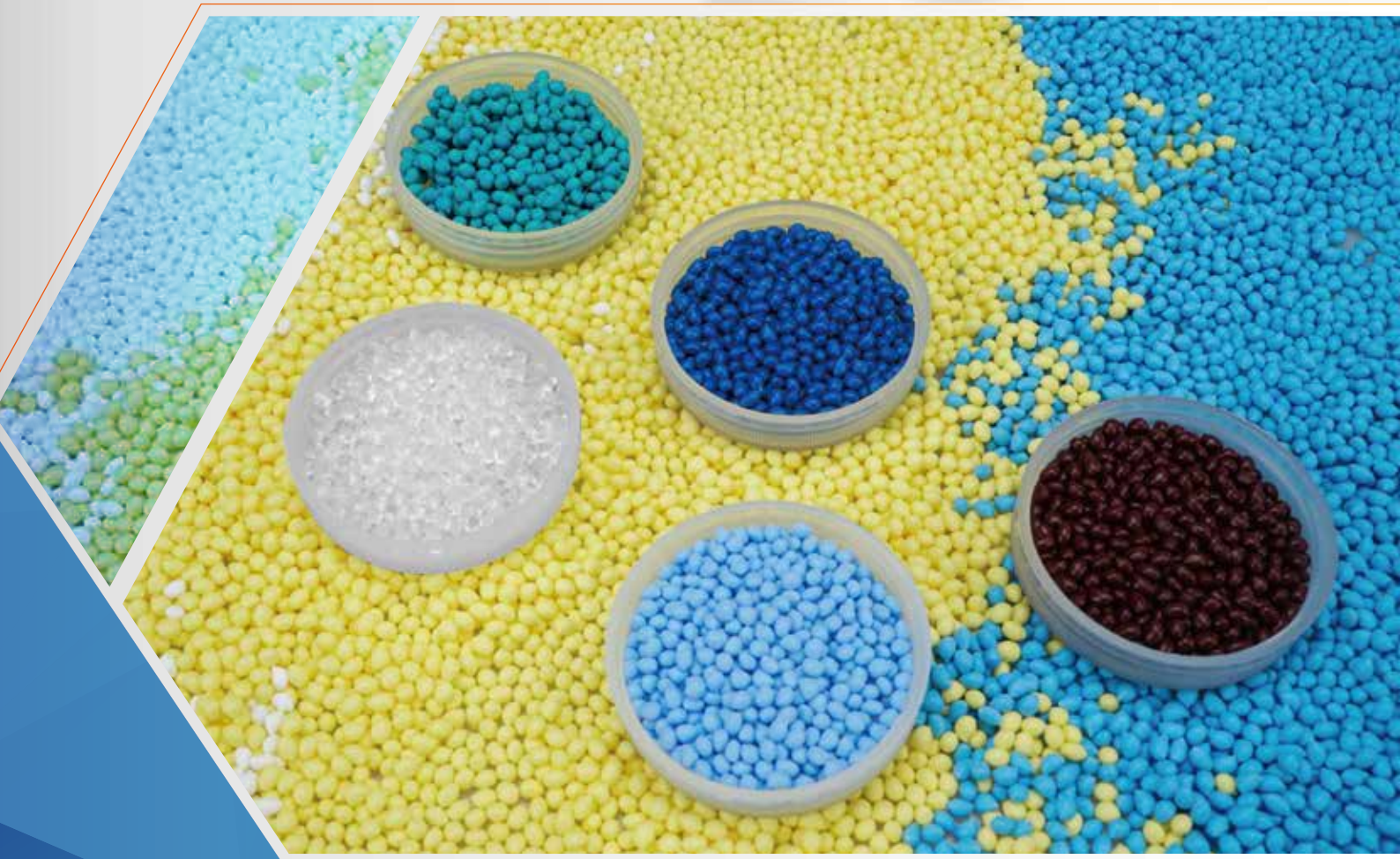




泓格生醫
ICP DAS - BMP

ICP DAS-BMP's Medical Grade TPU

The medical grade TPU provided by ICP DAS - BMP exhibits excellent biocompatibility, hydrolytic resistance, good mechanical properties and chemical resistance. It can be used in cardiology, urology, orthodontics, wound care and many other applications. Whether your device needs color and/or radiopacifier, we can meet your material specification requirement with reduced lead time.



ICP DAS – Biomedical Polymers
The Professional Provider of Medical TPU



ICP DAS - BMP was established in 2018 with a manufacturing facility certified to ISO 13485. The TPU materials we produce have passed biocompatibility testing requirements according to USP Class VI, ISO 10993-4, ISO 10993-5, ISO 10993-6, ISO 10993-10, ISO 10993-11 and ISO 10993-23. We offer a complete OEM/ODM service with 100% quality inspection.

- Located in the eastern district of the Hsinchu Industrial Park, Taiwan
- ISO 13485:2016 Certification



ICP DAS-BMP is committed to comply with ISO 13485, a quality management system for medical devices. With complete analysis, testing and evaluation, we ensure stable quality of TPU pellets from the production process to the final product through strict quality control.



The Competitiveness of ICP DAS - BMP



Lot-to-Lot Consistency

ISO 13485-Certified Manufacturer



100% Quality Control

Physical / Mechanical testing and Processability testing
(extrusion and injection molding)



Biocompatibility Certification

ISO 10993 / USP Class VI



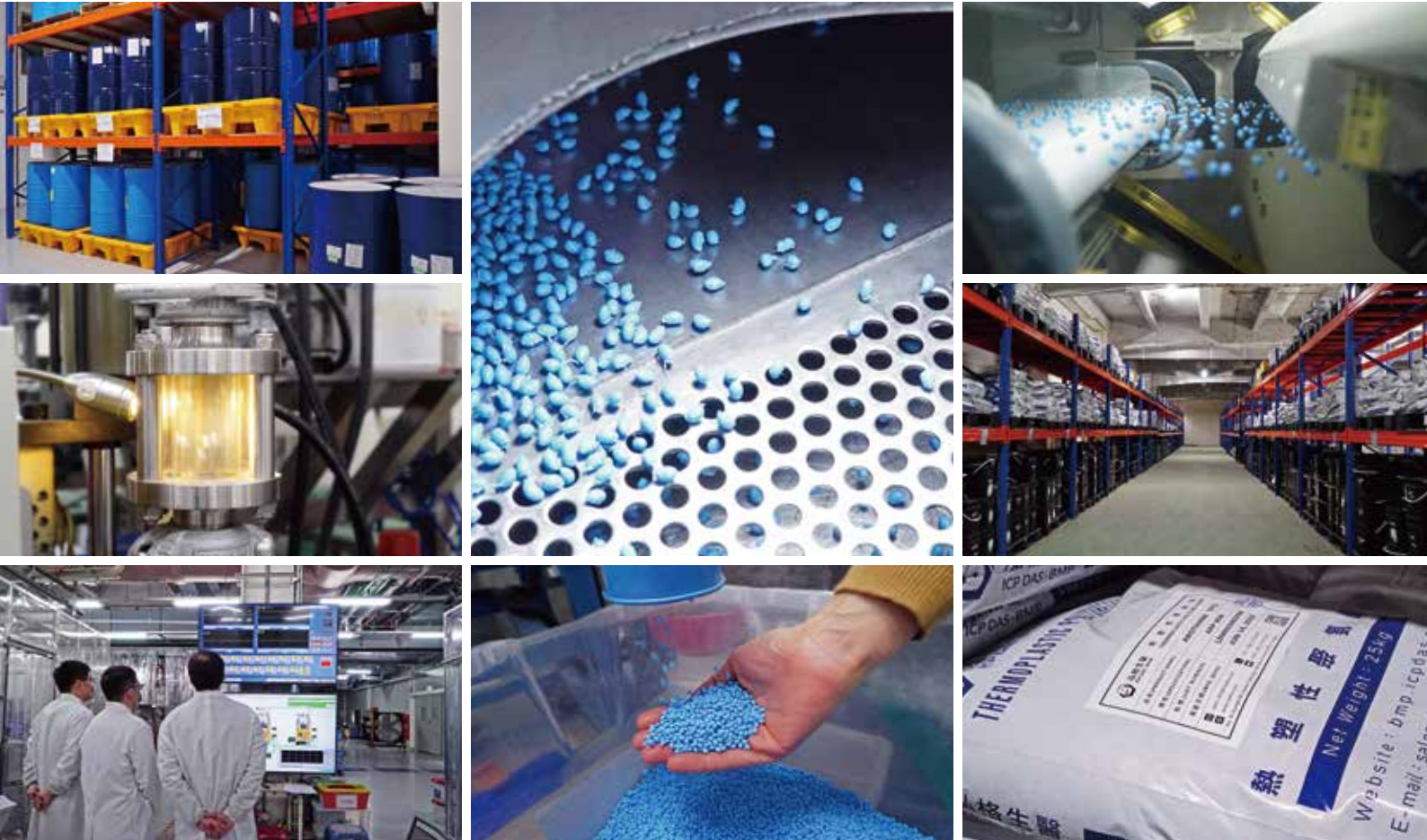
Color Matching / Radiopacity

Customized service for color-matching and radiopaque filler
(barium sulfate/tungsten)

