

Isothane® Thermoplastic Urethane

5000 Series

Great Eastern Resins Industrial Co. Ltd.

ISOTHANE 5000 series products are polyether based thermolastic polyurethanes. They exhibit excellent bio-compatibility, hydrolytic resistance, fungus resistance, and low temperature performance properties. These products can be injection molded, blow molded, and extruded.

Property	ASTM Test Method	Conditions	Units	5075A	5080A	5085A	5090A	5095A	5055D	5065D	5075D
Biomedical	USP	-	Class	VI	VI	VI	VI	VI	VI	VI	VI
Specific Gravity	D-792	-	gms/cm ³	1.10	1.12	1.13	1.13	1.15	1.17	1.17	1.18
Hardness	D-2240	-	Shore	75A	82A	85A	90A	95A	57D	65D	74D
Tensile Strength	D-412	-	MPa	31	37	39	41	51	51	53	54
			psi	4,500	5,300	5,600	6,000	7,300	7,340	7,670	7,760
Tensile Modulus	D-638	@50% elongation	MPa	2.3	3.6	3.9	6.2	15	25	35	46
			psi	340	520	560	900	2,180	3,610	5,030	6,640
		@100% elongation	MPa	3.2	5.4	5.9	8.3	19	31	40	46
			psi	460	780	850	1,200	2,820	4,490	5,790	6,740
		@300% elongation	MPa	5.9	10	12	17	36	48	49	52
			psi	850	1,500	1,800	2,400	5,240	6,980	7,110	7,540
Tensile Elongation	D-412	@ break	%	650	620	540	550	438	400	340	322
Flexural Modulus	D-790	-	MPa	29	35	43	72	96	134	420	1,360
			psi	4,140	5,050	6,200	10,400	14,000	19,500	60,800	197,000
Tear Strength	D-624 Die C	-	N/mm	70	80	90	120	190	225	270	370
			lb/in	400	450	500	700	1,060	1,280	1,540	2,100
Melt Flow Rate	D-1238	-	g/10min 224 °C, 1.2kg	15-30	45-65	30-45	10-25	5-20	5-15	5-15	2-12

Values are shown as typical values and should not be used as specifications

Great Eastern Resins Industrial Co. Ltd. (GRECO) is a leading Taiwanese producer of thermoplastic urethanes, coatings, films and specialty chemicals. Isothane is a registered trademark of GRECO.

Foster Polymer Distribution, a business unit of Foster Corporation, is a specialized supplier of performance polymers for medical device applications. Specialty services included product development, material sampling, lot selection, custom batches, regulatory support and logistics.

Foster Corporation (Foster) believes that the information contained in this document is an accurate description of the typical characteristics and/or uses of the product or products, but it is the customer's responsibility to thoroughly test the product in each specific application to determine its performance, efficacy and safety for each end-use product, device or other application. Suggestions of uses should not be taken as inducements to infringe any particular patent. The information and data contained herein are based on information we believe reliable. Mention of a product in this documentation is not a guarantee of availability. Foster reserves the right to modify products, specifications and/or packaging as part of a continuous program of product development. FOSTER MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, A WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR OF INTELLECTUAL PROPERTY NON-INFRINGEMENT, INCLUDING, BUT NOT LIMITED TO PATENT NON-INFRINGEMENT, WHICH ARE EXPRESSLY DISCLAIMED, WHETHER EXPRESS OR IMPLIED, IN FACT OR BY LAW. FURTHER, FOSTER MAKES NO WARRANTY TO YOUR CUSTOMERS OR AGENTS, AND HAS NOT AUTHORIZED ANYONE TO MAKE ANY REPRESENTATION OR WARRANTY OTHER THAN AS PROVIDED ABOVE. FOSTER SHALL IN NO EVENT BE LIABLE FOR ANY GENERAL, INDIRECT, SPECIAL, CONSEQUENTIAL, PUNITIVE, INCIDENTAL OR SIMILAR DAMAGES, INCLUDING WITHOUT LIMITATION, DAMAGES FOR HARM TO BUSINESS, LOST PROFITS OR LOST SAVINGS, EVEN IF FOSTER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, REGARDLESS OF THE FORM OF ACTION.

