarylamide uniquely combines high stiffness with an ultra-smooth finish that’s on par with painted metal. Gamma-stabilised colours can be sterilised using gamma radiation without any significant change in appearance or loss of mechanical properties.

Ixef GS-1022 is a 50% glass fibre reinforced compound that uniquely combines high stiffness with an ultra-smooth finish that’s on par with painted metal. Ixef gamma-stabilised colours are available in white, dark gray, medium gray, light gray, blue, brown, green and black. This assortment of colours gives OEMs a unique branding opportunity and provides healthcare professionals a quick visual reference for differentiating sizes of single-use instruments.

Unlike lower-performing plastics, Ixef GS-1022 coloured resins can withstand high-energy gamma radiation without any significant change in appearance or loss of mechanical properties. This makes the material ideal for replacing metal in single-use instruments. Plus, it eliminates central service costs associated with the sterilisation of reusable instruments. Ixef GS resins demonstrate no evidence of cytotoxicity, sensitization, intracutaneous reactivity or acute systemic toxicity, based on biocompatibility testing as defined by ISO 10993-1*.

* Customers are advised to conduct their own investigation and testing on the suitability of these materials for the intended application. Only Solvay Advanced Polymers products designated as part of the Solviva® family of biomaterials may be considered candidates for medical applications implanted in the human body, or which come in contact with body fluids or tissues for greater than 24 hours.
Competence in plastics, historically evolved and used worldwide

As a leading chemical company and a globally active plastics manufacturer, BASF has always been, and continues to be, at the forefront of developments involving plastics and innovative applications.
Increasing customer demands in sophisticated medical applications with high-performance profiles and long-term formulation consistency, prompted BASF to extend its portfolio of engineering plastics for medical technology.

BASF customers can reliably offer their products in this demanding market only if the formulation remains unchanged over a long-term period. This is especially important as the medical technology market is characterised by long development timescales and costly approval procedures. Materials that have demonstrated their reliability in comprehensive testing are essential for the production of safe drug delivery systems and other medical devices. This is why BASF’s PRO products are an important link in the value chain – from the plastic raw material all the way to safe products for patients.

The PRO grades are adapted specifically for these requirements and needs of the medical technology industry. The suffix PRO (Profile covered Raw materials Only) expresses the claim that only very specific raw materials that are subject to strict controls are used. It points to an expanded service package for medical technology. The PRO service package offers evidence of and compliance with relevant stipulated international standards and tests regulating the use of plastics in medical and pharmaceutical applications.

**PRO Service Package, reliability and partnership in a demanding market**

**The extended PRO Service Package comprises**

- Documented intention not to change the plastic formulation (as lodged /defined in the Drug Master File DMF ) in the long-term, except for necessary adjustments and external constraints respectively due to regulatory changes or amendments to general legal framework.
- Guarantee to inform customers at least 36 months in advance of any unavoidable changes to resin formulations (as lodged /defined in the Drug Master File (DMF))
- Obligation to dedicated suppliers to ensure the purity and formulation of their products as well as ingredients
- Support of worldwide approvals for pharmaceutical and medical applications as well as for food contact
- Testing the compatibility of the plastic to specific chemicals
- Production conditions according to GMP (good manufacturing practices) principles Commission Regulation (EC) 2023 /2006
- Application technology support (processing, design, calculation)
BASF’s Ultrason® grades are amorphous thermoplastics derived from polysulfone (PSU), polyethersulfone (PESU) and polyphenylsulfone (PPSU) and offer very high resistance to heat. Their wide spectrum of properties allows them to be moulded into high-quality engineering parts and highly stressed mass-produced articles.

The extraordinary property profile of Ultrason®:
- High stiffness
- High mechanical strength
- Low dependence of the properties on temperature
- Very high long-term service temperature
- Good electrical insulating capacity
- Favours dielectric properties
- Very favourable behaviour in case of exposure to fire
- Excellent hydrolysis resistance
- Good dimensional stability

Ultraform® PRO (POM)

Ultraform resins are high quality developed materials which can withstand mechanical stress very well and thus lend themselves for functional parts such as springs, transmission and connecting elements. In addition they have a good hydrolysis resistance and dimensional stability under heat which ensures that components made of Ultraform® can also be sterilised with hot steam.