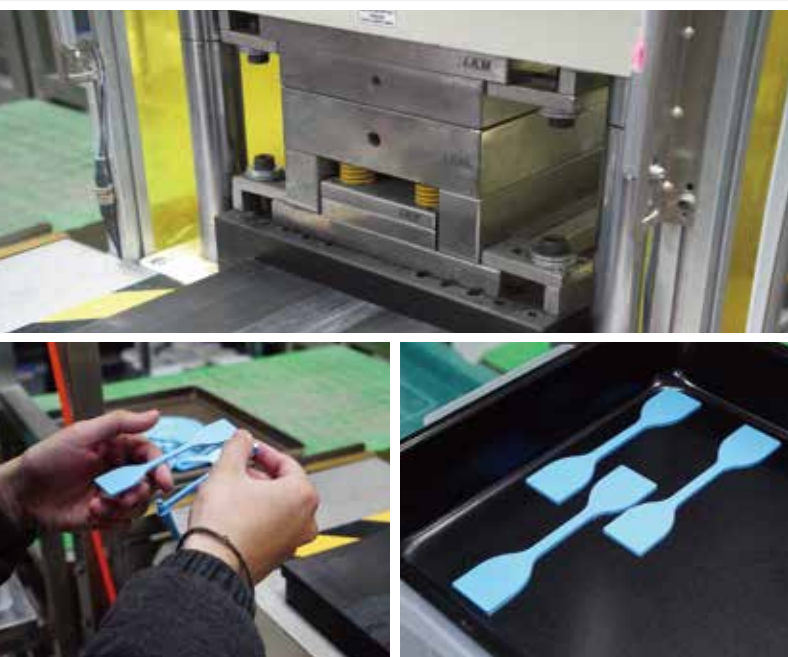


Production Plant

Production line



Injection molding for quality control



Extrusion for quality control



Production Plant

Laboratory for physical and chemical analysis



Laboratory for cytotoxicity and mechanical properties testing





Smart Factory

To ensure the consistent quality of TPU products, ICP DAS-BMP utilizes ICP DAS's IIoT technologies and 30 years of experience. In addition to monitoring factors such as factory environment quality, lighting, air conditioning, and access control, the system also oversees the operational status of equipment in medical-grade TPU production lines, collects process parameters, and ensures proper production process management.

ICP DAS's smart factory solution for TPU manufacturing not only reduces the variability between TPU production batches and improves product yield, but also shortens process time. This has earned trust and praise from customers both domestically and internationally for ICP DAS's TPU products, thereby securing a distinctive competitive edge.



On-site Lighting and HVAC Control



Power Consumption Collection



Data Visualization in the Control Center



ICP DAS - BMP TPU manufacturing process



ICP DAS - BMP TPU Quality Control



100% Quality Control

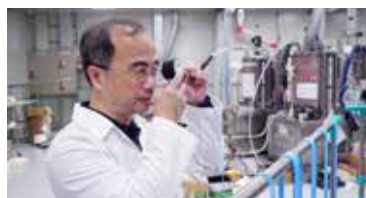


Injection Molding

Extrusion

Physical Property Analysis

Cytotoxicity Testing

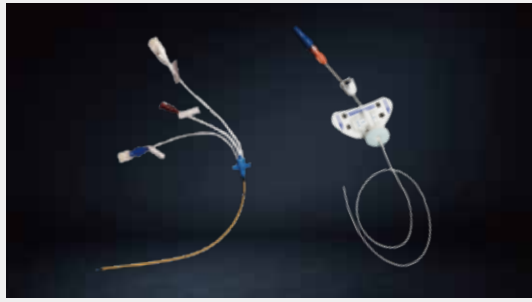


- Molecular weight
- Melt Index
- Radiopaque filler weight %
- Mechanical properties

Applications



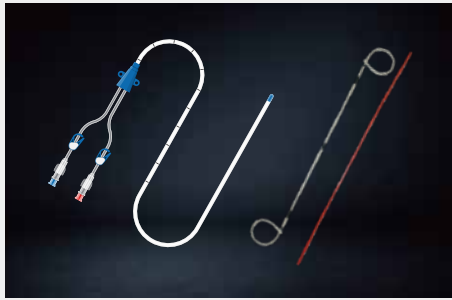
Cancer treatment devices



Cardiovascular devices



Gastrointestinal devices



Urology devices



Orthodontic Aligner/Retainer



Guidewire

Specifications

Specifications	Product Name
Aromatic polyether-based 75A-70D	Arothane™/ARP
Aliphatic polyether-based 75A-70D	Alithane™/ALP
Aliphatic polycarbonate-based 75A-70D	Durathane™/ALC
Aromatic polycarbonate-based 75A-70D (Coming soon)	Durathane™/ARC

- Clear
- Barium sulfate

20%	30%	40%
-----	-----	-----
- Tungsten

30%	40%	50%
60%	70%	80%
- Color matching *

* For tungsten series TPU, color-matching is not available



Customized Service : Color-Matching

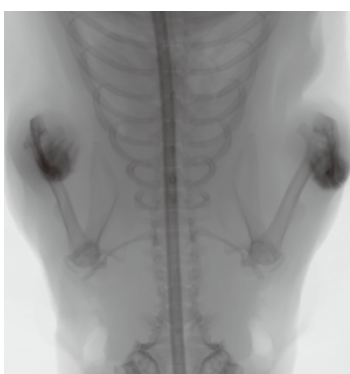
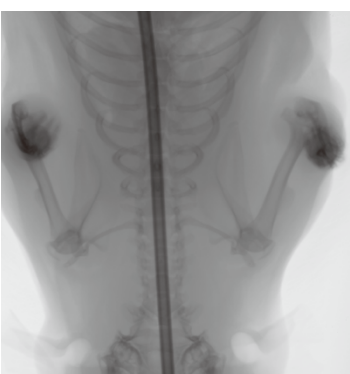


Color Chart

Unlisted colors can be customized



				
Pantone 3517C	Pantone 0131C	Pantone 7402C	Pantone 7403C	Pantone 3248C
				
Pantone 291C	Pantone 292C	Pantone 285C	Pantone 280C	Pantone 2577C
				
Pantone 2665C	Pantone 7629C	Pantone 428C	Pantone White	Pantone Black C

in vivo radiopacity for B20/B40 vs W30/W50

			
ARP-B20	ARP-B40	ARP-W30	ARP-W50

Biocompatibility and Other Testing on ICP DAS Medical Grade TPU

Product Name	Biocompatibility Testing	Other Testing
ARP	<ul style="list-style-type: none"> ▪ ISO 10993-4 ▪ ISO 10993-5 ▪ ISO 10993-10 ▪ ISO 10993-11 ▪ ISO 10993-23 	<ul style="list-style-type: none"> ▸ REACH ▸ RoHS ▸ IEC 61249-2-21
ARP-B20	<ul style="list-style-type: none"> ▪ ISO 10993-4 ▪ ISO 10993-5 ▪ ISO 10993-6 (90 days) ▪ ISO 10993-10 ▪ ISO 10993-11 ▪ ISO 10993-23 	
ARP-B40	<ul style="list-style-type: none"> ▪ ISO 10993-4 ▪ ISO 10993-5 ▪ ISO 10993-10 ▪ ISO 10993-11 ▪ ISO 10993-23 	
ARP-W30/W40/W50	<ul style="list-style-type: none"> ▪ ISO 10993-4 ▪ ISO 10993-5 ▪ ISO 10993-10 ▪ ISO 10993-11 ▪ ISO 10993-23 	



Product Name	Biocompatibility Testing	Other Testing
ALP	<ul style="list-style-type: none"> ▪ ISO 10993-4 ▪ ISO 10993-5 ▪ ISO 10993-10 ▪ ISO 10993-23 ▪ USP Class VI 	<ul style="list-style-type: none"> ▸ REACH ▸ RoHS
ALP-B20	<ul style="list-style-type: none"> ▪ ISO 10993-4 ▪ ISO 10993-5 ▪ ISO 10993-10 ▪ ISO 10993-23 ▪ USP Class VI 	
ALP-B40	<ul style="list-style-type: none"> ▪ ISO 10993-4 ▪ ISO 10993-5 ▪ ISO 10993-10 ▪ ISO 10993-23 ▪ USP Class VI 	

Biocompatibility and Other Testing on ICP DAS Medical Grade TPU

Product Name	Biocompatibility Testing	Other Testing
ALC	<ul style="list-style-type: none"> ▪ ISO 10993-4 ▪ ISO 10993-5 ▪ ISO 10993-10 	<ul style="list-style-type: none"> ▪ ISO 10993-23
ALC-B20	<ul style="list-style-type: none"> ▪ ISO 10993-4 ▪ ISO 10993-5 ▪ ISO 10993-10 	<ul style="list-style-type: none"> ▪ ISO 10993-23 ▪ USP Class VI
ALC-B30	<ul style="list-style-type: none"> ▪ ISO 10993-4 ▪ ISO 10993-5 ▪ ISO 10993-10 	<ul style="list-style-type: none"> ▪ ISO 10993-23
ALC-B40	<ul style="list-style-type: none"> ▪ ISO 10993-4 ▪ ISO 10993-5 ▪ ISO 10993-6 (90 days) 	<ul style="list-style-type: none"> ▪ ISO 10993-10 ▪ ISO 10993-23

- REACH
- RoHS
- Reducing Substances
- pH
- Evaporation Residue
- Cadmium Content
- Heavy Metals (GB/T14233.1-2002)

ICP DAS may support the use of devices or component with contact less than 30 days. For permanent contact applications, manufacturers should evaluate the suitability of materials for the end-use requirements.