Supply and Storage

Isothane TPU resins are supplied in pellet form packed in 25kg moisture proof bags. All TPU resins have been dried before packing. Isothane TPU resins should be stored in cool and dry environment in their original containers until be used. Storage temperature should not exceed 30°C. If only a portion of TPU resins was used from a bag, the remainder of TPU resins should be tightly closed.

Drying

TPU resins are hygroscopic and pre-drying of TPU resins is always a necessary step before processing. Depend on the climate, the granule exposed to the atmosphere will absorb moisture very quickly. The moisture might bring about partial degradation of polymers and the formation of bubbles or streaks in the molded and extruded parts. In order to ensure the efficient and successful processing into quality parts, the moisture content in TPU resins is recommended less than 0.02%. A desiccant-bed-type hopper dryer is recommended for drying Isothane Biocompatible Series. The recommended drying conditions are 80°C (176°F) for 3-5 hours. The dew point of the inlet air should be in the range of -30 to -40°C.

Extrusion Processing

Barrel and Motor - High torque drive capacity at low speed; Vented or standard barrels acceptable

Screw - Compression ratios between 2:1 and 3:1; Minimum L/D of 30/1

Feed Throat - Vertical and tangential; Water cooling is recommended

Screen Pack - Streamlined breaker plates with screen packing is recommended; Typical 40/80/80/40 mesh screens

Die - Streamline with good temperature control; Land Length is generally 10 to 15 times the part thickness; Coat-hanger manifold-type dies are recommended for extruding film and sheet; Crosshead dies are recommended for wire, cable and hose jacketing; Side-fed rotating dies are recommended for blown film

Injection Processing

Barrel and Motor - High torque drive capacity at low speed; Vented or standard barrels acceptable

Screw - Compression ratios between 2:1 and 3:1; Metering screw with gradual transition zone

Injection Pressure - Typical 6,000 to 15,000 psi; Hold pressure 60 – 70% of forward time

Injection Speed - Slow to moderate; Depends on gating, wall section and flow length

Coloring

Generally, Isothane TPU resins are supplied in their natural color. They can be colored by blending with pigment or pigment master batch. Using master batch based on TPU is recommended. Other master batch based on polyethylene or polystyrene is suitable to a limited extent. All colorants employed in TPU resins must be pre-dried before processing. The normal addition of pigment or pigment master batch is 0.2%-0.5% or 1-3%.

Additives

Various additives can be used to enhanced the properties of Isothane TPU resins, e.g. anti-blocking agents, antioxidant, UV stabilizers or release agents. Most additives supplied as master batches are available. But not all additives are compatible with Isothane TPU resins. It is recommended to inquire of your suppliers or our technical service before compounding.

Post-treatment

In order to obtain optimal functional properties of Isothane TPU resins, annealing of the finished products is necessary. The heat treatment can be undertaken in a circulating-air oven. The recommended annealing conditions are 80°C (176°F) for 12-16 hours. The finished products without annealing may require several weeks storage at room temperature to obtain full mechanical properties. Extrusion products are annealed only in special cases.

Recycling

For Isothane TPU resins, up to 20% of regrind may be recycled with virgin material depending on finished parts requirements. The regrind material has to be kept free of contamination, diced and dried before re-using. The material which has been contaminated, discolored or degraded is not suitable for recycling. TPU resins may decrease desired properties, e.g. hardness and mechanical properties, due to improperly mixing with regrind. Regulatory or testing organizations (e.g., UL) may have specific requirements limiting the allowance amount of regrind. Certain quality requirements laid down in specifications may exclude the use of regrind material.

Healthy and Safety Information

Before working with these products, it is essential that all operators are aware of the healthy and safety precautions. Isothane TPU resins can be processed or machined over a wide range of temperature. There can be some smoke formation during processing. The smoke that contains some decomposition substances of TPU or additives may cause irritation to human body. Generally, the temperature does not exceed 230°C that can reduce decomposition formation. An effective extraction system, especially in the melt outlet zone, is necessary. The detail information concerning healthy and safety can be available in material safety data sheets (MSDS) or contact our technical service.

Disposal

Isothane TPU resins present no hazard to the environment or water. They can be dumped on municipal landfill or in a waste incineration plant. The official regulations on waste disposal should be observed.