



# REVITALIZING GLOBAL CARE

Styrenic solutions for the healthcare industry

**INEOS**  
**STYROLUTION**

Driving Success. Together.

# TABLE OF CONTENTS

---

STYRENIC SOLUTIONS are shaping the future	04
HEALTHCARE PACKAGES going beyond industry benchmarks	06
STYRENICS APPLICATIONS providing clean and safe solutions	08
PRODUCT PORTFOLIO for healthcare applications	10
GLOBAL REACH and customer proximity	36
STERILIZATION and aesthetics combined with styrenics	38
INEOS STYROLUTION infographic & contacts	40
Statistics, studies, specifications	43



# NEW NEEDS, NEW OPPORTUNITIES

A wave of trends in global healthcare is raising the level for everyone involved. Major technological advancements in diagnostic monitoring and imaging are spurring smaller, more portable and lightweight devices, as well as a greater variety of safety devices for the protection of staff and patients. At the same time, a massive transformation of global healthcare systems is driving cost reduction through design optimization and processing selection. With a dramatic worldwide increase in

the number of age and wealth-related diseases, such as diabetes, cardiovascular issues, and respiratory problems like chronic obstructive pulmonary disease (COPD) and asthma, demand for their treatment is growing exponentially. Greater competition, expanded regulation, and increasing price pressure are also contributing to the transformation of the market in every aspect: from raw materials to end products, from manufacturers to patients.

## STYRENICS STAND FOR STRONG RESISTANCE

Styrenics have proven to have a good to excellent chemical resistance against saturated hydrocarbons, ethanol, solutions containing alcohol, water, aqueous solutions of salts, detergents, mineral acids, glycerine, dilute acids and alkalis, and aliphatic amines and amides.

## HOW STYRENIC SOLUTIONS ARE SHAPING THE FUTURE

Styrenics are a family of unique organic polymeric materials with a broad range of applications. These provide added quality and value to countless products worldwide – in everything from bike helmets, car trims, and toys to smart phones, refrigerators, and inhalers – making styrenics one of the world’s most important thermoplastics. Primarily because of properties like lower density, balanced performance, superior processing, excellent aesthetics and unsurpassed value for money, styrenics are also being used in an increasing number of applications in the healthcare sector.

As the worldwide leader in styrenics, INEOS Styrolution supports stakeholders in the healthcare sector in meeting the challenges of

change. Based on a deep understanding of the medical industry, its applications, value chains and regulatory requirements, INEOS Styrolution continuously renews and improves its portfolio and services to generate further value for its customers.

With wide-reaching expertise and a dedication to unparalleled service, INEOS Styrolution offers a broad range of products dedicated to healthcare, top quality styrenic solutions for new applications, product co-development opportunities, and comprehensive assistance with strict regulatory requirements.

## STYRENICS’ PROPERTIES THAT MAKE THE DIFFERENCE

GOOD ESCR THERMAL SHOCK RESISTANCE  
 SUPERB RIGIDITY  
 SURFACE QUALITY  
 BONDING TO PVC ACCURATE MOLD DETAIL REPRODUCTION  
 OPTIMAL SCRATCH RESISTANCE  
 LOW DENSITY  
 STERILIZABILITY  
 GOOD HIGH IMPACT STRENGTH  
 PROCESSABILITY EXCELLENT DIMENSIONAL STABILITY  
 OUTSTANDING  
 EASY TO POST-PROCESS  
 TRANSPARENCY  
 GOOD RECOVERY

# HOW INEOS STYROLUTION SERVES YOU

## HEALTHCARE PACKAGES

Based on a deep understanding of the medical industry, its applications, value chains and regulatory requirements, INEOS Styrolution has a proven track record in supporting and working with our customers in the innovative use and application of its materials. Therefore, INEOS Styrolution offers various healthcare service packages, which vary according to customer requirements.



## CUSTOMER REQUIREMENTS

### FULL SERVICE HD PACKAGE (RISK CLASS 1 & 2)



- Up to 36 months NOC\*, with signed long term supply contract
- Locked formulations as defined in the Drug Master File (DMF)
- Enhanced quality control processes
- Food contact statements, USP Class VI, ISO 10993, DMF
- Security of supply, long-term and global availability
- Increased technical support (color & application development, design support etc.)

NOVODUR® HD & LUSTRAN® ABS

TERLUX® HD

LURAN® HD

\* NOC: Notification of Change

### ESSENTIAL HD PACKAGE (RISK CLASS 1 & 2)



- Up to 12 months NOC\*, with signed long term supply contract
- Food contact statements, USP Class VI, ISO 10993, DMF

NAS®

LUSTRAN® SAN

ZYLAR® & CLEARBLEND®

STYROFLEX®

STYROLUX®

K-RESIN®

### STANDARD FOOD CONTACT PACKAGE (RISK CLASS 1)



- FDA and EU food contact statements available
- no NOC\* guarantees

STYROLUTION® PS

TERLURAN®

NOVODUR®

LUSTRAN® ABS

TERLUX®

LURAN®

# BUILDING A CLEAN, SAFE PATH TO GOOD HEALTH

## STYRENICS APPLICATIONS

Whether for vaccines, transfusions or nebulizers, the healthcare applications of styrenics are plentiful. It is not just cleanliness and safety that make styrenics attractive for healthcare solutions providers. They also exhibit great strength and resistance, easy processability, the highest quality standards and an attractive appearance. Here is a sampling:

### IV SYSTEMS & FLUID DELIVERY

- IV tubing, lumen tubes, co-ex tubes
- IV bags
- IV drip chambers
- Spikes
- Connectors (rigid/flexible, Y, valves)
- Stopcocks
- Rollerclamps
- Dialyzers
- Blood filters and reservoirs

### RESPIRATORY & DRUG DELIVERY

- Inhalers
- Sleep apnea devices
- Insulin pens
- Insulin pumps
- Injection pens
- Needleless injection devices
- Syringes
- Nebulizers

### LABWARE

- Titer plates, petri dishes, pipettes
- Sample spoons
- Cell growth bottles
- Cuvettes
- Centrifuge tubes, caps and closures
- Anesthesia-, blood analysis trays
- Diagnostic test kits
- Retinal surgery cassette

### SURGICAL INSTRUMENTS

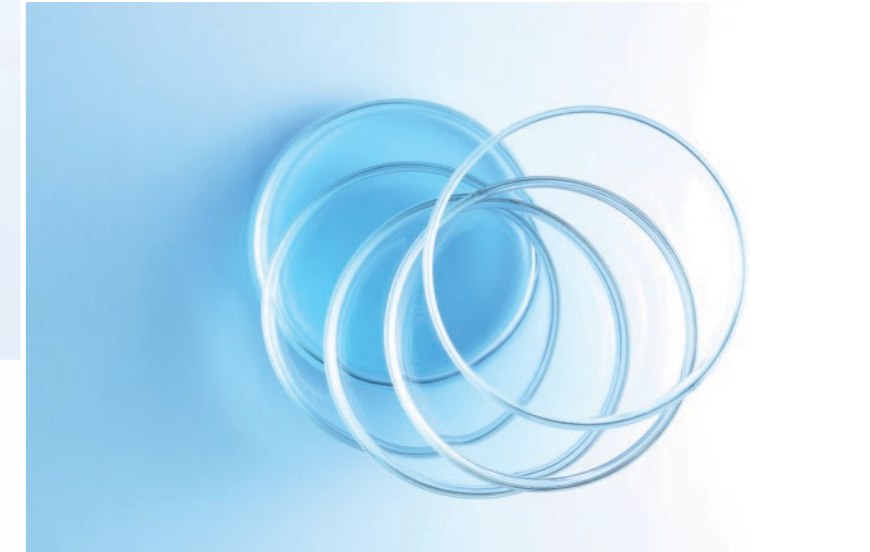
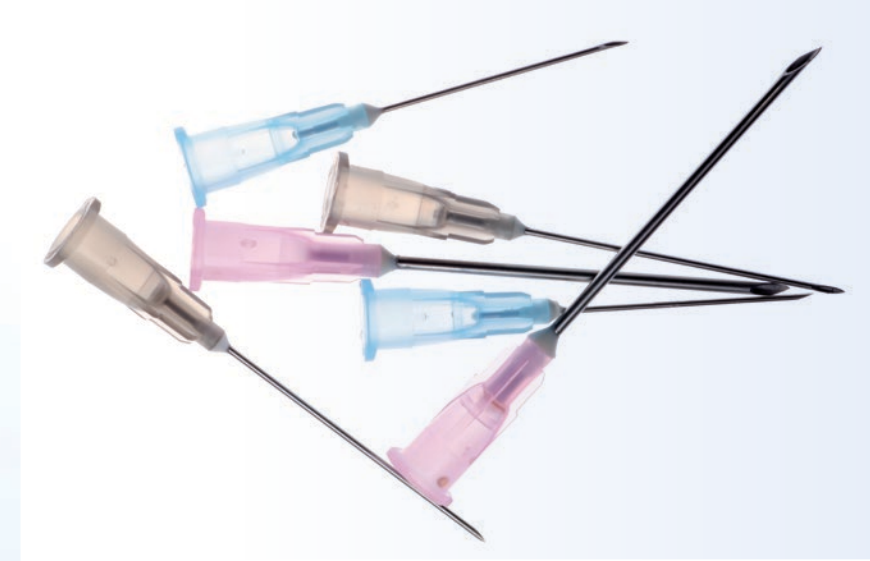
- Handle grips
- Vaginal specular
- Electro surgical pencils
- Trocars
- Arthroscopes
- Endoscopes
- Microlaparoscopy instruments
- Anesthesia devices
- Endoscopy tube and parts
- Prosthesis

