

HUNTSMAN

Enriching lives through innovation

Shaping the future

TPU elastomers for
Molding applications





Experts in elastomers

Our polyurethanes business division is a leading developer of polyurethane (PU) and thermoplastic polyurethane (TPU) materials. Combining global reach with decades of experience in material innovation, we are experts in urethane-based elastomers and have in-depth knowledge of their application across a vast range of industries.

A flexible partner for plastics molders

We are a leading provider of TPU elastomers that can help meet the manufacturing challenges of a fast-paced world. Tough and reliable, yet incredibly versatile, our TPU elastomers can be easily injection molded or overmolded and are renowned for their extreme adaptability.

We offer:

- **IROGRAN® TPU elastomers** – a range of premium injection molding elastomers for demanding industrial applications
- **AVALON® TPU elastomers** – a portfolio of elastomers well suited to the manufacture of consumer products and general-purpose applications.

Through our Tecnoelastomeri business, we provide a wide range of off-the-shelf and custom made hot-cast elastomers. Under our **TECNOTHANE®** and **DALTOCAST®** brands, we offer hot-cast elastomers that provide good chemical resistance and excellent mechanical characteristics. This includes engineering elastomers, which are exceptionally resilient and designed for use in extreme working conditions.

We also make our own range of high performance **CASTECH™** casting machines. These machines are used for processing hot cast elastomer systems including our **TECNOTHANE®** range.

For more information, go to www.tecnoelastomeri.com or refer to the Huntsman Tecnoelastomeri brochure.

Shaping the future

Our IROGRAN® and AVALON® TPU elastomers for specialty molding applications range from 55 Shore A to 65 Shore D hardness and can be adapted to suit different production techniques.

Regardless of their application, our injection molding elastomers are renowned for their mechanical and physical properties including:

- Wear and tear strength
- Dimensional stability
- Hydrolysis and oil resistance
- Low compression set
- Dynamic load performance
- Elasticity and flexibility down to -50°C
- Processing consistency with perfect surface definition
- Processing speed with up to 30% quicker demolding than industry standard materials
- Excellent slip resistance (specialty grades)
- Transparency and translucency (specialty grades)
- Recyclability.





Key applications

Industrial

- Hydraulic and pneumatic seals and gaskets
- Wheels, pulleys, sprockets, castors, rollers
- Bladders
- Handles for industrial equipment
- Agricultural parts for sorting and sowing equipment
- Parts for construction tools and machinery
- Mineral extraction and mining screens.

Transportation & automotive

- Automotive dashboard parts
- Other interior components e.g., trays, gear knobs, cup holders, buttons
- Over-molded key cases
- Technical parts such as spring aids
- Stone protection parts
- Reusable automotive packaging or dunnage.

Consumer goods

- Soft-touch handles and wheels
- Protection cases for electrical equipment
- Sports equipment
- Nose pads for glasses / eyewear
- Durable furniture parts.

Product highlights

IROGRAN® TPU elastomers

IROGRAN® TPU A 70 E 4675:

Exceptional performance in over-molding

IROGRAN® A 70 E 4675 elastomer is a unique, soft, plasticizer-free, polyester TPU for injection molding applications. Easily processed, and with an exceptionally short cycle time, IROGRAN® A 70 E 4675 TPU is used extensively across a wide range of industries including the production of specialized automotive, sports and consumer goods.

IROGRAN® TPU A 92 E 4246:

For thick wall parts with a short cycle time

Within our injection molding product range, IROGRAN® A 92 E 4246 TPU is one of the best performing polyester-based elastomers that we offer. With an increased degree of crystallinity, this elastomer grade is ideally suited to the creation of thick walled parts, where short cycle times and fast demolding rates are a prerequisite.

IROGRAN® TPU A 92 E 4860:

Improved hydrolysis and excellent melt strength

IROGRAN® A 92 E 4860 TPU is a great elastomer choice for extrusion and injection blow molding projects. High crystallinity gives this polyester-based material the melt strength needed for these special processes and for the production of bellows and other blow molded parts. This TPU grade also offers a short cycle time compared to standard grades.



Product highlights

AVALON® TPU elastomers

AVALON® TPU 95 AHT:

A high transparency TPU elastomer

AVALON® 95 AHT TPU is a colorless, high transparency, TPU elastomer. Offering excellent UV and abrasion resistance, this durable elastomer is frequently used in the production of consumer goods such as footwear and protective covers for mobile phones and tablets.