Category	Definition	Contact Duration	ICP DAS
A	Short term	Less than or equal to 24 hours	
B	Long term	More than 24 hours to 30 days (including 30 days)	
C	Permanent	More than 30 days	Some specifications are provided* *

* The safety of long-term implantation of materials is subject to evaluation by the device manufacturer

AROTHANE™ ARP SERIES CLEAR GRADE

Version: 1.2

Description

Arothane™ ARP is medical-grade aromatic polyether-based thermoplastic polyurethane (TPU). It exhibits excellent hydrolytic and chemical resistance, good mechanical properties, and biocompatibility. Color matching is available. Pellets can be processed by injection molding and extrusion.

Biocompatibility

Arothane™ ARP pellets passed the

- ✓ Hemolysis test (ISO 10993-4)
- ✓ MEM Elution test (ISO 10993-5)
- ✓ Acute Systemic Toxicity test (ISO 10993-11)
- ✓ Dermal Sensitization test (ISO 10993-10 : 2010, 2021)
- ✓ Intracutaneous Irritation test (ISO 10993-10 : 2010 & 10993-23 : 2021)
- ✓ *In vivo* Pyrogen test (ISO 10993-11, USP <151>)

Storage



Arothane™ ARP TPU pellets should be stored in cool and dry environment in their original containers until used.



Storage temperature should not exceed 85°F/30°C.



If only a portion of TPU pellets was used, the container with the remaining TPU pellets should be tightly closed.



Since aromatic-type TPU is light-sensitive, it may turn yellowish after light exposure but will not necessarily have an adverse impact on the mechanical properties when stored properly.

Products and Properties

Arothane™ ARP	ASTM Test	ARP-75A	ARP-80A	ARP-85A	ARP-90A	ARP-95A	ARP-60D	ARP-63D	ARP-68D	ARP-73D
Durometer (Shore hardness)	D2240	75A	82A	87A	92A	95A	59D	64D	68D	74D
Specific Gravity	D792	1.08	1.09	1.11	1.14	1.15	1.16	1.17	1.18	1.18
Flexural Modulus (psi)	D790	3,000	3,300	4,750	8,800	11,000	17,000	24,000	30,000	67,000
Ultimate Tensile (psi)	D412	4,100	5,500	6,200	7,300	6,600	7,000	7,200	8,000	8,800
Tensile Modulus at 100% Elongation (psi)	D412	490	720	890	1,850	2,750	3,100	3,100	3,400	3,550
Tensile Modulus at 300% Elongation (psi)	D412	820	1,400	2,350	4,500	5,400	5,650	5,800	6,100	6,350
Ultimate Elongation (%)	D412	760	650	590	540	420	380	370	380	365
Mold Shrinkage (mm/mm)	D955	0.008-0.012	0.008-0.012	0.008-0.012	0.006-0.010	0.006-0.010	0.004-0.008	0.004-0.008	0.004-0.008	0.004-0.006

Note: These test results are based on small samples of Arothane™ ARP TPUs and do not represent the results from larger test samples. The manufacturing parameters should be adjusted according to users' actual conditions. The mold shrinkage test (D955) was performed on Type A bar specimen molded by injection process.

AROTHANE™ ARP CLEAR

Processing Information

Arothane™ ARP TPU pellets are hygroscopic and therefore should be dried before processing.

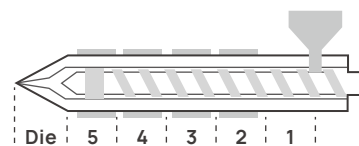
Depending on the climate, the pellets absorb moisture rapidly when exposed to the atmosphere. The moisture might cause the degradation of polymers and form bubbles or streaks in the molded and extruded parts. To ensure efficient and successful processing, the moisture content in TPU pellets is recommended to be less than 0.05%. A dehumidifying dryer is recommended for drying Arothane™ ARP TPU.

The recommended drying conditions are listed below.

Arothane™ ARP	ARP-75A	ARP-80A	ARP-85A	ARP-90A	ARP-95A	ARP-60D	ARP-63D	ARP-68D	ARP-73D
Recommended Drying Temperature (°F)	185-210	195-220	195-220	195-220	195-220	205-230	205-230	205-230	220-240
Recommended Drying Temperature (°C)	85-100	90-105	90-105	90-105	90-105	95-110	95-110	95-110	105-115

Note: Dry for a minimum of 5 hours at -40°F/ -40°C dew point

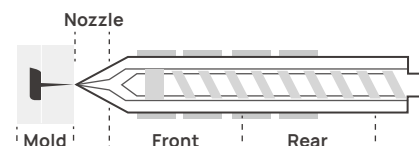
Recommended Extrusion Temperature Profile



Arothane™ ARP	ARP-75A (°F / °C)	ARP-80A (°F / °C)	ARP-85A (°F / °C)	ARP-90A (°F / °C)	ARP-95A (°F / °C)	ARP-60D (°F / °C)	ARP-63D (°F / °C)	ARP-68D (°F / °C)	ARP-73D (°F / °C)
Zone 1	375/190	385/195	390/200	390/200	400/205	400/205	410/210	410/210	410/210
Zone 2	385/195	390/200	400/205	400/205	410/210	410/210	420/215	420/215	420/215
Zone 3	385/195	390/200	400/205	400/205	410/210	410/210	420/215	420/215	420/215
Zone 4	390/200	400/205	410/210	410/210	420/215	420/215	430/220	430/220	430/220
Adapter 5	390/200	400/205	410/210	410/210	420/215	420/215	430/220	430/220	430/220
Die	385-400/ 195-205	390-410/ 200-210	400-420/ 205-215	400-420/ 205-215	410-430/ 210-220	410-430/ 210-220	420-435/ 215-225	420-435/ 215-225	420-435/ 215-225

Screen Pack Recommendation : 50/200/100

Recommended Injection Molding Temperature Profile



Arothane™ ARP	ARP-75A (°F / °C)	ARP-80A (°F / °C)	ARP-85A (°F / °C)	ARP-90A (°F / °C)	ARP-95A (°F / °C)	ARP-60D (°F / °C)	ARP-63D (°F / °C)	ARP-68D (°F / °C)	ARP-73D (°F / °C)
Rear	355/180	365/185	375/190	375/190	385/195	385/195	390/200	390/200	390/200
Front	365/185	375/190	385/195	385/195	390/200	390/200	400/205	400/205	400/205
Nozzle	375/190	385/195	390/200	390/200	400/205	400/205	410/210	410/210	410/210
Melt	410-430/ 210-220	420-435/ 215-225	430-445/ 220-230	430-445/ 220-230	435-455/ 225-235	435-455/ 225-235	445-465/ 230-240	445-465/ 230-240	445-465/ 230-240
Mold	60-85/ 15-30	60-85/ 15-30	60-85/ 15-30	70-105/ 20-40	70-105/ 20-40	70-105/ 20-40	75-120/ 25-50	75-120/ 25-50	75-120/ 25-50

AROTHANE™ ARP SERIES B20

Version: 1.2

Description

Arothane™ ARP-B20 is medical grade aromatic polyether-based thermoplastic polyurethane (TPU) loaded with **20% Barium Sulfate** as radiopacifier.

It exhibits excellent radiopacity and can be color-matched while retaining superior mechanical properties, excellent hydrolytic resistance, oxidative stability, chemical resistance, and biocompatibility of clear-grade ARP. It can be injection molded and extruded.

Biocompatibility

Arothane™ ARP-B20 pellets passed the

- ✓ Hemolysis test (ISO 10993-4)
- ✓ MEM Elution test (ISO 10993-5)
- ✓ 90-day implantation test (ISO 10993-6)
- ✓ Acute Systemic Toxicity test (ISO 10993-11)
- ✓ Dermal Sensitization test (ISO 10993-10 : 2010, 2021)
- ✓ Intracutaneous Irritation test (ISO 10993-10 : 2010 & 10993-23 : 2021)
- ✓ *In vivo* Pyrogen test (ISO 10993-11, USP <151>)

Storage



Arothane™ ARP-B20 TPU pellets should be stored in cool and dry environment in their original containers until used.



Storage temperature should not exceed 85°F/30°C.



If only a portion of TPU pellets was used, the container with the remaining TPU pellets should be tightly closed.



Since aromatic-type TPU is light-sensitive, it may turn yellowish after light exposure but will not necessarily have an adverse impact on the mechanical properties when stored properly.

Products and Properties

Arothane™ ARP-B20	ASTM Test	ARP-80A-B20	ARP-85A-B20	ARP-90A-B20	ARP-95A-B20	ARP-60D-B20	ARP-65D-B20	ARP-69D-B20	ARP-73D-B20
Durometer (Shore hardness)	D2240	80A	85A	90A	95A	59D	63D	69D	75D
Specific Gravity	D792	1.26	1.28	1.31	1.33	1.35	1.36	1.37	1.37
Flexural Modulus (psi)	D790	4,000	5,600	8,200	13,000	20,000	55,000	190,000	290,000
Ultimate Tensile (psi)	D412	3,600	4,800	5,800	5,300	5,500	5,700	5,500	5,600
Tensile Modulus at 100% Elongation (psi)	D412	670	900	1,300	2,050	3,000	3,800	4,500	N/A
Tensile Modulus at 300% Elongation (psi)	D412	1,050	1,650	2,350	4,300	5,050	N/A	N/A	N/A
Ultimate Elongation (%)	D412	720	560	530	420	375	265	200	80
Mold Shrinkage (mm/mm)	D955	0.007-0.014	0.007-0.014	0.006-0.012	0.006-0.010	0.004-0.008	0.004-0.008	0.004-0.006	0.004-0.006

Note: These test results are based on small samples of Arothane™ ARP-B20 TPUs and do not represent the results from larger test samples. The manufacturing parameters should be adjusted according to users' actual conditions. The mold shrinkage test (D955) was performed on Type A bar specimen molded by injection process.