### MEDICAL PACKAGING

- Medical trays
- Pouches
- Blisters
- Films
- Overwraps
- Film/multi layer film applications

### MOBILE & DIGITAL HEALTH

- Medical monitoring
- Diagnostic systems
- CT scanners
- Blood pressure monitors
- Thermometers, pulse oximeters
- Fitness devices
- Glucometers, AED
- Ultrasound instruments
- Wireless-, remote devices



# STYRENIC SOLUTIONS

## INEOS STYROLUTION'S PRODUCT PORTFOLIO

INEOS Styrolution offers the world's largest styrenic specialties portfolio, reliable global supply and the commitment to collaborate with our customers to even create new grades with the exact properties required. This also includes a broad range of medical grade portfolios and top quality styrenic solutions for new applications.



ENHANCED POLYMERS

CHEMICAL RESISTANCE  
DIMENSIONAL STABILITY  
PROCESSABILITY  
BONDABILITY

**NOVODUR® HD (ABS)  
LUSTRAN® ABS**

NOVODUR® HD AND LUSTRAN® ABS ARE INEOS STYROLUTION'S ACRYLONITRILE BUTADIENE STYRENE COPOLYMERS



TRANSPARENT POLYMERS

IMPACT MODIFIED

HEAT RESISTANCE  
CHEMICAL RESISTANCE

**TERLUX® HD (MABS)**

TERLUX® HD IS INEOS STYROLUTION'S METHYL METHACRYLATE ACRYLONITRILE BUTADIENE STYRENE (MABS) COPOLYMER

PROCESSABILITY  
SURFACE QUALITY AND BRILLIANCE

**ZYLAR® (MBS)  
CLEARBLEND® (MBS)**

ZYLAR® AND CLEARBLEND® ARE INEOS STYROLUTION'S METHYL METHACRYLATE BUTADIENE STYRENE (MBS) COPOLYMERS

CLARITY  
HIGH TOUGHNESS  
BONDABILITY

**STYROLUX® (SBC)**

STYROLUX® IS ONE OF INEOS STYROLUTION'S THERMOPLASTICS STYRENE BUTADIENE COPOLYMERS

CLARITY  
IMPACT TOUGHNESS  
STIFFNESS  
GLOSS

**K-RESIN® (SBC)**

K-RESIN® IS INEOS STYROLUTION'S LATEST ADDITION TO THERMOPLASTICS STYRENE BUTADIENE COPOLYMERS

TOUGHNESS  
ELASTICITY  
CLARITY  
BONDABILITY

**STYROFLEX® (S-TPE)**

STYROFLEX® IS INEOS STYROLUTION'S STYRENIC THERMOPLASTIC ELASTOMER, A STYRENE BUTADIENE BLOCK COPOLYMER WITH TAILOR-MADE ARCHITECTURE



STANDARD FOOD CONTACT PACKAGE

HIGH STIFFNESS

HEAT RESISTANCE  
GENERAL CHEMICAL RESISTANCE

**LUSTRAN® SAN  
LURAN® HD (SAN)**

LUSTRAN® SAN AND LURAN® HD ARE INEOS STYROLUTION'S STYRENE ACRYLONITRILE COPOLYMERS

CLARITY  
COLOR CONSISTENCY  
PROCESSABILITY

**NAS® (SMMA)**

NAS® IS INEOS STYROLUTION'S STYRENE METHYL METHACRYLATE COPOLYMER (SMMA)

EASY PROCESSING  
COLORABLE

**STYROLUTION® PS  
TERLURAN® (ABS)**

STYROLUTION® PS IS INEOS STYROLUTION'S POLYSTYRENE POLYMER AND TERLURAN® IS INEOS STYROLUTION'S ACRYLONITRILE BUTADIENE STYRENE COPOLYMER

# INTRODUCING NEW HEALTHCARE GRADES

## NOVODUR® HD M203FC G3 (ABS)



© Fleima

FIRST GLASS FIBER REINFORCED  
INJECTION MOULDING GRADE  
WITH FULL SERVICE HD PACKAGE

### KEY PROPERTIES

- Full service HD package
- High flowability
- Stiffness
- Dimensional stability

### APPLICATIONS

- IV spikes
- Housings

## STYROLUX® 4G60 (SBC)



SPECIFICALLY DESIGNED  
FOR THE DEVELOPMENT OF  
DRIP CHAMBERS IN IV SETS

### KEY PROPERTIES

- Essential service HD package
- Excellent softness, elasticity and transparency
- Very good bonding properties

### APPLICATIONS

- Drip chambers in IV sets

## STYROFLEX® 4G80 (S-TPE)



SPECIFICALLY DESIGNED  
FOR MEDICAL TUBING

### KEY PROPERTIES

- Essential service HD package
- High transparency
- Chemical resistance, food contact compliancy
- Outstanding bonding properties

### APPLICATIONS

- Medical tubes



**APPLICATION FIELDS**

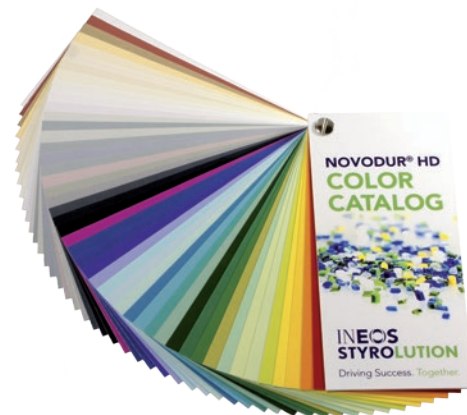
- Inhalers
- Instrument handles
- Drug delivery housings
- Insulin and injection pens

# NOVODUR® HD AND LUSTRAN® ABS

INEOS STYROLUTION'S FULL SERVICE HD GRADES OF ACRYLONITRILE BUTADIENE STYRENE (ABS) RESINS DEMONSTRATE A GOOD BALANCE OF PHYSICAL AND MECHANICAL PROPERTIES. MOST GRADES EXHIBIT EXCELLENT CHEMICAL RESISTANCE TO COMMON HEALTHCARE CLEANERS AND DISINFECTANTS.

**KEY FEATURES**

- Reliability – consistent products proven in numerous medical devices
- Excellent property retention after gamma-radiation, E-beam, NO<sub>2</sub>, or EtO sterilization
- Great ESCR to common healthcare disinfectants and cleaners, including bleach, betadine (glutaraldehyde, lipids, and isopropyl alcohol)
- Excellent balance of properties
  - Impact strength
  - Flexural modulus and flexural strength
  - Tensile modulus (good stiffness and strength)
- Dimensional stability
- Processibility – easy to mold, fast cycle times
- Bondability – ultrasonic, solvent, adhesive



Selected **Novodur® HD** and **Lustran® ABS** grades are available in the broadest range of colors for medical applications – off the shelf or custom colored.

Property	Test method	Units	Lustran® ABS 248FC	Lustran® ABS 348	Novodur® HD M203FC	Novodur® HD M203FC G3	Novodur® HD 15
Melt volume-flow rate MVR 220 °C/10 kg	ISO 1133	cm <sup>3</sup> /10 min	23	16	31	18	15
Melt-flow rate MFR 220 °C/10 kg	ASTM D 1238	g/10 min	21	14	28	14	14
Tensile modulus 1 mm/min	ISO 527-1/-2	MPa	2620	2660	2400	5600	2300
	ASTM D 638	psi × 10 <sup>3</sup>	380	380	325	800	
Charpy notched impact strength (23 °C)	ISO 179-1eA	kJ/m <sup>2</sup>	20	18	16	5	14
Izod notched impact strength (23 °C)	ASTM D 256	ft-lb/in	4.2	4	4	1	
Vicat softening temperature VST B 50	ISO 306	°C	100	100	99	107	100
Vicat softening temperature B10	ASTM D 648	°F	227	225	226	236	

**Novodur® HD** and **Lustran® ABS** are part of the INEOS Styrolution Full Service HD Package which can be offered with Notification of Change (NOC) term up to 36 months when signing a long term supply contract. Full regulatory compliance (USP class VI, ISO 10993, EU and US food contact statements, Drug Master File (DMF)) can be provided with this package. Furthermore, Novodur® HD and Lustran® ABS grades are available in pre-colored versions, some of which are listed in the DMF and have been assessed according to the above mentioned regulations. For more information please contact your sales representative.