Since products made of Ultraform® stand out for their smooth and hard surface, it is possible to manufacture functional parts that are subject to sliding stress. Moreover, since Ultraform® is highly resistant to chemicals, it can go into the production of parts for valves and metering systems.

Properties of Ultraform® S2320 003 PRO and Ultraform® W2320 003 PRO
- High crystallinity
- Ideal combination of strength, stiffness and toughness
- Outstanding tribological properties, i.e. low friction and wear
- Low fatigue under mechanical stress
- Excellent chemical and hydrolysis resistance
- Withstands sterilisation with hot steam, plasma and ethylene oxide
- High dimensional stability
- Good processability

Ultraform® S2320 003 PRO and Ultraform® W2320 003 PRO:
- Chemically resistant to Neutral and alkaline aqueous solutions
- Alcohols
- Aliphatic and aromatic hydrocarbons
- Esters, ethers and ketones
- Fats and oils

Potential applications:
- Valves
- Metering systems for liquids or powders
- Spring elements
- Gears
- Low adhesion applications
Plastics for high precision requirements and dimensional stability

**Ultradur® PRO (PBT)**

BASF Ultradur® (PBT, polybutylene terephthalate) is a semi-crystalline engineering plastic, which is part of the polyester family of resins. Among the many features of Ultradur are outstanding mechanical properties like rigidity and strength combined with excellent heat aging behaviour. Depending on the friction partner, Ultradur shows excellent sliding behaviour. Ultradur can be easily processed by injection moulding due to its good flow properties. Short cycle times can be achieved. Ultradur B4520 PRO is suited for injection moulding applications in medical technology. The Ultradur B4520 PRO grade offers the combination of high dimensional stability with a uniform shrinkage behaviour. Products made from Ultradur B4520 PRO are able to meet the strict requirements of dimensional component accuracy intended for medical devices. Other advantages of this material are low water absorption under standard use conditions for medical devices as well as high resistance to many chemicals. Ultradur B4520 PRO can be easily printed using hot stamping as well as pad printing processes and sterilised with ionizing (gamma) radiation or ethylene oxide.

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<th>Possible applications</th>
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<td>• High reproducibility accuracy plus high dimensional stability due to improved shrinking behaviour</td>
<td>• Functional and mechanical components with high dimensional precision and stability for use in drug delivery systems such as insulin pens, inhalers or metering devices</td>
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<td>• Broad chemical resistance to polar and non-polar solvents</td>
<td>• Device components such as manifolds, screws, sleeves, valves, plungers, lancets or caps</td>
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<td>• Low water/moisture absorption</td>
<td>• Chassis and housings</td>
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<tr>
<td>• Ideal for sliding components due to excellent friction and wear resistance (depending on the sliding partner)</td>
<td>• Filter systems</td>
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<tr>
<td>• Very good printability (can be decorated using the hot stamping and pad printing processes)</td>
<td>• Drug containers</td>
</tr>
<tr>
<td>• Excellent heat ageing behaviour</td>
<td>• Pharmaceutical closures</td>
</tr>
<tr>
<td>• Retains its property profile on exposure to ionizing radiation and ethylene oxide</td>
<td>• Technical disposable applications</td>
</tr>
<tr>
<td>• Good mouldability with fast cycle times</td>
<td></td>
</tr>
<tr>
<td>Properties</td>
<td>Physical</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------</td>
</tr>
<tr>
<td></td>
<td>MFR(23D/2,16)</td>
</tr>
<tr>
<td>Method</td>
<td>ISO 1133</td>
</tr>
<tr>
<td>Unit</td>
<td>g/10min</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Low Density Polyethylene (LDPE)</strong></td>
<td></td>
</tr>
<tr>
<td>Purell PE1810E</td>
<td>0,4</td>
</tr>
<tr>
<td>Purell PE1840H</td>
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<tr>
<td>Purell PE2420F</td>
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</tr>
<tr>
<td>Purell PE3020H</td>
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</tr>
<tr>
<td>Purell PE3020D</td>
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</tr>
<tr>
<td>Purell PE3040D</td>
<td>0,25</td>
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<td>Purell PE3220D</td>
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<tr>
<td>Purell PE3420F</td>
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<tr>
<td>Purell 2007H</td>
<td>1,5</td>
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<tr>
<td>Purell 2410T</td>
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</table>