AROTHANE™ ARP-B20

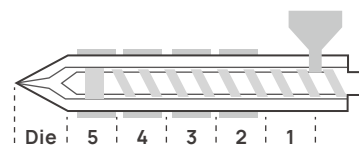
Processing Information

Arothane™ ARP-B20 TPU pellets are hygroscopic and therefore should be dried before processing. Depending on the climate, the pellets absorb moisture rapidly when exposed to the atmosphere. The moisture might cause the degradation of polymers and form bubbles or streaks in the molded and extruded parts. To ensure efficient and successful processing, the moisture content in TPU pellets is recommended to be less than 0.05%. A dehumidifying dryer is recommended for drying Arothane™ ARP-B20 TPU. The recommended drying conditions are listed below.

Arothane™ ARP-B20	ARP-80A-B20	ARP-85A-B20	ARP-90A-B20	ARP-95A-B20	ARP-60D-B20	ARP-65D-B20	ARP-69D-B20	ARP-73D-B20
Recommended Drying Temperature (°F)	205-240	205-240	205-240	205-240	205-240	205-240	220-255	240-255
Recommended Drying Temperature (°C)	95-115	95-115	95-115	95-115	95-115	95-115	105-125	115-125

Note: Dry for a minimum of 5 hours at -40°F/ -40°C dew point

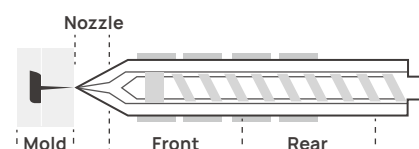
Recommended Extrusion Temperature Profile



Arothane™ ARP-B20	ARP-80A-B20 (°F / °C)	ARP-85A-B20 (°F / °C)	ARP-90A-B20 (°F / °C)	ARP-95A-B20 (°F / °C)	ARP-60D-B20 (°F / °C)	ARP-65D-B20 (°F / °C)	ARP-69D-B20 (°F / °C)	ARP-73D-B20 (°F / °C)
Zone 1	375/190	385/195	390/200	390/200	400/205	400/205	410/210	410/210
Zone 2	385/195	390/200	400/205	400/205	410/210	410/210	420/215	420/215
Zone 3	385/195	390/200	400/205	400/205	410/210	410/210	420/215	420/215
Zone 4	390/200	400/205	410/210	410/210	420/215	420/215	430/220	430/220
Adapter 5	390/200	400/205	410/210	410/210	420/215	420/215	430/220	430/220
Die	385-400/ 195-205	390-410/ 200-210	400-420/ 205-215	400-420/ 205-215	410-430/ 210-220	410-430/ 210-220	420-435/ 215-225	420-435/ 215-225

Screen Pack Recommendation : 50/200/100

Recommended Injection Molding Temperature Profile



Arothane™ ARP-B20	ARP-80A-B20 (°F / °C)	ARP-85A-B20 (°F / °C)	ARP-90A-B20 (°F / °C)	ARP-95A-B20 (°F / °C)	ARP-60D-B20 (°F / °C)	ARP-65D-B20 (°F / °C)	ARP-69D-B20 (°F / °C)	ARP-73D-B20 (°F / °C)
Rear	355/180	365/185	375/190	375/190	385/195	385/195	390/200	390/200
Front	365/185	375/190	385/195	385/195	390/200	390/200	400/205	400/205
Nozzle	375/190	385/195	390/200	390/200	400/205	400/205	410/210	410/210
Melt	410-430/ 210-220	420-435/ 215-225	430-445/ 220-230	430-445/ 220-230	435-455/ 225-235	435-455/ 225-235	445-465/ 230-240	445-465/ 230-240
Mold	60-85/15-30	60-85/15-30	60-85/15-30	70-105/20-40	70-105/20-40	70-105/20-40	75-120/25-50	75-120/25-50

AROTHANE™ ARP SERIES B40

Version: 1.2

Description

Arothane™ ARP-B40 is medical grade aromatic polyether-based thermoplastic polyurethane (TPU) loaded with **40% Barium Sulfate** as radiopacifier.

It exhibits better radiopacity than ARP-B20 and can be color-matched while retaining superior mechanical properties, excellent hydrolytic resistance, oxidative stability, chemical resistance, and biocompatibility of clear-grade ARP. It can be injection molded and extruded.

Biocompatibility

Arothane™ ARP-B40 pellets passed the

- ✓ Hemolysis test (ISO 10993-4)
- ✓ MEM Elution test (ISO 10993-5)
- ✓ Acute Systemic Toxicity test (ISO 10993-11)
- ✓ Dermal Sensitization test (ISO 10993-10 : 2010, 2021)
- ✓ Intracutaneous Irritation test (ISO 10993-10 : 2010 & 10993-23 : 2021)
- ✓ *In vivo* Pyrogen test (ISO 10993-11, USP <151>)

Storage



Arothane™ ARP-B40 TPU pellets should be stored in cool and dry environment in their original containers until used.



Storage temperature should not exceed 85°F/30°C.



If only a portion of TPU pellets was used, the container with the remaining TPU pellets should be tightly closed.



Since aromatic-type TPU is light-sensitive, it may turn yellowish after light exposure but will not necessarily have an adverse impact on the mechanical properties when stored properly.

Products and Properties

Arothane™ ARP-B40	ASTM Test	ARP-85A-B40	ARP-90A-B40	ARP-95A-B40	ARP-60D-B40	ARP-67D-B40
Durometer (Shore hardness)	D2240	85A	90A	95A	60D	67D
Specific Gravity	D792	1.52	1.57	1.59	1.59	1.61
Flexural Modulus (psi)	D790	5,050	10,600	15,100	26,000	58,000
Ultimate Tensile (psi)	D412	2,800	3,500	3,600	3,700	4,000
Tensile Modulus at 100% Elongation (psi)	D412	610	1,300	1,800	2,400	3,700
Tensile Modulus at 300% Elongation (psi)	D412	800	1,900	2,600	3,500	N/A
Ultimate Elongation (%)	D412	830	530	400	330	175
Mold Shrinkage (mm/mm)	D955	0.006-0.012	0.005-0.010	0.005-0.010	0.004-0.008	0.004-0.008

Note: These test results are based on small samples of Arothane™ ARP-B40 TPUs and do not represent the results from larger test samples. The manufacturing parameters should be adjusted according to users' actual conditions. The mold shrinkage test (D955) was performed on Type A bar specimen molded by injection process.

AROTHANE™ ARP-B40

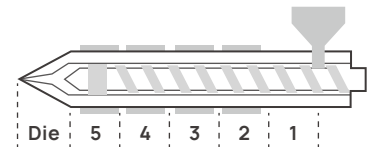
Processing Information

Arothane™ ARP-B40 TPU pellets are hygroscopic and therefore should be dried before processing. Depending on the climate, the pellets absorb moisture rapidly when exposed to the atmosphere. The moisture might cause the degradation of polymers and form bubbles or streaks in the molded and extruded parts. To ensure efficient and successful processing, the moisture content in TPU pellets is recommended to be less than 0.05%. A dehumidifying dryer is recommended for drying Arothane™ ARP-B40 TPU. The recommended drying conditions are listed below.

Arothane™ ARP-B40	ARP-85A-B40	ARP-90A-B40	ARP-95A-B40	ARP-60D-B40	ARP-67D-B40
Recommended Drying Temperature (°F)	205-240	205-240	205-240	205-240	205-240
Recommended Drying Temperature (°C)	95-115	95-115	95-115	95-115	95-115

Note: Dry for a minimum of 5 hours at -40°F/ -40°C dew point.

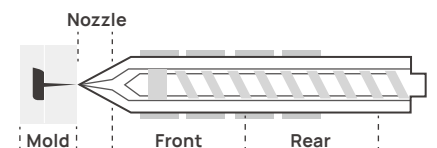
Recommended Extrusion Temperature Profile



Arothane™ ARP-B40	ARP-85A-B40 (°F / °C)	ARP-90A-B40 (°F / °C)	ARP-95A-B40 (°F / °C)	ARP-60D-B40 (°F / °C)	ARP-67D-B40 (°F / °C)
Zone 1	375/190	375/190	385/195	385/195	390/200
Zone 2	385/195	385/195	390/200	390/200	400/205
Zone 3	385/195	385/195	390/200	390/200	400/205
Zone 4	390/200	390/200	400/205	400/205	410/210
Adapter 5	390/200	390/200	400/205	400/205	410/210
Die	385-400/ 195-205	385-400/ 195-205	390-410/ 200-210	390-410/ 200-210	400-420/ 205-215

Screen Pack Recommendation : 50/200/100

Recommended Injection Molding Temperature Profile



Arothane™ ARP-B40	ARP-85A-B40 (°F / °C)	ARP-90A-B40 (°F / °C)	ARP-95A-B40 (°F / °C)	ARP-60D-B40 (°F / °C)	ARP-67D-B40 (°F / °C)
Rear	355/180	355/180	365/185	365/185	375/190
Front	365/185	365/185	375/190	375/190	385/195
Nozzle	375/190	375/190	385/195	385/195	390/200
Melt	410-430/ 210-220	410-430/ 210-220	420-435/ 215-225	420-435/ 215-225	430-445/ 220-230
Mold	60-85/15-30	60-85/15-30	60-85/15-30	60-85/15-30	70-105/20-40

AROTHANE™ ARP-W SERIES

Version: 1.1

Description

Arothane™ ARP-W Series is medical grade aromatic polyether-based thermoplastic polyurethane (TPU) loaded with **30-50% Tungsten** as radiopacifier.