# TERLUX® HD

## APPLICATION FIELDS

- Connectors
- Transparent housings
- Stopcocks
- Valves
- Mouthpieces

INEOS STYROLUTION'S TERLUX® HD (MABS) PRODUCTS STAND OUT FOR THEIR BALANCED TOUGHNESS-TO-STIFFNESS RATIO AND HIGH OPTICAL CLARITY. THIS COMBINATION OF PROPERTIES AND EASE OF PROCESSING MAKES TERLUX® HD AN OPTIMAL CHOICE FOR UPSCALE AND DESIGN-ORIENTED HEALTHCARE APPLICATIONS.

### KEY FEATURES

- Reliability – consistent products proven in numerous medical devices
- Injection molding/extrusion/blow-molding
- High impact strength
- Excellent transparency
- High heat resistance
- Good mechanical strength and stiffness
- Excellent chemical resistance and good environmental stress cracking resistance (ESCR)
- Outstanding surface quality, excellent feel and appearance
- Good processability
- Thermal stability
- Good solvent bonding to PVC



Property	Test method	Unit	Terlux® HD 2812 (Easy flow)	Terlux® HD 2802/2822 (Standard flow)
Melt volume-flow rate MVR 220 °C/10 kg	ISO 1133	cm <sup>3</sup> /10 min	8	2
Melt-flow rate MFR 220 °C/10 kg	ASTM D 1238	g/10 min	7	2
Tensile modulus 1 mm/min	ISO 527-1-2	MPa	1900	2000
	ASTM D 638	psi × 10 <sup>3</sup>	275	295
Charpy impact strength (23 °C) Unnotched	ISO 179/1eU	kJ/m <sup>2</sup>	110	120
			Notched	5
Izod notched impact strength (23 °C)	ISO 180-1A	kJ/m <sup>2</sup>	7	7
Vicat softening temperature VST B 50	ISO 306	°C	87	93
Vicat softening temperature B10	ASTM D 648	°F	220	220
Light transmission 4 mm thick	ASTM D 1003	%	89	90

Terlux® HD belongs to the INEOS Styrolution Full Service HD Package which can be offered with Notification of Change (NOC) term up to 36 months when signing a long term supply contract. Full regulatory compliance (USP class VI, ISO 10993, EU and US food contact statement, Drug Master File (DMF)) can be provided with this package. For more information please contact your sales representative.

# ZYLAR® AND CLEARBLEND®

INEOS STYROLUTION'S CLEAR IMPACT MODIFIED STYRENE ACRYLIC (MBS) COPOLYMERS OFFER PRACTICAL TOUGHNESS, EXCELLENT CLARITY, AND SUPERIOR PROCESSING. IN SPIRAL FLOW TESTS, ZYLAR® AND CLEARBLEND® RESINS FLOW THE SAME DISTANCE AS POLYCARBONATE AT SIGNIFICANTLY LOWER TEMPERATURES, LEADING TO HIGHER PRODUCTIVITY, LOWER ENERGY CONSUMPTION AND LESS MOLDED-IN STRESS.

## KEY FEATURES

- Practical toughness and excellent clarity
- Lower moisture retention means little or no pre-drying
- Low processing temperatures
- Superior flow properties
- Outstanding property retention after gamma, E-beam, NO<sub>2</sub>, or EtO sterilization
- Good chemical resistance: particularly to many detergents, cleaning solutions, and alcohols



## APPLICATION FIELDS

- Transparent reservoirs
- Housings
- Urine containers
- Connectors
- Mouth pieces
- Enclosures

Property	Test method	Unit	Zylar® 245	Zylar® 550	Zylar® 631	Zylar® 650	Zylar® 765	Zylar® 960	Clearblend® 145	Clearblend® 155	Clearblend® 165
Melt volume-flow rate MVR 200 °C/5 kg	ISO 1133	cm³/10 min	48	5		4	4.5	6			
Melt-flow rate MFR 200 °C/5 kg	ASTM D 1238	g/10 min		5	5	4		6	3.5	6	5
Tensile modulus 1 mm/min	ISO 527-1-2	MPa	2300	2100		2100	1700	1640	2400		1700
	ASTM D 638	psi × 10³		290	310	310		250	325	270	220
Charpy impact strength (23 °C) Unnotched Notched	ISO 179/1eU	kJ/m²	15	n.b.		n.b.	n.b.	n.b.	40		n.b.
			2	4		4	15	16	2		14
Izod notched impact strength (23 °C)	ASTM D 256	ft-lb/in		1	2	3		11	1	2	5
Vicat softening temperature VST B 50	ISO 306	°C	78	73		72	64	60	82		67
Vicat softening temperature B10	ASTM D 648	°F		207	211	210		201	208	208	201
Light transmission 4 mm thick	ASTM D 1003	%	90	89	90	89	90	89	91	91	91

Zylar® and Clearblend® are a part of the Essential HD Package that can be provided with EU and US food contact statements, USP Class VI, ISO 10993 compliance and a Drug Master File (DMF). Notification of Change (NOC) term up to 12 months can also be offered when signing a long term supply contract. For more information please contact your sales representative.



# K-RESIN®

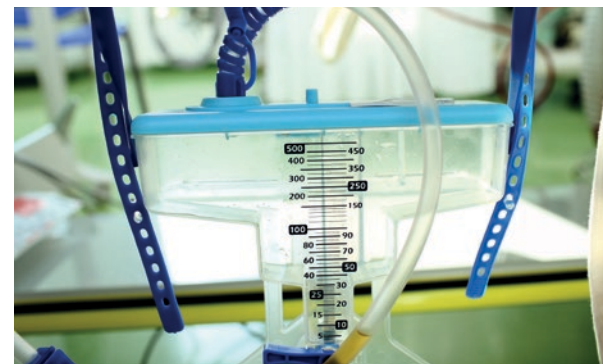
## APPLICATION FIELDS

- IV drip chambers
- Containers, oxygenators
- Filter housings
- Respiratory devices
- Packaging

AS A PREMIER CLEAR RESIN, K-RESIN® STYRENE BUTADIENE COPOLYMER (SBC) IS KNOWN FOR ITS UNIQUE BLEND OF SPARKLING CLARITY, IMPACT TOUGHNESS, STIFFNESS AND EXCEPTIONAL GLOSS. K-RESIN® HAS BEEN USED IN VARIOUS APPLICATIONS FOR MORE THAN 40 YEARS. IT IS FEATURED IN FLEXIBLE AND RIDGED PACKAGING APPLICATIONS AND CAN ALSO BE USED IN INJECTION MOLDED MEDICAL DEVICES.

## KEY FEATURES

- Excellent clarity and transparency
- Good toughness
- Dimensional stability
- High surface gloss
- Outstanding property retention after gamma, E-beam, NO<sub>2</sub> or EtO sterilization
- Consistant low color shift post high doses of radiation



Property	Test method	Unit	K-Resin® KR01	K-Resin® KR03, KR05, DK11
Melt volume-flow rate MVR 200 °C/5 kg	ISO 1133	cm <sup>3</sup> /10 min	8	7,5
Melt-flow rate MFR 200 °C/5 kg	ASTM D 1238	g/10 min	8	7,5
Tensile modulus 1 mm/min	ISO 527-1-2	MPa	1600	1500
	ASTM D 638	psi x 10 <sup>3</sup>	260	240
Tensile strength at yield	ISO 527-1/2	MPa	33	25
	ASTM D 638	psi	4845	3800
Tensile elongation at break	ISO 527-1/2	%	20	180
	ASTM D 638	%	30	200
Charpy impact strength (23 °C) Unnotched	ISO 179/1eU	kJ/m <sup>2</sup>	27	n.b.
			Notched	2
Izod notched impact strength 23 °C	ASTM D 256	ft-lb/in	1	0.3
Light transmission 4 mm thick	ASTM D 1003	%	92	92

K-Resin® is a part of the Essential HD Package that can be provided with EU and US food contact statements, USP Class VI, ISO 10993 compliance and a Drug Master File (DMF). Notification of Change (NOC) term up to 12 months can also be offered when signing a long term supply contract. For more information please contact your sales representative.

# STYROLUX®

## APPLICATION FIELDS

- Containers for IV and dialysis fluids
- Rigid extruded luers and containers
- Infusion drip chambers
- Labware
- Oxygen delivery equipment
- Filter housings
- Drainage containers

STYROLUX® IS INEOS STYROLUTION'S BRAND OF CRYSTAL-CLEAR THERMOPLASTIC STYRENE BUTADIENE COPOLYMERS (SBC). IT HAS VERY HIGH TRANSPARENCY AND IMPACT RESISTANCE, AND ITS PERFECT MISCIBILITY WITH STANDARD POLYSTYRENE (PS) GIVES IT AN EXTREMELY WIDE APPLICATION FIELD.