AVALON® TPU 95 ABR:

A TPU elastomer with high abrasion resistance

This polyester-based TPU forms part of a family of products designed for applications that require the lowest possible abrasion loss. Offering good cut and scratch resistance, alongside low temperature performance and short cycle times, AVALON® 95 ABR TPU is widely used to produce objects including escalator wheels and sports shoe soles.

AVALON® TPU 55 AHG:

A soft, phthalate-free TPU elastomer

Part of the AVALON® soft range, AVALON® 55 AHG TPU is a polyester-based elastomer system for injection molding applications. Offering a broad processing window and a short cycle time compared to other soft TPU grades, this elastomer offers all the usual physical properties expected of a TPU including good abrasion resistance.

Infinite scope for innovation

IROGRAN® TPU: Key products

Physical properties	Norm	Unit	A 60 E 4612 N	A 70 H 4673 N	A 70 E 4675	A 80 H 4698	A 87 H 4615	A 92 E 4860	A 92 E 4246	A 92 H 4656	A 95 E 4813
			IROGRAN® ester-based								
GENERAL											
Hardness	ISO 7619	Shore A	65	74	75	81	85	91	92	93	95
Hardness	ISO 7619	Shore D	18	25	25	31	35	42	44	40	44
Density	ISO 1183-1	g/cm ³	1,17	1,18	1,15	1,19	1,20	1,20	1,21	1,21	1,21
MECHANICAL											
Tensile strength	DIN 53504	MPa	31	35	30	47	45	49	50	45	41
Elongation @ break	DIN 53504	%	900	790	650	650	640	600	610	550	550
Tensile stress @ 100% elongation	DIN 53504	MPa	2,7	3,1	3,3	4,6	5,6	7,5	7,2	8,9	10
Tensile stress @ 300% elongation	DIN 53504	MPa	5	7,5	5,8	12,7	11,1	16	15	18,6	17,5
Tear strength	ISO 34-1	N/mm	35	50	35	85	80	85	90	100	105
Compression set 70h @ 23°C	ISO 815	%	17	-	35	19	25	25	25	25	25
Compression set 24h @ 70°C	ISO 815	%	43	-	58	40	43	39	50	43	45
Mold shrinkage	ISO 294-4	%	3	2	1,6	0,6	1,1	0,9	0,9	0,6	0,8
Bayshore rebound resilience	ASTM D-2632	%	54	50	25	42	40	33	32	32	-
Abrasion	ISO 4649	mm ³	55	45	90	30	25	30	25	30	30
THERMAL											
TMA low melt range	Huntsman	°C	140	-	150	155	135	180	175	170	170
TMA high melt range	Huntsman	°C	170	-	190	165	185	200	190	185	200
OTHER FEATURES											
Transparent				x		x					
Highly crystalline			x		x			x	x		x
Antistatic										x	
Presence of plasticizer			Phthalate-free	Phthalate-free	No	No	No	No	No	No	No



A 95 H 4678	A 98 E 4066	A 98 H 4661	A 65 P 4324 N	A 80 P 5039	A 85 P 4394	A 92 P 4207	A 92 P 4637	A 95 P 5044	A 98 P 4535			Physical properties
IROGRAN® ester-based			IROGRAN® ether-based							Unit	Norm	
												GENERAL
95	97	96	71	80	85	92	92	95	96	Shore A	ISO 7619	Hardness
45	49	52	22	29	36	40	39	48	51	Shore D	ISO 7619	Hardness
1,23	1,22	1,23	1,12	1,10	1,12	1,14	1,13	1,14	1,16	g/cm ³	ISO 1183-1	Density
												MECHANICAL
45	50	50	30	32	45	49	45	55	55	MPa	DIN 53504	Tensile strength
540	530	520	800	720	640	570	600	500	510	%	DIN 53504	Elongation @ break
11,1	11,4	16	3,9	4,6	7	9,5	9,1	12,3	15,4	MPa	DIN 53504	Tensile stress @ 100% elongation
19,8	25	27,7	9,8	8,7	12	16,6	15,9	30,7	25	MPa	DIN 53504	Tensile stress @ 300% elongation
115	135	125	35	45	60	75	74	101	120	N/mm	ISO 34-1	Tear strength
24	30	25	25	23	20	28	25	30	32	%	ISO 815	Compression set 70h @ 23°C
43	45	46	48	43	40	44	41	82	50	%	ISO 815	Compression set 24h @ 70°C
0,7	0,7	0,7	1,2	0,9	0,8	0,8	0,9	0,7	0,8	%	ISO 294-4	Mold shrinkage
30	30	28	58	47	36	34	34	35	30	%	ASTM D-2632	Bayshore rebound resilience
30	30	35	60	30	25	25	30	30	30	mm ³	ISO 4649	Abrasion
												THERMAL
180	185	190	110	145	150	165	160	175	185	°C	Huntsman	TMA low melt range
190	200	200	165	155	170	188	170	187	200	°C	Huntsman	TMA high melt range
												OTHER FEATURES
				x				x				Transparent
	x					x			x			Highly crystalline
x		x										Antistatic
No	No	No	Phthalate-free	No	No	No	No	No	No			Presence of plasticizer