It exhibits exceptional radiopacity compared to Barium Sulfate, especially for small-dimension or thin-walled devices. ARP-W Series maintains superior mechanical properties, excellent hydrolytic resistance, oxidative stability, chemical resistance, and biocompatibility of clear-grade ARP. It is typically a material of choice for guidewire coating or extrusion process.

Biocompatibility

Arothane™ ARP-W Series pellets passed the

- ✓ Hemolysis test (ISO 10993-4)
- ✓ MEM Elution test (ISO 10993-5)
- ✓ Acute Systemic Toxicity test (ISO 10993-11)
- ✓ Dermal Sensitization test (ISO 10993-10 : 2010, 2021)
- ✓ Intracutaneous Irritation test (ISO 10993-10 : 2010 & 10993-23 : 2021)
- ✓ *In vivo* Pyrogen test (ISO 10993-11, USP <151>)

Storage



Arothane™ ARP-W Series TPU pellets should be stored in cool and dry environment in their original containers until used.



Storage temperature should not exceed 85°F/30°C.



If only a portion of TPU pellets was used, the container with the remaining TPU pellets should be tightly closed.

Products and Properties

Arothane™ ARP-W	ASTM Test	ARP-85A-W30	ARP-85A-W40	ARP-85A-W50
Durometer (Shore hardness)	D2240	85A	85A	85A
Specific Gravity	D792	1.50	1.71	1.98
Flexural Modulus (psi)	D790	5,200	5,500	7,250
Ultimate Tensile (psi)	D412	4,900	4,700	4,600
Tensile Modulus at 100% Elongation (psi)	D412	1,000	1,000	1,000
Tensile Modulus at 300% Elongation (psi)	D412	1,900	1,700	1,600
Ultimate Elongation (%)	D412	520	570	600
Mold Shrinkage (mm/mm)	D955	0.006-0.012	0.005-0.010	0.005-0.010

Note: These test results are based on small samples of Arothane™ ARP-85A-W30 and do not represent the results from larger test samples. The manufacturing parameters should be adjusted according to users' actual conditions.

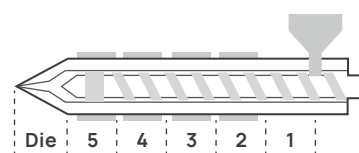
AROTHANE™ ARP-W SERIES

Processing Information

Arothane™ ARP-W Series TPU pellets are hygroscopic and therefore should be dried before processing. Depending on the climate, the pellets absorb moisture rapidly when exposed to the atmosphere.

The moisture might cause the degradation of polymers and form bubbles or streaks in the molded and extruded parts. To ensure efficient and successful processing, the moisture content in TPU pellets is recommended to be less than 0.05%. A dehumidifying dryer is recommended for drying Arothane™ ARP-W Series TPU.

The recommended drying temperature is 205-220/105-115(°F/°C) for a minimum of 5 hours at -40°F/-40°C dew point.

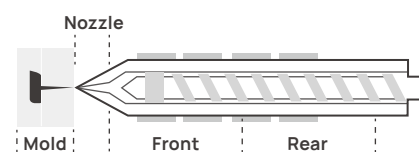


Recommended Extrusion Temperature Profile

Arothane™ ARP-W	ARP-85A-W30 (°F / °C)	ARP-85A-W40 (°F / °C)	ARP-85A-W50 (°F / °C)
Zone 1	385/195	375/190	365/185
Zone 2	390/200	385/195	375/190
Zone 3	390/200	385/195	375/190
Zone 4	400/205	390/200	385/195
Adapter 5	400/205	390/200	385/195
Die	390-410/200-210	385-400/195-205	375-390/190-200

Screen Pack Recommendation : 50/200/100

Recommended Injection Molding Temperature Profile



Arothane™ ARP-W	ARP-85A-W30 (°F / °C)	ARP-85A-W40 (°F / °C)	ARP-85A-W50 (°F / °C)
Rear	365/185	355/180	350/175
Front	375/190	365/185	355/180
Nozzle	385/195	375/190	365/185
Melt	420-435/215-225	410-430/210-220	400-420/205-215
Mold	60-85/15-30	70-95/20-35	70-95/20-35

ALITHANE™ ALP SERIES CLEAR GRADE

Version: 1.1

Description

Alithane™ ALP is medical grade aliphatic polyether-based thermoplastic polyurethane (TPU). Due to the chemical structure, aliphatic-type TPU is more **light-stable** and **bio-stable** than aromatic-type TPU. ALP TPU exhibits excellent biocompatibility, hydrolytic resistance, good mechanical properties, and chemical resistance, and can be color matched. It can be processed by injection molding and extrusion.

Biocompatibility

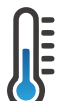
Alithane™ ALP pellets passed the

- ✓ Hemolysis test (ISO 10993-4)
- ✓ MEM Elution test (ISO 10993-5)
- ✓ USP Class VI test
- ✓ Dermal Sensitization test (ISO 10993-10 : 2010, 2021)
- ✓ Skin Irritation test (ISO 10993-10 : 2010 & 10993-23 : 2021)

Storage



Alithane™ ALP TPU pellets should be stored in cool and dry environment in their original containers until used.



Storage temperature should not exceed 85°F/30°C.



If only a portion of TPU pellets was used, the container with the remaining TPU pellets should be tightly closed.

Products and Properties

Alithane™ ALP	ASTM Test	ALP-75A	ALP-80A	ALP-85A	ALP-90A	ALP-95A	ALP-60D	ALP-65D	ALP-70D
Durometer (Shore hardness)	D2240	77A	80A	86A	93A	95A	62D	67D	72D
Specific Gravity	D792	1.06	1.07	1.08	1.09	1.10	1.10	1.10	1.10
Flexural Modulus (psi)	D790	N/A	2,800	2,800	4,300	11,400	27,000	37,000	58,000
Ultimate Tensile (psi)	D412	3,400	3,900	5,000	6,900	6,800	6,600	6,200	6,000
Tensile Modulus at 100% Elongation (psi)	D412	810	1,000	1,100	1,500	2,200	2,400	3,000	3,650
Tensile Modulus at 300% Elongation (psi)	D412	1,600	2,200	3,100	5,200	5,650	5,850	6,200	N/A
Ultimate Elongation (%)	D412	560	495	460	415	330	320	305	295
Mold Shrinkage (mm/mm)	D955	0.010-0.013	0.010-0.013	0.008-0.010	0.008-0.010	0.006-0.009	0.006-0.009	0.004-0.006	0.004-0.006

Note: These test results are based on small samples of Alithane™ ALP TPUs and do not represent the results from larger test samples. The manufacturing parameters should be adjusted according to users' actual conditions. The mold shrinkage test (D955) was performed on Type A bar specimen molded by injection process.

ALITHANE™ ALP CLEAR

Processing Information

Alithane™ ALP TPU pellets are hygroscopic and therefore should be dried before processing.

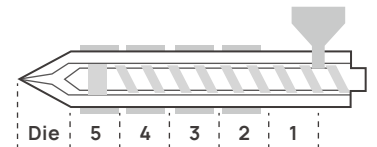
Depending on the climate, the pellets absorb moisture rapidly when exposed to the atmosphere. The moisture might cause the degradation of polymers and form bubbles or streaks in the molded and extruded parts. To ensure efficient and successful processing, the moisture content in TPU pellets is recommended to be less than 0.05%. A dehumidifying dryer is recommended for drying Alithane™ ALP TPU.

The recommended drying conditions are listed below.