## KEY FEATURES

- Clarity
- Toughness
- Ease in processing
- Low density (1020 kg/m<sup>3</sup>)
- Cost performance
- Excellent bonding performance
- Can be used as a modifier to GPPS and SMMA
- Outstanding retention after gamma, E-beam, NO<sub>2</sub> or EtO sterilization
- Excellent color consistency after gamma and E-beam, sterilization



Property	Test method	Unit	Styrolux® 3G46	Styrolux® 656C	Styrolux® 684D	Styrolux® 4G60
Melt volume-flow rate MVR 200 °C/5 kg	ISO 1133	cm <sup>3</sup> /10 min	12	16	11	15
Melt-flow rate MFR 200 °C/5 kg	ASTM D 1238	g/10 min	11	15	10	14
Tensile modulus 1 mm/min	ISO 527-1-2	MPa	1550	1800	1500	900
	ASTM D 638	psi × 10 <sup>3</sup>	238	244	190	170
Tensile strength at yield	ISO 527-1/2	MPa	27	35	26	14
	ASTM D 638	psi	3700	4060	3770	2100
Tensile elongation at break	ISO 527-1/2	%	180	20	160	250
	ASTM D 638	%	220	40	250	250
Charpy impact strength (23 °C) Unnotched	ISO 179/1eU	kJ/m <sup>2</sup>	> 80	25	n.b.	> 80
			Notched	3	2	4
Izod notched impact strength 23 °C	ASTM D 256	ft-lb/in	1	0.3	0.8	12
Light transmission 4 mm thick	ASTM D 1003	%	91	90	90	90
Hardness shore D	ISO 868		65	72	68	50
	ASTM D 2240		75	72	68	64

Styrolux® is a part of the Essential HD Package that can be provided with EU and US food contact statements, USP Class VI, ISO 10993 compliance and a Drug Master File (DMF). Notification of Change (NOC) term up to 12 months can also be offered when signing a long term supply contract. For more information please contact your sales representative.

# STYROFLEX®

## APPLICATION FIELDS

- Drip chambers
- Catheters\*
- Connectors
- Tubes
- Collection bags
- Infusion bags\*
- Film applications
- Soft touch (2K molding)

\* Pure or as additives

STYROFLEX® IS INEOS STYROLUTION'S UNIQUELY DESIGNED STYRENE THERMOPLASTIC ELASTOMER (S-TPE) THAT COMBINES TRANSPARENCY, ELASTICITY AND EXCELLENT PROCESSABILITY. DUE TO ITS OUTSTANDING THERMAL STABILITY, STYROFLEX® IS SUITABLE FOR BOTH FILM EXTRUSION AND INJECTION MOLDING.

### KEY FEATURES

- Good processability
- Rubber-like mechanics
- Outstanding toughness
- Extremely high tear and perforation resistance
- Low density (~1002 kg/m<sup>3</sup>)
- Excellent bonding to other polymers
- Sterilizable
- High oxygen and water vapor permeability
- Great transparency and low yellowness index
- Toughness modifier and compatibilizer (improved mechanics)
- Higher polarity due to randomized soft phase:
  - Good compatibility with other polymers
  - Great compatibility with styrenics as well as polyolefins



Property	Test method	Unit	Styroflex® 2G66	Styroflex® 4G80
Melt volume-flow rate MVR 200 °C/5 kg	ISO 1133	cm <sup>3</sup> /10 min	13	18
Melt-flow rate MFR 200 °C/5 kg	ASTM D 1238	g/10 min	11	15
Tensile modulus 1 mm/min	ISO 527-1-2	MPa	120	50
	ASTM D 638	psi × 10 <sup>3</sup>	19	5
Tensile stress at yield	ISO 527-1/2	MPa	4	3
	ASTM D 638	psi	450	350
Tensile elongation at break	ISO 527-1/2	%	> 500	> 500
	ASTM D 638	%	500	> 500
Light transmission 4 mm thick	ASTM D 1003	%	80	80
Hardness shore D	ISO 868		34	28
	ASTM D 2240		36	28

Styroflex® is a part of the Essential HD Package that can be provided with EU and US food contact statements, USP Class VI, ISO 10993 compliance and a Drug Master File (DMF). Notification of Change (NOC) term up to 12 months can also be offered when signing a long term supply contract. For more information please contact your sales representative.

# LUSTRAN® SAN AND LURAN® HD

LUSTRAN® SAN AND LURAN® HD ARE INEOS STYROLUTION'S BRANDS OF STYRENE ACRYLONITRILE (SAN). THEY HAVE A UNIQUE BALANCE OF COST/PERFORMANCE PROPERTIES, DEMONSTRATING TRANSPARENCY WITH HIGH RIGIDITY AND OUTSTANDING RESISTANCE TO HEAT DEFORMATION, SCRATCHING, AND CHEMICAL ATTACK.

## KEY FEATURES

- High stiffness
- Heat resistance
- Transparency – allows easy visual, automated inspection
- Processability – high flow, fast cycle time
- Dimensional stability – rigidity and tensile strength
- Sterilizability – EtO, Gamma, E-beam, NO<sub>2</sub>
- Bondability – ultrasonic, solvent, or adhesive
- Excellent light transmission
- Parts are printable
- Chemical resistance – saline, bleach, betadine, glutaraldehyde, lipids
- Cost effectiveness with proven performance



## APPLICATION FIELDS

- Cell growth bottles
- Cuvettes
- Centrifuge tubes
- Caps and closures
- Anesthesia trays
- Diagnostic test kits
- Blood analysis trays
- Labware

Property of Styrene Acrylonitrile	Test method	Unit	Luran® HD 20	Lustran® SAN 29	Lustran® SAN 31	Lustran® SAN Sparkle
Melt volume-flow rate MVR 220 °C/10 kg	ISO 1133	cm <sup>3</sup> /10 min	22	16	24	44
Melt-flow rate MFR 220 °C/10 kg	ASTM D 1238	g/10 min	20	15	22	39
Tensile modulus 1 mm/min	ISO 527 – 1/-2	MPa	3700	3830	3580	3630
	ASTM D 638	psi × 10 <sup>3</sup>	520	475	475	470
Charpy notched impact strength (23 °C)	ISO 179/1eA	kJ/m <sup>2</sup>	2	1.5	1.5	1.5
Izod notched impact strength (23 °C)	ASTM D 256	ft-lb/in	0.4	0.4	0.4	0.4
Light transmission	ASTM 1003	1/8" thick	90	88	88	90
		4 mm thick	90	86	86	88

Luran® HD, as a part of Full Service HD Package, is offered with Notification of Change (NOC) term up to 36 months when signing a long term supply contract. Lustran® SAN belongs to Essential HD Package and can be offered with NOC term up to 12 months under the same conditions. Luran® HD and Lustran® SAN can be provided with full regulatory compliance (USP class VI, ISO 10993, EU and US food contact statement, Drug Master File (DMF)). For more information please contact your sales representative.



NAS®

**APPLICATION FIELDS**

- Filters
- Connectors
- Adapters
- Nebulizer housings
- Specimen holders

INEOS STYROLUTION'S BEST-IN-CLASS TRANSPARENT STYRENE-METHYL-METHACRYLATE-COPOLYMERS (SMMA) ARE A PREMIUM CHOICE FOR APPLICATIONS DEMANDING A STRONG, STIFF, WATER-CLEAR PLASTIC. NAS® IS HYDROPHOBIC, PROVIDES EXCELLENT THERMAL STABILITY, AND VERY GOOD ALCOHOL RESISTANCE.

**KEY FEATURES**

- Extreme clarity and transparency
- Excellent flow properties
- Hydrophobic (no pre-drying)
- Virtually no molded-in stress
- Outstanding property retention after sterilization: EtO, Gamma, E-beam, NO<sub>2</sub>
- High chemical resistance to alcohols
- Clarity and color consistency/neutrality
- Ease of processing



Property	Test method	Unit	NAS® 21	NAS® 30	NAS® 90
Melt volume-flow rate MVR 220 °C/10 kg	ISO 1133	cm <sup>3</sup> /10 min	24	30	16
Melt-flow rate MFR 220 °C/10 kg	ASTM D 1238	g/10 min	22	27	14
Tensile modulus 1 mm/min	ISO 527-1-2	MPa	3300	3300	3100
	ASTM D 638	psi × 10 <sup>3</sup>	470	470	490
Charpy impact strength (23 °C) Unnotched	ISO 179/1eU	kJ/m <sup>2</sup>	12	12	13
			Notched	1.5	1.5
Vicat softening temperature VST B 50	ISO 306	°C	98	98	90
Vicat softening temperature B10	ASTM D 648	°F	222	220	207
Flexural modulus	ASTM D 790	psi × 10 <sup>3</sup>	450	460	490
Light transmission 4 mm thick	ASTM D 1003	%	91	91	91

NAS® is a part of the Essential HD Package that can be provided with EU and US food contact statements, USP Class VI, ISO 10993 compliance and a Drug Master File (DMF). Notification of Change (NOC) term up to 12 months can also be provided when signing a long term supply contract. For more information please contact your sales representative.