Purell is a trademark owned or used by the LyondellBasell family of companies and is registered in the U.S. Patent and Trademark Office.
<table>
<thead>
<tr>
<th>Properties</th>
<th>Physical</th>
<th>Mechanical/Thermal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MFR(190/2,16)</td>
<td>Density</td>
</tr>
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<tr>
<td>Method</td>
<td>ISO 1133</td>
<td>ISO 1183</td>
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<tr>
<td>Unit</td>
<td>g/10min</td>
<td>g/cm³</td>
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<tr>
<td>Purell PE GF4750</td>
<td>0.4</td>
<td>0.95</td>
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<td>Purell ACP5231D</td>
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<td>Purell PE GF4760</td>
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<td>Purell ACP6031D</td>
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<td>0.96</td>
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<tr>
<td>Purell ACP6541A</td>
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<td>0.954</td>
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<td>Purell GB7250</td>
<td>10</td>
<td>0.952</td>
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<tr>
<td>Purell GC7260</td>
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<td>0.96</td>
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<tr>
<td>Purell GA7760</td>
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Properties | Physical | Mechanical/Thermal |
<table>
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<tbody>
<tr>
<td>Method</td>
<td>ISO 1133</td>
<td>ISO 527</td>
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<tr>
<td>Unit</td>
<td>g/10min</td>
<td>MPa</td>
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</table>

### Homopolymers (HOMO-PP)

- **Purell HP570M**: MFR 7.5, Tensile Modulus 1400, Vicat Softening Temperature 152, Conversion Technology (v)
  - Good stiffness and impact resistance: used in medical applications and healthcare products such as containers, closures and diagnostics equipment.

- **Purell HP371P**: MFR 18, Tensile Modulus 1250, Vicat Softening Temperature 150, Conversion Technology (v)
  - Very good transparency combined with good impact resistance and stiffness; gamma-ray sterilisable; used in empty 3-part-syringes.

- **Purell HP570R**: MFR 23, Tensile Modulus 1500, Vicat Softening Temperature 153, Conversion Technology (v)
  - High flow and high stiffness; used in 3-part syringes, diagnostics applications, containers and drug delivery systems.

- **Purell HM671T**: MFR 60, Tensile Modulus 1700, Vicat Softening Temperature 135, Conversion Technology (v)
  - Excellent flowability and very high stiffness, low warpage, high clarity; gamma-ray sterilisable; used in diagnostics applications.

- **Purell HP570U**: MFR 75, Tensile Modulus 1550, Vicat Softening Temperature 154, Conversion Technology (v)
  - High flow and high stiffness; used in diagnostics applications and other thin wall injection moulding that need to be free from antistatic agents.

### Heterophasic Copolymers (HECO-PP)

- **Purell EP274P**: MFR 15, Tensile Modulus 1000, Vicat Softening Temperature 142, Conversion Technology (v)
  - Excellent balance of stiffness and low-temperature impact resistance; used in medical applications and healthcare products.

### Random Copolymers (RACO-PP)

- **Purell SM170G**: MFR 1.5, Tensile Modulus 650, Vicat Softening Temperature 125, Conversion Technology (v) (v)
  - Excellent balance of stiffness and low-temperature impact resistance; used in medical applications and healthcare products.

- **Purell RP270G**: MFR 1.8, Tensile Modulus 950, Vicat Softening Temperature 134, Conversion Technology (v) (v)
  - Good impact strength, clarity and resistance to chemicals, used in extrusion blow moulding and ISBM for pharmaceutical applications.

- **Purell RP270M**: MFR 9, Tensile Modulus 1100, Vicat Softening Temperature 133, Conversion Technology (v) (v)
  - Good impact strength, clarity and resistance to chemicals, used in ISBM for pharmaceutical applications.

- **Purell RP373R**: MFR 25, Tensile Modulus 950, Vicat Softening Temperature 130, Conversion Technology (v)
  - High transparency, used in empty disposable 2-part-syringes.

- **Purell RP374R**: MFR 25, Tensile Modulus 950, Vicat Softening Temperature 130, Conversion Technology (v)
  - High transparency, used in empty disposable 3-part-syringes.

- **Purell RP378T**: MFR 48, Tensile Modulus 1150, Vicat Softening Temperature 130, Conversion Technology (v)
  - High transparency, flowability and gloss, low warpage; used in medical applications and healthcare products, e.g., inhalers and diagnostic devices.