Alithane™ ALP	ALP-75A	ALP-80A	ALP-85A	ALP-90A	ALP-95A	ALP-60D	ALP-65D	ALP-70D
Recommended Drying Temperature (°F)	175-185	175-185	175-185	175-185	175-185	175-185	175-185	175-185
Recommended Drying Temperature (°C)	80-85	80-85	80-85	80-85	80-85	80-85	80-85	80-85

Note: Dry for a minimum of 5 hours at -40°F/ -40°C dew point

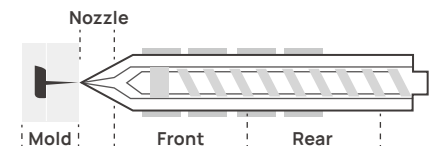
Recommended Extrusion Temperature Profile



Alithane™ ALP	ALP-75A (°F / °C)	ALP-80A (°F / °C)	ALP-85A (°F / °C)	ALP-90A (°F / °C)	ALP-95A (°F / °C)	ALP-60D (°F / °C)	ALP-65D (°F / °C)	ALP-70D (°F / °C)
Zone 1	340/170	350/175	350/175	355/180	355/180	355/180	365/185	365/185
Zone 2	350/175	355/180	355/180	365/185	365/185	365/185	375/190	375/190
Zone 3	350/175	355/180	355/180	365/185	365/185	365/185	375/190	375/190
Zone 4	355/180	365/185	365/185	375/190	375/190	375/190	385/195	385/195
Adapter 5	355/180	365/185	365/185	375/190	375/190	375/190	385/195	385/195
Die	350-365/ 175-185	355-375/ 180-190	355-375/ 180-190	365-385/ 185-195	365-385/ 185-195	365-385/ 185-195	375-390/ 190-200	375-390/ 190-200

Screen Pack Recommendation : 50/200/100

Recommended Injection Molding Temperature Profile



Alithane™ ALP	ALP-75A (°F / °C)	ALP-80A (°F / °C)	ALP-85A (°F / °C)	ALP-90A (°F / °C)	ALP-95A (°F / °C)	ALP-60D (°F / °C)	ALP-65D (°F / °C)	ALP-70D (°F / °C)
Rear	320/160	330/165	330/165	340/170	340/170	340/170	350/175	350/175
Front	330/165	340/170	340/170	350/175	350/175	350/175	355/180	355/180
Nozzle	340/170	350/175	350/175	355/180	355/180	355/180	365/185	365/185
Melt	375-390/ 190-200	385-400/ 195-205	385-400/ 195-205	390-410/ 200-210	390-410/ 200-210	390-410/ 200-210	400-420/ 205-215	400-420/ 205-215
Mold	50-75/10-25	60-85/15-30	60-85/15-30	70-105/20-40	70-105/20-40	70-105/20-40	75-120/25-50	75-120/25-50

ALITHANE™ ALP SERIES B20

Version: 1.1

Description

Alithane™ ALP-B20 is medical grade aliphatic polyether-based thermoplastic polyurethanes (TPU) loaded with **20% Barium Sulfate** as radiopacifier.

Due to the chemical structure, aliphatic-type TPU is more **light-stable** and **bio-stable** than aromatic-type TPU. It exhibits excellent radiopacity and can be color-matched while retaining biocompatibility, hydrolytic resistance, good mechanical properties, and chemical resistance of clear-grade ALP.

It can be processed by injection molding and extrusion.

Biocompatibility

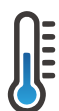
Alithane™ ALP-B20 pellets passed the

- ✓ Hemolysis test (ISO 10993-4)
- ✓ MEM Elution test (ISO 10993-5)
- ✓ USP Class VI test
- ✓ Dermal Sensitization test (ISO 10993-10 : 2010, 2021)
- ✓ Skin Irritation test (ISO 10993-10 : 2010 & 10993-23 : 2021)

Storage



Alithane™ ALP-B20 TPU pellets should be stored in cool and dry environment in their original containers until used.



Storage temperature should not exceed 85°F/30°C.



If only a portion of TPU pellets was used, the container with the remaining TPU pellets should be tightly closed.

Products and Properties

Alithane™ ALP-B20	ASTM Test	ALP-75A-B20	ALP-80A-B20	ALP-85A-B20	ALP-90A-B20	ALP-95A-B20	ALP-60D-B20	ALP-65D-B20	ALP-70D-B20
Durometer (Shore hardness)	D2240	75A	80A	85A	90A	95A	62D	65D	71D
Specific Gravity	D792	1.21	1.23	1.23	1.26	1.27	1.28	1.28	1.29
Flexural Modulus (psi)	D790	2,900	3,650	4,100	5,000	6,100	13,600	19,500	43,000
Ultimate Tensile (psi)	D412	1,950	2,500	3,350	3,850	5,800	6,700	6,700	6,300
Tensile Modulus at 100% Elongation (psi)	D412	650	750	1,000	1,250	1,950	2,200	2,500	3,000
Tensile Modulus at 300% Elongation (psi)	D412	1,000	1,100	1,900	2,900	5,050	6,200	6,300	6,300
Ultimate Elongation (%)	D412	700	645	500	435	350	310	310	300
Mold Shrinkage (mm/mm)	D955	0.010-0.013	0.010-0.013	0.008-0.010	0.008-0.010	0.006-0.009	0.006-0.009	0.004-0.006	0.004-0.006

Note: These test results are based on small samples of Alithane™ ALP-B20 TPUs and do not represent the results from larger test samples. The manufacturing parameters should be adjusted according to users' actual conditions. The mold shrinkage test (D955) was performed on Type A bar specimen molded by injection process.

ALITHANE™ ALP-B20

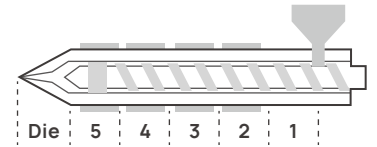
Processing Information

Alithane™ ALP-B20 TPU pellets are hygroscopic and therefore should be dried before processing. Depending on the climate, the pellets absorb moisture rapidly when exposed to the atmosphere. The moisture might cause the degradation of polymers and form bubbles or streaks in the molded and extruded parts. To ensure efficient and successful processing, the moisture content in TPU pellets is recommended to be less than 0.05%. A dehumidifying dryer is recommended for drying Alithane™ ALP-B20 TPU. The recommended drying conditions are listed below.

Alithane™ ALP-B20	ALP-75A-B20	ALP-80A-B20	ALP-85A-B20	ALP-90A-B20	ALP-95A-B20	ALP-60D-B20	ALP-65D-B20	ALP-70D-B20
Recommended Drying Temperature (°F)	195-220	195-220	195-220	205-230	205-230	205-230	205-230	205-230
Recommended Drying Temperature (°C)	90-105	90-105	90-105	95-110	95-110	95-110	95-110	95-110

Note: Dry for a minimum of 5 hours at -40°F/ -40°C dew point

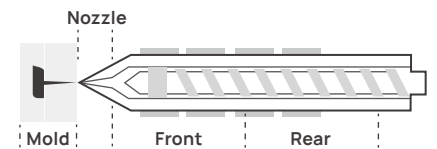
Recommended Extrusion Temperature Profile



Alithane™ ALP-B20	ALP-75A-B20 (°F / °C)	ALP-80A-B20 (°F / °C)	ALP-85A-B20 (°F / °C)	ALP-90A-B20 (°F / °C)	ALP-95A-B20 (°F / °C)	ALP-60D-B20 (°F / °C)	ALP-65D-B20 (°F / °C)	ALP-70D-B20 (°F / °C)
Zone 1	330/165	340/170	350/175	350/175	355/180	355/180	355/180	365/185
Zone 2	340/170	350/175	355/180	355/180	365/185	365/185	365/185	375/190
Zone 3	340/170	350/175	355/180	355/180	365/185	365/185	365/185	375/190
Zone 4	350/175	355/180	365/185	365/185	375/190	375/190	375/190	385/195
Adapter 5	350/175	355/180	365/185	365/185	375/190	375/190	375/190	385/195
Die	340-355/ 170-180	350-365/ 175-185	355-375/ 180-190	355-375/ 180-190	365-385/ 185-195	365-385/ 185-195	365-385/ 185-195	375-390/ 190-200

Screen Pack Recommendation : 50/200/100

Recommended Injection Molding Temperature Profile



Alithane™ ALP-B20	ALP-75A-B20 (°F / °C)	ALP-80A-B20 (°F / °C)	ALP-85A-B20 (°F / °C)	ALP-90A-B20 (°F / °C)	ALP-95A-B20 (°F / °C)	ALP-60D-B20 (°F / °C)	ALP-65D-B20 (°F / °C)	ALP-70D-B20 (°F / °C)
Rear	310/155	320/160	330/165	330/165	340/170	340/170	340/170	350/175
Front	320/160	330/165	340/170	340/170	350/175	350/175	350/175	355/180
Nozzle	330/165	340/170	350/175	350/175	355/180	355/180	355/180	365/185
Melt	365-385/ 185-195	375-390/ 190-200	385-400/ 195-205	385-400/ 195-205	390-410/ 200-210	390-410/ 200-210	390-410/ 200-210	400-420/ 205-215
Mold	50-75/10-25	50-75/10-25	60-85/15-30	60-85/15-30	70-105/20-40	70-105/20-40	70-105/20-40	75-120/25-50

ALITHANE™ ALP SERIES B40

Version: 1.1

Description

Alithane™ ALP-B40 is medical grade aliphatic polyether-based thermoplastic polyurethanes (TPU) loaded with **40% Barium Sulfate** as radiopacifier.

Due to the chemical structure, aliphatic-type TPU is more **light-stable** and **bio-stable** than aromatic-type TPU. It exhibits better radiopacity than ALP-B20 and can be color-matched while retaining biocompatibility, hydrolytic resistance, good mechanical properties, and chemical resistance of clear-grade ALP. It can be processed by injection molding and extrusion.

Biocompatibility

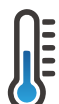
Alithane™ ALP-B40 pellets passed the

- ✓ Hemolysis test (ISO 10993-4)
- ✓ MEM Elution test (ISO 10993-5)
- ✓ USP Class VI test
- ✓ Dermal Sensitization test (ISO 10993-10 : 2010, 2021)
- ✓ Skin Irritation test (ISO 10993-10 : 2010 & 10993-23 : 2021)

Storage



Alithane™ ALP-B40 TPU pellets should be stored in cool and dry environment in their original containers until used.



Storage temperature should not exceed 85°F/30°C.



If only a portion of TPU pellets was used, the container with the remaining TPU pellets should be tightly closed.