# STANDARD FOOD CONTACT PACKAGE

INEOS Styrolution also provides FDA and EU food contact compliant grades, such as general-purpose polystyrene, high impact polystyrene, and ABS Standard grades, which can be suitable for specific medical devices and pharmaceutical packaging applications. Moreover, other specialty products are also available for Risk Class 1 applications.

<p><b>PS</b> STYROLUTION® PS</p>	<p><b>MABS</b> TERLUX®</p>	<p>Please note there are some grades within the same product family (ex. Terlurux®, Novodur®) that are offered with various packages. Only those specific products marked with the "HD" nomenclature come with the Full Service HD Package.</p>
<p><b>ABS</b> TERLURAN® &amp; NOVODUR® &amp; LUSTRAN® ABS</p>	<p><b>SAN</b> LURAN®</p>	

Standard Food Contact Package is offered for Risk Class 1 applications where customers do not require biocompatibility data, Drug Master File entry and/or locked formulation.

# STYROLUTION® PS & TERLURAN®

## APPLICATION FIELDS

### Styrolution® PS

Risk Class 1 medical devices<sup>1)</sup> and pharmaceutical packaging applications such as:

- Labware
- Packaging
- Housings
- Diagnostics devices
- Petri-dishes
- Roller-clamps

### Terluran®

Risk Class 1 medical devices<sup>1)</sup> and pharmaceutical applications such as:

- Monitor housing
- Housings
- Diagnostics/measuring devices
- Sanitary appliances

<sup>1)</sup> Risk Class 1 and other applications reviewed and acknowledged as low risk.

## KEY FEATURES

- **GPPS:** General purpose or crystal polystyrene  
*Transparent, stiff, easy processing*
- **HIPS:** high impact polystyrene  
*Opaque, impact resistant, easy processing*
- **Terluran®:** Excellent colorability, high flowability, good impact resistance  
Good heat distortion resistance
- Outstanding surface quality, excellent gloss, feel and appearance
- Amorphous structure provides excellent dimensional stability



# INEOS STYROLUTION'S PRODUCT PORTFOLIO

ASTM Standards

Typical values for uncolored products at 23 °C	Test method	Unit	Novodur® HD MF203FC	Novodur® HD MF203FC G3	Novodur® HD 15	Lustran® ABS 248FC	Lustran® ABS 348	Terlux® HD 2802 Terlux® HD 2822	Terlux® HD 2812	Zylar® 245	Zylar® 550	Zylar® 631	Zylar® 650	Zylar® 765	Zylar® 960	Clearblend® 145	Clearblend® 155	Clearblend® 165	Styrolux® 3G46	Styrolux® 4G60	Styrolux® 656C	Styrolux® 684D	Styreflex® 2G66	Styreflex® 4G80	Luran® HD 20	Lustran® SAN 29	Lustran® SAN 31	Lustran® SAN Sparkle	NAS® 21	NAS® 30	NAS® 90	K-Resin® KR01	K-Resin® KR03, KR05, DK11		
HD PACKAGE			Full Service HD	Full Service HD	Full Service HD	Full Service HD	Full Service HD	Full Service HD	Full Service HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	
Producing region			EMEA	EMEA	EMEA	Americas	Americas	EMEA	EMEA	EMEA	EMEA	Americas	Americas	EMEA	Americas	Americas	Americas	Americas	Americas	Americas	Americas	Americas	Americas	EMEA	EMEA	EMEA	Americas	Americas	Americas	Americas	Americas	Americas	Americas	All	Asia Pacific
PROPERTIES																																			
Polymer abbreviation			ABS	ABS	ABS	ABS	ABS	ABS	MABS		MBS	MBS	MBS		MBS	MBS	MBS	MBS	SBC	SBC	SBC	SBC	S - TPE	S - TPE	SAN	SAN	SAN	SAN	SMMA	SMMA	SMMA	SBC	SBC		
Density	ASTM D 792	g/ cm <sup>3</sup>	1.05	1.05	1.05	1.06	1.06	1.08	1.08		1.05	1.05	1.04		1.05	1.04	1.05	1.04	1.02	1.01	1.02	1.01	1.00	0.98	1.08	1.08	1.08	1.08	1.08	1.09	1.07	1.01	1.01		
Water absorption, saturated at 23 °C	ASTM D 570	%	0.30 - 0.40	0.95	0.30 - 0.40	0.30 - 0.40	0.30 - 0.40	0.70	0.35		0.05	0.10	0.05		0.10	0.10	0.10	0.10	0.07	0.07	0.07	0.07	0.07	0.07	0.20	0.20	0.20	0.20	0.10	0.15	0.15	0.07	0.09		
PROCESSING																																			
Method: Injection molding (M), Extrusion (E), Blow molding (B)			M	M	M	M	M	M, E, B	M, E, B		M	M	M		M	M	M	M	M, E, B	M, E	M	M, E, B	M, E	M, E	M	M	M	M	M, E, B	M, E, B	M, E, B	M	M, E, B		
Melt flow rate MFR 220 °C/10 kg	ASTM D 1238	g/10 min	28	14	14	21	14	2	7		50		41		59				130					76	20	15	22	39	22	27	14	90	80		
Melt flow rate MFR 200 °C/5 kg	ASTM D 1238	g/10 min		1.40		3.00	2.00	2.00		5.00	5.00	4.00		6.00	3.50	6.00	5.00	11.00	14.00	15.00	10.00	11.00	15.00		2.00	2.00	3.00	1.90	2.20	1.50	8.00	7.50			
Melt temperature		°F	446 - 500	446 - 501	446 - 500	475 - 510	475 - 525	446 - 500	446 - 500		400 - 460	400 - 460	400 - 460		400 - 460	400 - 460	400 - 460	400 - 460	356 - 482	356 - 482	356 - 482	356 - 482	338 - 464	338 - 464	428 - 500	425 - 500	425 - 500	425 - 500	410 - 470	410 - 470	410 - 470	356 - 482	356 - 482		
Mold temperature		°F	140 - 176	140 - 177	86 - 176	110 - 150	110 - 150	122 - 176	122 - 176		80 - 130	80 - 130	80 - 130		80 - 130	80 - 130	80 - 130	80 - 130	86 - 122	86 - 122	86 - 122	86 - 122	86 - 122	86 - 122	86 - 122	104 - 176	100 - 180	100 - 180	100 - 180	90 - 140	90 - 140	90 - 140	86 - 122	86 - 122	
Mold shrinkage	ASTM D 955	in/in	0.004 - 0.007	0.004 - 0.007	0.004 - 0.007	0.004 - 0.006	0.004 - 0.006	0.004 - 0.007	0.003 - 0.010		0.002 - 0.006	0.002 - 0.006	0.002 - 0.006		0.002 - 0.006	0.002 - 0.006	0.002 - 0.006	0.002 - 0.006	0.003 - 0.010	0.003 - 0.010	0.003 - 0.010	0.003 - 0.010	0.003 - 0.010	0.003 - 0.010	0.003 - 0.007	0.003 - 0.004	0.003 - 0.004	0.003 - 0.004	0.002 - 0.006	0.002 - 0.006	0.002 - 0.006	0.003 - 0.010	0.003 - 0.010		
MECHANICAL PROPERTIES																																			
Tensile modulus	ASTM D 638	psi x 10 <sup>3</sup>		800		380	380	295	275		290	310	310		250	325	270	220	238	170	244	190	19	5	520	475	475	470	470	470	490	260	240		
Tensile stress at yield	ASTM D 638	psi		10600		6800	7000	6960	5100		3500	3800	3800		3400	4000	4000	3000	3700	2100	4060	3770	450	350	10200	10800	10500	9000	8400	8800	8100	4300	3400		
Tensile strain at break	ASTM D 638	%		2.00		9.00	6.00	20.00	55.00		40.00	40.00	40.00		70.00	40.00	40.00	50.00	220.00	250.00	40.00	250.00	550.00	1050.00		3.00	3.00	2.00	2.10	2.30	2.10	10.00	130.00		
Flexural strength	ASTM D 790	psi		15900		10400	10600	9800	8400		6600	8800	7000		6200	8000	6000	5400	3940	3200	4790	4500	392	300	17400	18900	16700	14000	14100	14600	14500	6800	5900		
Flexural modulus	ASTM D 790	psi x 10 <sup>3</sup>		725		390	390	270	255		285	300	280		250	330	270	225	193	158	217	170	12	10	510	500	500	500	450	460	490	220	230		
Izod notched impact strength, (23 °C)	ASTM D 256	ft - lb/in		1.00		4.20	4.00	1.29	1.00		1.00	2.00	3.00		11.00	1.00	2.00	5.00	1.00	12.00	0.30	0.80	n.b.	n. b.	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.70		
Rockwell hardness	ASTM D 785			112R		105R	112R	107R	100R		81R	70R	84R		62R	80R	70R	70R								77M	83M	83M	75M	70M	75M	65M	86R	52R	
Hardness shore D	ASTM D 2240			92															75	64	72	68	36	28								83	77		
THERMAL PROPERTIES																																			
Deflection temperature under load (1.82 MPa, 264 psi, annealed)	ASTM D 1525	°F		213		204	204	194	193		183	189	197		180	198			140	147	152	158		118	212	222	218	216	200	200	176	182	182		
Vicat softening temperature B10 (120 °C/hour, 10 N)	ASTM D 648	°F		236		227	225	220	220		207	211	210		201	208	208	201	190	165	194	186	118	103	232	232	230	226	222	220	207	204	196		
OPTICAL PROPERTIES																																			
Light transmission (1/8" thick)	ASTM D 1003	%		30				90	89		90	90	90		91	90	91	90	91	90	90	90	93	81	90	88	88	81 - 90	91	91	91	93	92		
Haze (1/8" thick)	ASTM D 1003	%						< 3.00	< 3.00		1.50	1.50	2.00		2.00	2.00	2.50	2.20	0.20	5.00	1.50	1.50	1.00	18.00	< 1.00	0.80	0.70	0.70	0.30	0.30	0.30	0.50	1.00		
Refractive index (nD)	ASTM D 542							1.54	1.54		1.57	1.56	1.57		1.57	1.57	1.56	1.57	1.57	1.57	1.58	1.58	1.56	1.56	1.57	1.57	1.57	1.57	1.56	1.56	1.56	1.57	1.57		