(v) conversion technology also used by customers but not the main one.
<table>
<thead>
<tr>
<th>Properties</th>
<th>Physical</th>
<th>Mechanical / Thermal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>Density g/cm³ ISO 1183</td>
<td>Melt Volume Rate (220°/10kg)</td>
</tr>
<tr>
<td>Terlux 2802 HD 1,08</td>
<td>2 / 17</td>
<td>2000</td>
</tr>
<tr>
<td>Terlux 2812 HD 1,08</td>
<td>8 / 45</td>
<td>1900</td>
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<tr>
<td>Acrylonitrile Butadiene Styrene (ABS)</td>
<td>Terluran HD-15 1,05</td>
<td>15</td>
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<tr>
<td>Acrylonitrile Butadiene Styrene (ABS)</td>
<td>Lustran M203FC 1,05</td>
<td>31</td>
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<tr>
<td>Acrylonitrile Butadiene Styrene (ABS)</td>
<td>Lustran M205FC 1,06</td>
<td>20</td>
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<tr>
<td>Styrene Acrylonitrile (SAN)</td>
<td>Luran HD-20 1,08</td>
<td>22 / 27</td>
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<table>
<thead>
<tr>
<th>Properties</th>
<th>Physical</th>
<th>Mechanical / Thermal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Styrene-methyl methacrylate (SMMA)</td>
<td>NAS 21</td>
<td>1,9</td>
</tr>
<tr>
<td>Styrene-methyl methacrylate (SMMA)</td>
<td>NAS 30</td>
<td>2,2</td>
</tr>
<tr>
<td>Styrene-methyl methacrylate (SMMA)</td>
<td>NAS 90</td>
<td>1,5</td>
</tr>
</tbody>
</table>

<p>| Polymethacrylate Butadiene Styrene (MBS) | Zylar 220 | 4,8 | 0,8 | 37 | 2220 | 16 | 59 | 2270 | 77 | Displays, Medical devices, office accessories, small appliances, Break-resistant CD jewel boxes, Toys |
| Polymethacrylate Butadiene Styrene (MBS) | Zylar 530 | 5,0 | 3,0 | 30 | 2140 | 35 | 49 | 2090 | 72 | Medical Devices, Industrial covers and housings, appliance parts, Personal care items |</p>
<table>
<thead>
<tr>
<th>Properties</th>
<th>Physical</th>
<th>Mechanical/Thermal</th>
<th>Description / applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>Melt Volume Rate (190°C, 2,16kg) ISO 1133</td>
<td>Impact strength, Notched Charpy(23°/-30°)kJ/m² ISO 179</td>
<td>Tensile yield stress MPa ISO 527</td>
</tr>
<tr>
<td>Acetal / polyoxymethylene (POM)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ultraform Pro S2320 003 PRO</td>
<td>11</td>
<td>5.5 - 5</td>
<td>65</td>
</tr>
<tr>
<td>Ultraform Pro W2320 003 PRO</td>
<td>25</td>
<td>5 - 4</td>
<td>65</td>
</tr>
<tr>
<td>PES/PSU/PPSU</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ultrason Pro E1010 (360°C/10kg)</td>
<td>6.5 - 7</td>
<td>90</td>
<td>6.7</td>
</tr>
<tr>
<td>Ultrason Pro E2010 G6 (360°C/10kg)</td>
<td>8 - 8</td>
<td>140 (stress at break)</td>
<td>1.9 (strain at break)</td>
</tr>
<tr>
<td>Ultrason Pro E3010 (360°C/10kg)</td>
<td>7.5 - 7.5</td>
<td>90</td>
<td>6.7</td>
</tr>
<tr>
<td>Ultrason Pro P3010 (360°C/10kg)</td>
<td>65 - 24</td>
<td>74</td>
<td>7.8</td>
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<tr>
<td>Ultrason Pro S3010 (360°C/10kg)</td>
<td>5.5 - 5.5</td>
<td>75</td>
<td>5.7</td>
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<td>Polybutylene terephthalate (PBT)</td>
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<td>Ultradur Pro B4520</td>
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<td>4.5 - 3</td>
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## Resistance to sterilisation