Products and Properties

Alithane™ ALP-B40	ASTM Test	ALP-80A-B40	ALP-85A-B40	ALP-90A-B40	ALP-95A-B40	ALP-65D-B40	ALP-70D-B40
Durometer (Shore hardness)	D2240	80A	83A	92A	97A	66D	70D
Specific Gravity	D792	1.49	1.50	1.52	1.54	1.54	1.54
Flexural Modulus (psi)	D790	3,300	4,000	4,600	6,400	19,000	30,000
Ultimate Tensile (psi)	D412	1,100	1,300	3,200	4,200	4,600	4,400
Tensile Modulus at 100% Elongation (psi)	D412	600	800	1,300	2,000	2,700	3,000
Tensile Modulus at 300% Elongation (psi)	D412	700	950	2,100	4,200	N/A	N/A
Ultimate Elongation (%)	D412	900	700	500	300	270	200
Mold Shrinkage (mm/mm)	D955	0.010-0.013	0.010-0.013	0.008-0.010	0.008-0.010	0.006-0.009	0.006-0.009

Note: These test results are based on small samples of Alithane™ ALP-B40 TPUs and do not represent the results from larger test samples. The manufacturing parameters should be adjusted according to users' actual conditions. The mold shrinkage test (D955) was performed on Type A bar specimen molded by injection process.

ALITHANE™ ALP-B40

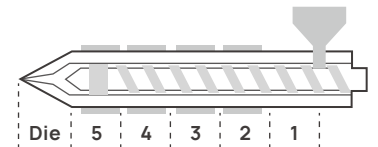
Processing Information

Alithane™ ALP-B40 TPU pellets are hygroscopic and therefore should be dried before processing. Depending on the climate, the pellets absorb moisture rapidly when exposed to the atmosphere. The moisture might cause the degradation of polymers and form bubbles or streaks in the molded and extruded parts. To ensure efficient and successful processing, the moisture content in TPU pellets is recommended to be less than 0.05%. A dehumidifying dryer is recommended for drying Alithane™ ALP-B40 TPU. The recommended drying conditions are listed below.

Alithane™ ALP-B40	ALP-80A-B40	ALP-85A-B40	ALP-90A-B40	ALP-95A-B40	ALP-65D-B40	ALP-70D-B40
Recommended Drying Temperature (°F)	195-220	195-220	205-230	205-230	205-230	205-230
Recommended Drying Temperature (°C)	90-105	90-105	95-110	95-110	95-110	95-110

Note: Dry for a minimum of 5 hours at -40°F/ -40°C dew point

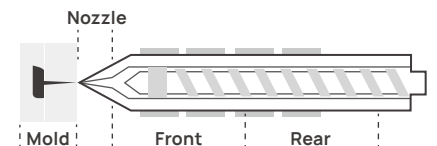
Recommended Extrusion Temperature Profile



Alithane™ ALP-B40	ALP-80A-B40 (°F / °C)	ALP-85A-B40 (°F / °C)	ALP-90A-B40 (°F / °C)	ALP-95A-B40 (°F / °C)	ALP-65D-B40 (°F / °C)	ALP-70D-B40 (°F / °C)
Zone 1	330/165	340/170	350/175	350/175	355/180	355/180
Zone 2	340/170	350/175	355/180	355/180	365/185	365/185
Zone 3	340/170	350/175	355/180	355/180	365/185	365/185
Zone 4	350/175	355/180	365/185	365/185	375/190	375/190
Adapter 5	350/175	355/180	365/185	365/185	375/190	375/190
Die	340-355/ 170-180	350-365/ 175-185	355-375/ 180-190	355-375/ 180-190	365-385/ 185-195	365-385/ 185-195

Screen Pack Recommendation : 50/200/100

Recommended Injection Molding Temperature Profile



Alithane™ ALP-B40	ALP-80A-B40 (°F / °C)	ALP-85A-B40 (°F / °C)	ALP-90A-B40 (°F / °C)	ALP-95A-B40 (°F / °C)	ALP-65D-B40 (°F / °C)	ALP-70D-B40 (°F / °C)
Rear	310/155	320/160	330/165	330/165	340/170	340/170
Front	320/160	330/165	340/170	340/170	350/175	350/175
Nozzle	330/165	340/170	350/175	350/175	355/180	355/180
Melt	365-385/ 185-195	375-390/ 190-200	385-400/ 195-205	385-400/ 195-205	390-410/ 200-210	390-410/ 200-210
Mold	50-75/10-25	50-75/10-25	60-85/15-30	60-85/15-30	70-105/20-40	70-105/20-40

DURATHANE™ ALC SERIES CLEAR GRADE

Version: 1.1

Description

Durathane™ ALC is medical grade aliphatic polycarbonate-based thermoplastic polyurethane (TPU). Compared with polyether-based TPU, polycarbonate-based TPU can provide better **oxidation resistance**, mechanical properties, and chemical resistance in addition to its biocompatibility and hydrolytic resistance. Color matching is available. Due to the chemical structure, the aliphatic nature of ALC series products makes them more light-stable and bio-stable than the aromatic TPUs. These products can be injection molded and extruded.

Biocompatibility

Durathane™ ALC pellets passed the

- ✓ Hemolysis test (ISO 10993-4)
- ✓ MEM Elution test (ISO 10993-5)
- ✓ Dermal Sensitization test (ISO 10993-10 : 2010, 2021)
- ✓ Skin Irritation test (ISO 10993-10 : 2010 & 10993-23 : 2021)

Storage



Durathane™ ALC TPU pellets should be stored in cool and dry environment in their original containers until used.



Storage temperature should not exceed 85°F/30°C.



If only a portion of TPU pellets was used, the container with the remaining TPU pellets should be tightly closed.

Products and Properties

Durathane™ ALC	ASTM Test	ALC-75A	ALC-80A	ALC-85A	ALC-90A	ALC-95A	ALC-60D	ALC-65D	ALC-70D
Durometer (Shore hardness)	D2240	75A	80A	86A	90A	95A	60D	65D	70D
Specific Gravity	D792	1.14	1.14	1.14	1.14	1.14	1.14	1.15	1.15
Flexural Modulus (psi)	D790	1,800	1,850	1,900	3,100	7,600	11,000	44,000	92,000
Ultimate Tensile (psi)	D412	3,500	4,000	4,100	4,400	4,700	5,200	5,500	6,000
Tensile Modulus at 100% Elongation (psi)	D412	440	610	780	1,050	1,500	1,900	3,000	3,800
Tensile Modulus at 300% Elongation (psi)	D412	920	1,450	2,000	2,900	3,900	4,600	5,200	N/A
Ultimate Elongation (%)	D412	580	490	450	395	350	320	310	290
Mold Shrinkage (mm/mm)	D955	0.025-0.028	0.018-0.020	0.013-0.016	0.008-0.009	0.007-0.008	0.006-0.007	0.003-0.004	0.003-0.004

Note: These test results are based on small samples of Durathane™ ALC TPUs and do not represent the results from larger test samples. The manufacturing parameters should be adjusted according to users' actual conditions. The mold shrinkage test (D955) was performed on Type A bar specimen molded by injection process.

DURATHANE™ ALC CLEAR

Processing Information

Durathane™ ALC TPU pellets are hygroscopic and therefore should be dried before processing.

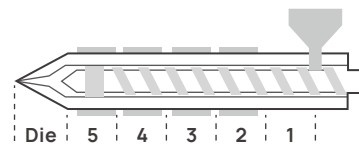
Depending on the climate, the pellets absorb moisture rapidly when exposed to the atmosphere. The moisture might cause the degradation of polymers and form bubbles or streaks in the molded and extruded parts. To ensure efficient and successful processing, the moisture content in TPU pellets is recommended to be less than 0.05%. A dehumidifying dryer is recommended for drying Durathane™ ALC TPU.

The recommended drying conditions are listed below.

Durathane™ ALC	ALC-75A	ALC-80A	ALC-85A	ALC-90A	ALC-95A	ALC-60D	ALC-65D	ALC-70D
Recommended Drying Temperature (°F)	165	165	175	175	175	195	195	195
Recommended Drying Temperature (°C)	75	75	80	80	80	90	90	90

Note: Dry for a minimum of 5 hours at -40°F/ -40°C dew point

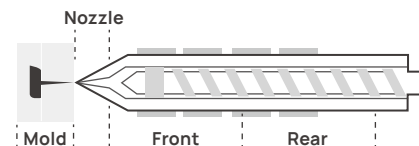
Recommended Extrusion Temperature Profile



Durathane™ ALC	ALC-75A (°F / °C)	ALC-80A (°F / °C)	ALC-85A (°F / °C)	ALC-90A (°F / °C)	ALC-95A (°F / °C)	ALC-60D (°F / °C)	ALC-65D (°F / °C)	ALC-70D (°F / °C)
Zone 1	350/175	350/175	355/180	355/180	355/180	365/185	365/185	365/185
Zone 2	355/180	355/180	365/185	365/185	365/185	375/190	375/190	375/190
Zone 3	355/180	355/180	365/185	365/185	365/185	375/190	375/190	375/190
Zone 4	365/185	365/185	375/190	375/190	375/190	385/195	385/195	385/195
Adapter 5	365/185	365/185	375/190	375/190	375/190	385/195	385/195	385/195
Die	355-375/ 180-190	355-375/ 180-190	365-385/ 185-195	365-385/ 185-195	365-385/ 185-195	375-390/ 190-200	375-390/ 190-200	375-390/ 190-200

Screen Pack Recommendation : 50/200/100

Recommended Injection Molding Temperature Profile



Durathane™ ALC	ALC-75A (°F / °C)	ALC-80A (°F / °C)	ALC-85A (°F / °C)	ALC-90A (°F / °C)	ALC-95A (°F / °C)	ALC-60D (°F / °C)	ALC-65D (°F / °C)	ALC-70D (°F / °C)
Rear	330/165	330/165	340/170	340/170	340/170	350/175	350/175	350/175
Front	340/170	340/170	350/175	350/175	350/175	355/180	355/180	355/180
Nozzle	350/175	350/175	355/180	355/180	355/180	365/185	365/185	365/185
Melt	385-390/ 195-205	385-390/ 195-205	390-410/ 200-210	390-410/ 200-210	390-410/ 200-210	390-420/ 205-215	390-420/ 205-215	390-420/ 205-215
Mold	60-85/15-30	60-85/15-30	60-85/15-30	60-85/15-30	60-85/15-30	70-105/20-40	70-105/20-40	70-105/20-40

DURATHANE™ ALC SERIES B20

Version: 1.1

Description

Durathane™ ALC-B20 is medical-grade aliphatic polycarbonate-based thermoplastic polyurethanes (TPU) loaded with **20% Barium Sulfate** as radiopacifier.