# INEOS STYROLUTION'S PRODUCT PORTFOLIO

ISO Standards

Typical values for uncolored products at 23 °C	Test method	Unit	Novodur® HD M203FC	Novodur® HD M203FC G3	Novodur® HD 15	Novodur® ABS 248FC	Lustran® ABS 348	Terlux® HD 2802 Terlux® HD 2822	Terlux® HD 2812	Zylar® 245	Zylar® 550	Zylar® 631	Zylar® 650	Zylar® 765	Zylar® 960	Clearblend® 145	Clearblend® 155	Clearblend® 165	Styrolux® 3G46	Styrolux® 4G60	Styrolux® 656C	Styrolux® 684D	Styroxflex® 2G66	Styroxflex® 4G80	Luran® HD 20	Lustran® SAN 29	Lustran® SAN 31	Lustran® SAN Sparkle	Nas® 21	Nas® 30	Nas® 90	K-Resin® KR01	K-Resin® KR03, KR05, DK11		
HD PACKAGE			Full Service HD	Full Service HD	Full Service HD	Full Service HD	Full Service HD	Full Service HD	Full Service HD		Essential HD		Essential HD		Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	Essential HD	
Producing region			EMEA	EMEA	EMEA	Americas	Americas	EMEA	EMEA	EMEA	EMEA	Americas	Americas	EMEA	Americas	Americas	Americas	Americas	Americas	Americas	Americas	Americas	Americas	Americas	Americas	EMEA	Americas	Americas	Americas	Americas	Americas	Americas	Americas	All	Asia Pacific
PROPERTIES																																			
Polymer abbreviation	–	–	ABS	ABS	ABS	ABS	ABS	MABS	MABS	MBS	MBS		MBS	MBS	MBS	MBS	MBS	MBS	SBC	SBC	SBC	SBC	SBC	SBC	SAN	SAN	SAN	SAN	SMMA	SMMA	SMMA	SBC	SBC		
Density	ISO 1183	kg/m³	1050	1190	1050	1060	1060	1080	1080	1050	1050		1050	1050	1050	1050	1050	1050	1020	1020	1020	1010	998	980	1080	1.07	1.07	1.07	1.07	1080	1090	1070	1020	1020	
Moisture absorption, equilibrium 23 °C/50% r.h.	ISO 62	%	0.30 - 0.40	0.20 - 0.30	0.30 - 0.40	0.30 - 0.40	0.30 - 0.40	0.35	0.35	0.05	0.05		0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.07	0.07	0.07	0.07	0.07	0.20	0.20	0.20	0.20	0.10	0.15	0.10	0.07	0.07		
PROCESSING																																			
Method: Injection molding (M), Extrusion (E), Blow molding (B)			M		M	M	M	M, E, B	M, E, B	M	M		M	M	M				M, E, B	M, E, B	M	M, E, B	M, E	E	M	M	M	M	M, E, B	M, E, B	M, E, B	M	M, E, B		
Melt volume-flow rate MVR 220 °C/10 kg	ISO 1133	cm³/10 min	31	18	15	23	16	2	8	48	55		45		65										22	16	24	44	24	30	16				
Melt-flow rate MFR 200 °C/5 kg	ISO 1133	cm³/10 min				3.00	4.00				5.00		4.00		6.00				12.00	15.00	16.00	11.00	13.00	18.00		3.00	2.00	3.00	2.10	2.40	1.70	8.00	7.50		
Melt temperature range	–	°C	230 - 260	230 - 260	230 - 260	245 - 265	245 - 275	230 - 260	230 - 260	200 - 240	200 - 240		200 - 240	200 - 240	200 - 240				180 - 250	180 - 250	180 - 250	180 - 250	170 - 240	170 - 240	220 - 260	220 - 260	205 - 260	200 - 240	200 - 240	230 - 260	180 - 250	180 - 250			
Mold temperature range	–	°C	60 - 80	60 - 80	30 - 80	45 - 65	45 - 65	50 - 75	50 - 75	30 - 55	30 - 55		10 - 60	30 - 55	10 - 60				30 - 50	30 - 50	30 - 50	30 - 50	30 - 50	30 - 50	40 - 80	40 - 80	40 - 80	30 - 60	30 - 60	30 - 50	30 - 50	30 - 50	30 - 50		
Mold shrinkage	ISO 294-4	%	0.40 - 0.70	0.20 - 0.40	0.40 - 0.70	0.40 - 0.60	0.40 - 0.60	0.40 - 0.70	0.40 - 0.70		0.20 - 0.60		0.20 - 0.60		0.20 - 0.60				0.30 - 1.00	0.30 - 1.00	0.30 - 1.00	0.30 - 1.00	0.30 - 1.00	0.30 - 1.00	0.30 - 0.70	0.30 - 0.40	0.30 - 0.40	0.30 - 0.40	0.20 - 0.60	0.20 - 0.60	0.20 - 0.60	0.30 - 1.00	0.30 - 1.00		
MECHANICAL PROPERTIES																																			
Tensile modulus	ISO 527-1/-2	MPa	2400	5600	2300	2620	2660	2000	1900	2300	2100		2100	1700	1640				1550	900	1800	1500	120	50	3700	3830	3580	3630	3300	3300	3100	1600	1500		
Stress at yield (stress at break)	ISO 527-1/-2	MPa	46	70	48	52	51	48	42	37	28		26	23	28				27	14	35	26	4	3	72	80	74	64	60	60	60	33	25		
Strain at yield (stress at yield)	ISO 527-1/-2	%	2.60	1.70																													2.80	2.20	
Strain at break	ISO 527-1/-2	%	> 15.00		2.50	5.00	4.00	4.00	4.00	20.00	50.00		40.00	80.00	120.00				180.00	200.00	20.00	160.00	> 500.00	> 500.00	3.00				2.50	2.50	2.30	15.00	170.00		
Flexural strength	ISO 178	MPa	70	100		77	77	70	60		50		48		45				31		48	40	4						100	100	100	43	30		
Charpy unnotched impact strength (23 °C)	ISO 179/1eU	kJ/m²	110	20	170	n.b.	n.b.	120	110	15	n.b.		25		n.b.				> 80	> 80	25	n.b.	n.b.	n.b.	120	125	120	105	12	12	13	27	n.b.		
Charpy notched impact strength (23 °C)	ISO 179/1eA	kJ/m²	16.00	5.00	14.00	20.00	18.00	5.00	5.00	2.00	4.00		2.00	15.00	16.00				3.00	4.00	2.00	4.00	n.b.	n.b.	2.00	1.50	1.50	1.50	1.50	1.50	1.50	2.00	2.00		
Izod notched impact strength (23 °C)	ISO 180-1U	kJ/m²		18		n.b.	n.b.			16	80		20		200												28	21	18	12	14				
Notched impact strength (23 °C)	ISO 180-1A	kJ/m²	16.00	6.00	16.00	4.00	4.00	7.00	7.00	2.00	6.00		3.00	8.00	15.00				3.00		3.00	4.00			2.00	1.00	1.00	1.00	2.50	2.50	2.50				
Ball indentation hardness (H 358/30)	ISO 2039-1	MPa	107	145	102			70	75		60				35				65						165				168	169	168				
Hardness shore D	ISO 868	–																	65	50	72	68	34	28								70	63		
THERMAL PROPERTIES																																			
Heat deflection temperature; HDT A (1.80 MPa)	ISO 75-1/2	°C	94	104	93	99	99	90	87	72	70		60	67					58	50	67	65			86	103	102	99	80	80	75	65	61		
Heat deflection temperature; HDT B (0.45 MPa)	ISO 75-1/2	°C	98	107	99	102	102	94	93	85	81		72	78					75	64	77	75			99	105	104	101	90	90	83	78	76		
Vicat softening temperature VST B 50 (50 N, 50° K/h)	ISO 306	°C	99	105	100	100	100	93	87	78	73		72	64	60				51	45	63	59			106	105	104	100	98	98	90	65	53		
Vicat softening temperature VST A 120 (50 N, 120° K/h)	ISO 360	°C				103	103	105		102	99		99	94	90				81	70			35	38		107	106	103	105	102	97	91	85		
OPTICAL PROPERTIES																																			
Light transmission (4 mm thick)	ASTM D 1003	%						89	89	90	90		90	90	89				90	90	90	89	80	80	90	86	86	88	91	91	91	92	92		
Haze (4 mm thick)	ASTM D 1003	%						3.00	< 3.00	2.00	2.00		2.00	2.00	2.00				2.00	2.00	2.00	2.00	5.00	18.00	< 1.00	0.80	0.70	0.70	0.30	0.30	0.30	1.00	2.00		
Refractive index (nD)	ISO 489	%						1.54	1.54	1.57	1.57		1.57	1.57	1.56				1.57	1.57	1.58	1.58	1.56	1.56	1.57	1.57	1.57	1.57	1.56	1.56	1.56	1.57	1.57		