<table>
<thead>
<tr>
<th>Material</th>
<th>Biocompatible</th>
<th>Light Transmission</th>
<th>Clarity</th>
<th>Steam autoclave</th>
<th>Gamma &amp; E’Beam</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Autoclave temp</td>
<td>Retention of</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Exposure</td>
<td>Mechanicals</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Polycarbonate (PC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lexan HP series</td>
<td>v</td>
<td>88</td>
<td>Clear</td>
<td>121 limited</td>
<td>v</td>
</tr>
<tr>
<td>HPS series</td>
<td>v</td>
<td>88</td>
<td>Clear / Gamma blue</td>
<td>121 limited</td>
<td>v</td>
</tr>
<tr>
<td>HPX series</td>
<td>v</td>
<td>82</td>
<td>Clear / Slight blue</td>
<td>121 Medium</td>
<td>x</td>
</tr>
<tr>
<td>HPM series</td>
<td>v</td>
<td>77</td>
<td>Clear / Slight blue</td>
<td>121 limited</td>
<td>v</td>
</tr>
<tr>
<td>HPH series</td>
<td>v</td>
<td>85</td>
<td>Clear</td>
<td>134 Medium</td>
<td>v</td>
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<tr>
<td>Polycarbonate blend (PC)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Xylex HX8300HP</td>
<td>v</td>
<td>88</td>
<td>Clear</td>
<td>/</td>
<td>v</td>
</tr>
<tr>
<td>Xylex HX7509HP</td>
<td>v</td>
<td>88</td>
<td>Clear / Slight blue</td>
<td>/</td>
<td>v</td>
</tr>
<tr>
<td>PBT or PET + PC blend</td>
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<td></td>
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<td></td>
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<tr>
<td>Xenoy HX5600HP</td>
<td>v</td>
<td>N/A</td>
<td>Opaque</td>
<td>/</td>
<td>v</td>
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<tr>
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<td>v</td>
<td>N/A</td>
<td>Opaque</td>
<td>/</td>
<td>v</td>
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<tr>
<td>Polyetherimide (PEI)</td>
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<td></td>
</tr>
<tr>
<td>Ultrum HU1xx0</td>
<td>V</td>
<td>/</td>
<td>Clear / Amber</td>
<td>134 Extended</td>
<td>V</td>
</tr>
<tr>
<td>Ultrum HU2xx0</td>
<td>V</td>
<td>/</td>
<td>Clear / Amber</td>
<td>134 Extended</td>
<td>V</td>
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<tr>
<td>Ultrum HU2xx0</td>
<td>V</td>
<td>NA</td>
<td>Opaque</td>
<td>134 Extended</td>
<td>V</td>
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<tr>
<td>HATXxxx</td>
<td>V</td>
<td>NA</td>
<td>Opaque</td>
<td>NA</td>
<td>NA</td>
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<tr>
<td>Polypolyethylene Ether (PPE)</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Noryl HNA033</td>
<td>V</td>
<td>NA</td>
<td>Opaque</td>
<td>134 Medium</td>
<td>V</td>
</tr>
<tr>
<td>Noryl HNA055</td>
<td>V</td>
<td>NA</td>
<td>Opaque</td>
<td>134 Extended</td>
<td>V</td>
</tr>
<tr>
<td>Noryl HN731A</td>
<td>V</td>
<td>NA</td>
<td>Opaque</td>
<td>NA</td>
<td>NA</td>
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<tr>
<td>PCIABS</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Cycoloy HC1204HF</td>
<td>v</td>
<td>N/A</td>
<td>Opaque</td>
<td>/</td>
<td>V</td>
</tr>
<tr>
<td>Acrylonitrile Butadiene Styrene (ABS)</td>
<td></td>
<td></td>
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<tr>
<td>Cycolace HMGxMD</td>
<td>v</td>
<td>N/A</td>
<td>Opaque</td>
<td>/</td>
<td>V</td>
</tr>
</tbody>
</table>

**Impact resistance after exposure to autoclave**

Limited L = 1-10 cycles / Medium M = within 350 cycles / Extended E = within 2500 cycles

V-0: Typically, the influence of radiation on colour of opaque grades is limited.
### Polycarbonate blend (PC)