Further technical data about individual products plus best practice advice for handling and processing our elastomers is available by contacting your local sales representative or by visiting our online product finder tool:

<http://www.huntsman-tpu.com/>

Infinite scope for innovation

AVALON® TPUs: Key products

Physical properties	Norm	Unit	55 AHG	65 AK-ESD	80 AHT	85 ABR	90 AHT
			AVALON® ester-based				
GENERAL							
Hardness	ISO 7619	Shore A	54	65	80	86	90
Hardness	ISO 7619	Shore D	-	-	30	37	42
Density	ISO 1183-1	g/cm ³	1,14	1,18	1,21	1,20	1,21
MECHANICAL							
Tensile strength	DIN 53504	MPa	12	30	30	50	47
Elongation @ break	DIN 53504	%	650	850	600	600	500
Tensile stress @ 100% elongation	DIN 53504	MPa	1,6	2,5	5	5,8	7
Tensile stress @ 300% elongation	DIN 53504	MPa	3,5	5	8	12	12
Tear strength	ISO 34-1	N/mm	30	45	70	80	95
Compression set 70h @ 23°C	ISO 815	%	-	25	-	20	-
Compression set 24h @ 70°C	ISO 815	%	-	-	-	-	-
Abrasion	ISO 4649	mm ³	45	< 100	40	20	40
OTHER FEATURES							
Transparent				x	x		x
Improved abrasion resistance						x	
Antistatic				x			
Presence of plasticizer			Phthalate-free	Phthalate-free	No	No	No

HG - High Gloss; HT - High transparency; K - Crystal, Transparent ; ESD - ESD adjusted; R - Abrasion improved.

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90 ABR	95 AHT	95 ABR	60 DB	65 DB			Physical properties
AVALON® ester-based					Unit	Norm	
GENERAL							
89	94	94	-	-	Shore A	ISO 7619	Hardness
44	48	47	59	64	Shore D	ISO 7619	Hardness
1,21	1,21	1,22	1,23	1,23	g/cm³	ISO 1183-1	Density
MECHANICAL							
50	55	50	55	60	MPa	DIN 53504	Tensile strength
500	480	500	470	400	%	DIN 53504	Elongation @ break
8,9	15	12,8	19	25	MPa	DIN 53504	Tensile stress @ 100% elongation
19	25	23,7	31	300	MPa	DIN 53504	Tensile stress @ 300% elongation
80	118	105	175	200	N/mm	ISO 34-1	Tear strength
25	-	30	35	35	%	ISO 815	Compression set 70h @ 23°C
-	-	-	65	65	%	ISO 815	Compression set 24h @ 70°C
20	35	25	30	30	mm³	ISO 4649	Abrasion
OTHER FEATURES							
	x						Transparent
x		x					Improved abrasion resistance
							Antistatic
No	No	No	No	No			Presence of plasticizer

Global elastomers experts

Committed to customers: We build partnerships with our customers and work across an international network of R&D and manufacturing locations to help solve complex challenges and deliver the highest levels of technical support and customer care.

Committed to quality: Wherever we are, whatever we are doing, we prioritize environmental, health and safety protection, and we are always rigorous about quality control and assurance.

Committed to innovation: We keep pace with the most innovative trends in plastics processing by using the latest equipment and making regular investments in our formulation, manufacturing and R&D capabilities.

Committed to sustainability: We create solutions that contribute to a more sustainable society by helping to conserve energy, preserve natural resources and reduce our overall carbon footprint.



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About Huntsman:

Huntsman Corporation is a publicly traded global manufacturer and marketer of differentiated and specialty chemicals with 2018 revenues of more than \$9 billion. Our chemical products number in the thousands and are sold worldwide to manufacturers serving a broad and diverse range of consumer and industrial end markets. We operate more than 75 manufacturing, R&D and operations facilities in approximately 30 countries and employ approximately 10,000 associates within our four distinct business divisions.

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