**SM:** styrene monomer  
**PS:** polystyrene  
**ABS:** acrylonitrile butadiene styrene  
**Specialties:** ABS/ASA, ASA, SAN, AMSAN, SBC, SMMA



# GLOBAL REACH

# AND PROXIMITY TO CUSTOMER MARKETS

<sup>(1)</sup> INEOS Styrolution acts as exclusive distributor for the INEOS ABS plant in Addyston, Ohio.

INEOS Styrolution is the only global company focused solely on styrenics with a broad product portfolio and proven customized approach to co-development. INEOS Styrolution delivers innovation and professional support with an experienced, personal touch.

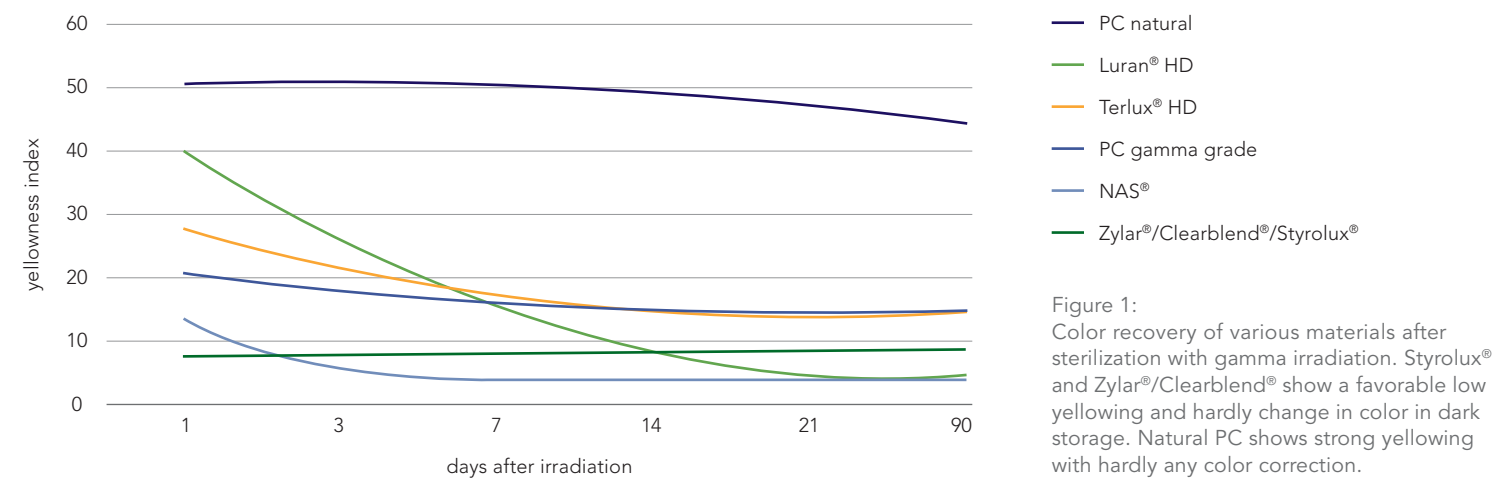


## COMBINING STERILIZATION AND AESTHETICS WITH STYRENICS

Sterilization of medical tools and devices is an absolutely essential process that is required for many medical procedures to prevent infections and contamination. Several sterilization procedures, such as steam sterilization, EtO treatment, NO<sub>2</sub>, as well as beta and gamma irradiation, have been established in the industry to guarantee the complete removal of microorganisms, including bacterial and fungal spores from medical devices. While the complete removal and destruction of all living organisms is not always apparent to the naked eye, the aesthetics of a device can help create a sense of safety and cleanliness for both healthcare professionals and patients.

Today one of the most economic procedures for medical device sterilization is the use of e-beam or gamma ray irradiation. Not all materials are equally suited for these high energy treatments as they can result in a yellowing of the product or even the impairment of physical and mechanical properties. While the yellowing tends to be temporary, depending on the material, the extent and duration of color recovery differs significantly and can take up to several weeks (Figure 1).

### YELLOWNESS INDEX AFTER GAMMA IRRADIATION (25 KGY)



While additives or blue tints can be incorporated into the material to allow for color correction over time, a poor color compensation results in increased costs and logistical challenges due to prolonged inventory hold times for many manufacturers. Devices that are tinted yellow simply do not offer the aesthetic appeal or create the sense of confidence and cleanliness necessary for the healthcare industry. Also a good physical-, mechanical retention after gamma irradiation (Table 2) or EtO sterilization (Table 3) is a key requirement for the medical industry.

Trade Name	Polymer	Gamma	E-beam	EtO	NO <sub>2</sub>	Steam
Terlux® HD	MABS	✓	✓	✓	✓	✗
Zylar®/Clearblend®	MBS	✓	✓	✓	✓	✗
Styrolux®/Styroflex®/K-Resin®	SBC	✓	✓	✓	✓	✗
NAS®	SMMA	✓	✓	✓	✓	✗
Luran® HD/Lustran® SAN	SAN	✓	✓	✓	✓	✗
Novodur® HD/Lustran® ABS	ABS	✓	✓	✓	✓	✗