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Xylex HX300HP</td>
<td>15 (265°/2,16kg)</td>
<td>70</td>
<td>55</td>
<td>1600</td>
<td>&gt;200%</td>
<td>78</td>
<td>1700</td>
<td>92</td>
<td>medical devices and pharmaceutical applications</td>
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<tr>
<td>HX709HP</td>
<td>11 (265°/2,16kg)</td>
<td>10</td>
<td>60</td>
<td>2300</td>
<td>&gt; 100%</td>
<td>92</td>
<td>2250</td>
<td>126</td>
<td>medical devices and pharmaceutical applications</td>
</tr>
</tbody>
</table>

### PBT or PET + PC blend

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</thead>
<tbody>
<tr>
<td>Xenoy HX560HP</td>
<td>10 (250°/5kg)</td>
<td>60</td>
<td>50</td>
<td>2050</td>
<td>100%</td>
<td>75</td>
<td>2050</td>
<td>123</td>
<td>medical devices and pharmaceutical applications</td>
</tr>
<tr>
<td>HX560HP</td>
<td>10 (250°/5kg)</td>
<td>70</td>
<td>44</td>
<td>1900</td>
<td>100%</td>
<td>64</td>
<td>1800</td>
<td>120</td>
<td>medical devices and pharmaceutical applications</td>
</tr>
</tbody>
</table>

### PC/ABS

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</thead>
<tbody>
<tr>
<td>Cycoloy HC1204HF</td>
<td>22 (260°/2,16kg)</td>
<td>50</td>
<td>55</td>
<td>2400</td>
<td>&gt;50%</td>
<td>80</td>
<td>2300</td>
<td>126</td>
<td>medical devices and pharmaceutical applications</td>
</tr>
</tbody>
</table>

### Polyphenylene Ether (PPE)

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</tr>
</thead>
<tbody>
<tr>
<td>Noryl HNA033</td>
<td>8,64 (300°/5kg)</td>
<td>16</td>
<td>68,5</td>
<td>2610</td>
<td>15%</td>
<td>107</td>
<td>2590</td>
<td>102</td>
<td>medical devices and pharmaceutical applications</td>
</tr>
<tr>
<td>HNA055</td>
<td>5,7 (300°/5kg)</td>
<td>27</td>
<td>61,8</td>
<td>2410</td>
<td>13%</td>
<td>107</td>
<td>2490</td>
<td>169</td>
<td>medical devices and pharmaceutical applications</td>
</tr>
<tr>
<td>HN731A</td>
<td>8 (280°/5kg)</td>
<td>15</td>
<td>55</td>
<td>2300</td>
<td>30%</td>
<td>75</td>
<td>2200</td>
<td>135</td>
<td>medical devices and pharmaceutical applications</td>
</tr>
</tbody>
</table>

### Polycarbonate blend (PC)

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Valox HX215HP</td>
<td>70 (250°/2,16kg)</td>
<td>6,5</td>
<td>50</td>
<td>2600</td>
<td>10%</td>
<td>80</td>
<td>2260</td>
<td>183°</td>
<td>medical devices and pharmaceutical applications</td>
</tr>
<tr>
<td>HX312C</td>
<td>31 (250°/2,2kg)</td>
<td>3</td>
<td>58</td>
<td>2500</td>
<td>25%</td>
<td>2400</td>
<td>165</td>
<td>165</td>
<td>medical devices and pharmaceutical applications</td>
</tr>
<tr>
<td>HX420HP</td>
<td>20 (250°/2,16kg)</td>
<td>5</td>
<td>125</td>
<td>9300</td>
<td>2%</td>
<td>195</td>
<td>8500</td>
<td>220</td>
<td>medical devices and pharmaceutical applications</td>
</tr>
<tr>
<td>Properties</td>
<td>Physical</td>
<td>Mechanical / Thermal</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Material</td>
<td>Density g/cm³ ISO 1183</td>
<td>Unnotched Izod Impact strength kJ/m² ISO 180</td>
<td>Tensile strength MPa ISO 527</td>
<td>Tensile modulus MPa ISO 527</td>
<td>Elongation, break % ISO 527</td>
<td>Flexural stress, yield MPa ISO 178</td>
<td>Flexural Modulus MPa ISO 178</td>
<td>Applications</td>
<td></td>
</tr>
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<td>Polymide (PARA)</td>
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<tr>
<td>Ixef GS-1022</td>
<td>1.78</td>
<td>50</td>
<td>265</td>
<td>22000</td>
<td>1.8</td>
<td>380</td>
<td>22000</td>
<td>Dental applications, Hospital goods, medical appliances, surgical instruments</td>
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