Table 1: Overview of sterilization techniques for styrenics

### TENSILE STRENGTH BEFORE AND AFTER ETO STERILIZATION

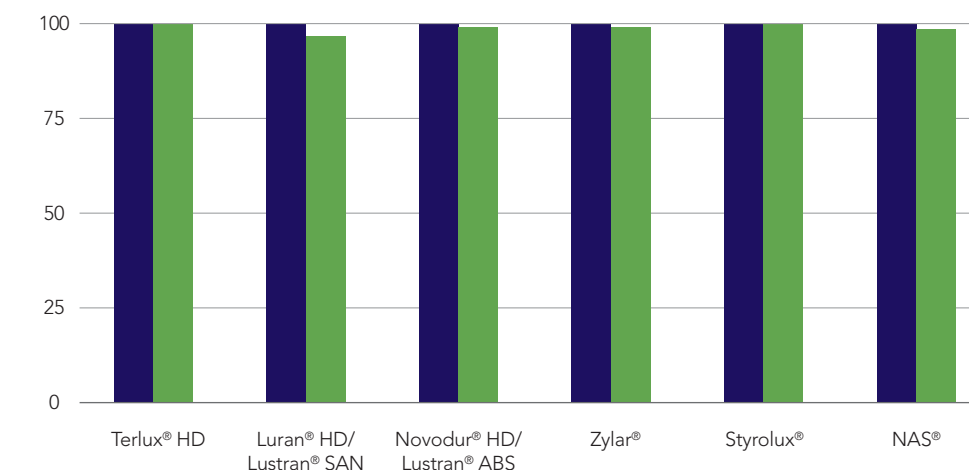


Table 2: Tensile retention before and after EtO

### RETENTION (%) AFTER 25 KGY AND 50 KGY GAMMA EXPOSURE

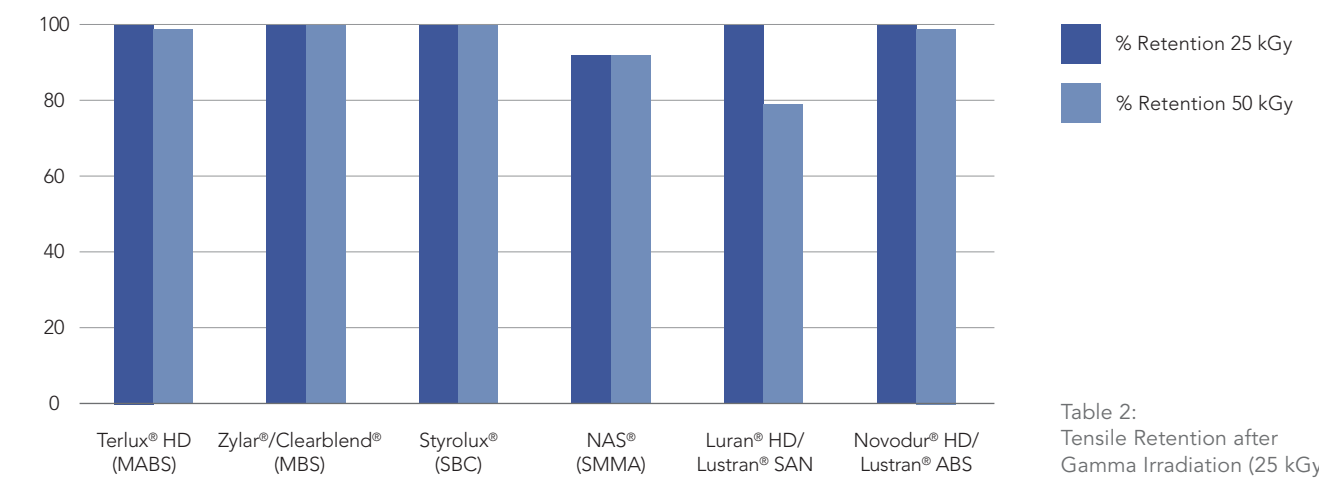
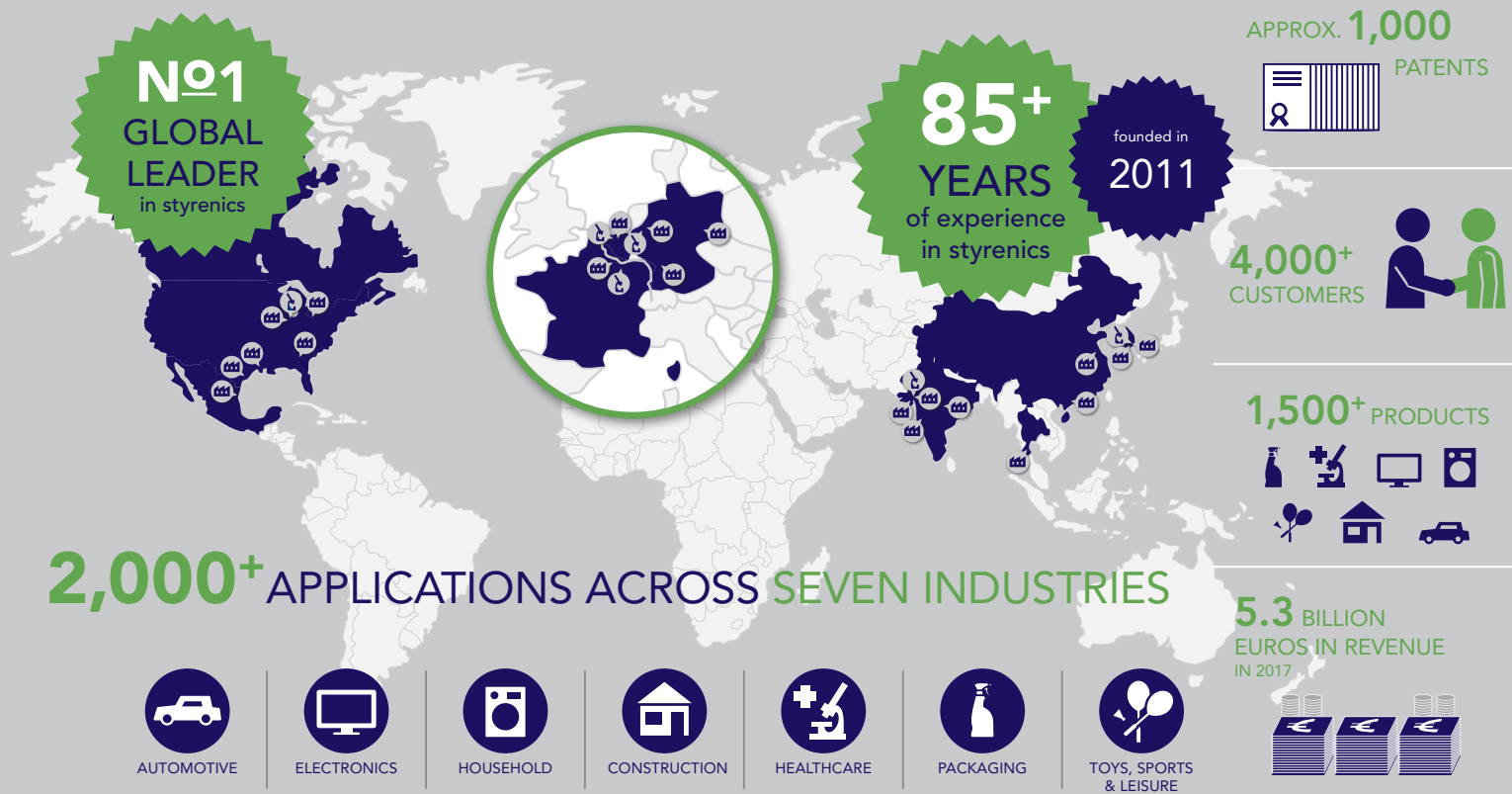


Table 2: Tensile Retention after Gamma Irradiation (25 kGy - 50 kGy)

## INEOS STYROLUTION AT A GLANCE

INEOS Styrolution is the global leader in styrenics. The company provides products for many everyday applications across a broad range of industries, including healthcare, automotive, electronics, household, construction, toys/sports/leisure, and packaging.

 **3,300** EMPLOYEES | 
  **10** COUNTRIES | 
  **20** PRODUCTION SITES | 
  **6** R&D CENTERS | 
  **24** SALES OFFICES



IN THE HEALTHCARE INDUSTRY, INEOS STYROLUTION HAS A LEGACY OF SUCCESSFULLY SERVING THE INDUSTRY FOR OVER 15 YEARS.

## LET'S COLLABORATE

If you would like further details, need assistance in creating your applications, or are curious to explore new possibilities with styrenics, please contact us!

[www.ineos-styrolution.com/industry/healthcare.html](http://www.ineos-styrolution.com/industry/healthcare.html)

### LOCAL REPRESENTATIVES

#### EUROPE, MIDDLE EAST AND AFRICA

INEOS Styrolution Group GmbH  
Mainzer Landstrasse 50  
60325 Frankfurt am Main  
Germany

INSTY.info@ineos.com  
+49 2133 9309168

#### ASIA-PACIFIC

INEOS Styrolution APAC Pte Ltd.  
111 Somerset Road, #14-16 to 21  
TripleOne Somerset  
Singapore 238164

INSTY.asia@ineos.com  
+82 2 6322 7775

#### AMERICAS

INEOS Styrolution America LLC  
4245 Meridian Parkway, Suite 15  
Aurora, IL 60504  
USA

INSTY.americas@ineos.com  
+1 866 890 6354



SPECIFICATIONS,  
**STATISTICS,**  
**STUDIES.**

---

A decorative pink geometric shape is located on the right side of the page. It consists of a vertical line on the left, a horizontal line at the top, a diagonal line sloping down to the right, and a horizontal line at the bottom. The bottom horizontal line is slightly shorter than the top one, creating a trapezoidal shape with a pointed right side.

# EXPLORE

If you would like more details, please contact a INEOS Styrolution representative who will gladly provide you with any information you require.

Please also refer to [INEOS-STYROLUTION.COM](http://INEOS-STYROLUTION.COM)

## **INEOS Styrolution Group GmbH**

Global Headquarters  
Mainzer Landstrasse 50  
60325 Frankfurt am Main, Germany  
[ineos-styrolution.com](http://ineos-styrolution.com)

### PLEASE NOTE

The data contained in this publication are based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, these data do not relieve processors from carrying out own investigations and tests; neither do these data imply any guarantee of certain properties, nor the suitability of the product for a specific purpose. Any descriptions, drawings, photographs, data, proportions, weights etc. given herein may change without prior information and do not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed. (May 2016)

**INEOS**  
**STYROLUTION**

Driving Success. Together.