It exhibits excellent radiopacity and can be color-matched while retaining traits of clear grade ALC, including superior biocompatibility and mechanical properties as well as excellent **resistance to oxidation**, chemical, and hydrolysis. Due to the chemical structure, the aliphatic nature of ALC-B20 series products makes them more light-stable and bio-stable than the aromatic TPUs.

These products can be injection molded and extruded.

Biocompatibility

Durathane™ ALC-B20 pellets passed the

- ✓ Hemolysis test (ISO 10993-4)
- ✓ MEM Elution test (ISO 10993-5)
- ✓ USP Class VI test
- ✓ Dermal Sensitization test (ISO 10993-10 : 2010, 2021)
- ✓ Skin Irritation test (ISO 10993-10 : 2010 & 10993-23 : 2021)

Storage



Durathane™ ALC-B20 TPU pellets should be stored in cool and dry environment in their original containers until used.



Storage temperature should not exceed 85°F/30°C.



If only a portion of TPU pellets was used, the container with the remaining TPU pellets should be tightly closed.

Products and Properties

Durathane™ ALC-B20	ASTM Test	ALC-75A-B20	ALC-80A-B20	ALC-85A-B20	ALC-90A-B20	ALC-95A-B20	ALC-60D-B20	ALC-65D-B20
Durometer (Shore hardness)	D2240	75A	80A	85A	90A	95A	60D	65D
Specific Gravity	D792	1.33	1.33	1.33	1.33	1.33	1.33	1.33
Flexural Modulus (psi)	D790	2,150	2,700	2,700	4,100	10,600	20,500	41,500
Ultimate Tensile (psi)	D412	2,700	3,200	4,200	4,000	4,000	4,350	4,600
Tensile Modulus at 100% Elongation (psi)	D412	350	500	700	910	1,600	2,000	2,500
Tensile Modulus at 300% Elongation (psi)	D412	500	750	1,500	1,800	3,400	3,600	4,000
Ultimate Elongation (%)	D412	800	650	500	450	360	350	320
Mold Shrinkage (mm/mm)	D955	0.020-0.025	0.013-0.014	0.013-0.014	0.011-0.014	0.009-0.010	0.007-0.009	0.006-0.008

Note: These test results are based on small samples of Durathane™ ALC-B20 TPUs and do not represent the results from larger test samples. The manufacturing parameters should be adjusted according to users' actual conditions. The mold shrinkage test (D955) was performed on Type A bar specimen molded by injection process.

DURATHANE™ ALC-B20

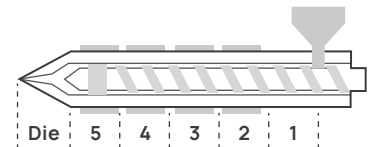
Processing Information

Durathane™ ALC-B20 TPU pellets are hygroscopic and therefore should be dried before processing. Depending on the climate, the pellets absorb moisture rapidly when exposed to the atmosphere. The moisture might cause the degradation of polymers and form bubbles or streaks in the molded and extruded parts. To ensure efficient and successful processing, the moisture content in TPU pellets is recommended to be less than 0.05%. A dehumidifying dryer is recommended for drying Durathane™ ALC-B20 TPU. The recommended drying conditions are listed below.

Durathane™ ALC-B20	ALC-75A-B20	ALC-80A-B20	ALC-85A-B20	ALC-90A-B20	ALC-95A-B20	ALC-60D-B20	ALC-65D-B20
Recommended Drying Temperature (°F)	160	165	165	175	175	175	195
Recommended Drying Temperature (°C)	70	75	75	80	80	80	90

Note: Dry for a minimum of 5 hours at -40°F/ -40°C dew point

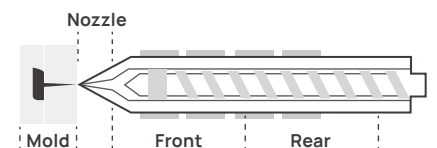
Recommended Extrusion Temperature Profile



Durathane™ ALC-B20	ALC-75A-B20 (°F / °C)	ALC-80A-B20 (°F / °C)	ALC-85A-B20 (°F / °C)	ALC-90A-B20 (°F / °C)	ALC-95A-B20 (°F / °C)	ALC-60D-B20 (°F / °C)	ALC-65D-B20 (°F / °C)
Zone 1	350/175	355/180	355/180	355/180	365/185	365/185	375/190
Zone 2	355/180	365/185	365/185	365/185	375/190	375/190	385/195
Zone 3	355/180	365/185	365/185	365/185	375/190	375/190	385/195
Zone 4	365/185	375/190	375/190	375/190	385/195	385/195	390/200
Adapter 5	365/185	375/190	375/190	375/190	385/195	385/195	390/200
Die	355-375/ 180-190	365-385/ 185-195	365-385/ 185-195	365-385/ 185-195	375-390/ 190-200	375-390/ 190-200	385-400/ 195-205

Screen Pack Recommendation : 50/200/100

Recommended Injection Molding Temperature Profile



Durathane™ ALC-B20	ALC-75A-B20 (°F / °C)	ALC-80A-B20 (°F / °C)	ALC-85A-B20 (°F / °C)	ALC-90A-B20 (°F / °C)	ALC-95A-B20 (°F / °C)	ALC-60D-B20 (°F / °C)	ALC-65D-B20 (°F / °C)
Rear	330/165	340/170	340/170	340/170	350/170	350/175	355/180
Front	340/170	350/175	350/175	350/175	355/180	355/180	365/185
Nozzle	350/175	355/180	355/180	355/180	365/185	365/185	375/190
Melt	385-400/ 195-205	390-410/ 200-210	390-410/ 200-210	390-410/ 200-210	400-420/ 205-215	400-420/ 205-215	410-430/ 210-220
Mold	60-85/15-30	60-85/15-30	60-85/15-30	60-85/15-30	70-95/20-35	70-95/20-35	70-95/20-35

DURATHANE™ ALC SERIES B30

Version: 1.0

Description

Durathane™ ALC-B30 is medical-grade aliphatic polycarbonate-based thermoplastic polyurethanes (TPU) loaded with **30% Barium Sulfate** as radiopacifier.

It exhibits excellent radiopacity and can be color-matched while retaining traits of clear grade ALC, including superior biocompatibility and mechanical properties as well as excellent **resistance to oxidation**, chemical, and hydrolysis. Due to the chemical structure, the aliphatic nature of ALC-B30 series products makes them more light-stable and bio-stable than the aromatic TPUs.

These products can be injection molded and extruded.

Biocompatibility

Durathane™ ALC-B30 pellets passed the

- ✓ Hemolysis test (ISO 10993-4)
- ✓ MEM Elution test (ISO 10993-5)
- ✓ Dermal Sensitization test (ISO 10993-10 : 2010, 2021)
- ✓ Skin Irritation test (ISO 10993-10 : 2010 & 10993-23 : 2021)

Storage



Durathane™ ALC-B30 TPU pellets should be stored in cool and dry environment in their original containers until used.



Storage temperature should not exceed 85°F/30°C.



If only a portion of TPU pellets was used, the container with the remaining TPU pellets should be tightly closed.

Products and Properties

Durathane™ ALC-B30	ASTM Test	ALC-90A-B30	ALC-93A-B30	ALC-95A-B30
Durometer (Shore hardness)	D2240	90A	92A	94A
Specific Gravity	D792	1.45	1.45	1.45
Flexural Modulus (psi)	D790	3,550	6,000	9,000
Ultimate Tensile (psi)	D412	3,300	4,000	4,200
Tensile Modulus at 100% Elongation (psi)	D412	910	1,200	1,400
Tensile Modulus at 300% Elongation (psi)	D412	1,600	3,000	3,400
Ultimate Elongation (%)	D412	500	380	350
Mold Shrinkage (mm/mm)	D955	0.010-0.011	0.010-0.011	0.009-0.010

Note: These test results are based on small samples of Durathane™ ALC-B30 TPUs and do not represent the results from larger test samples. The manufacturing parameters should be adjusted according to users' actual conditions. The mold shrinkage test (D955) was performed on Type A bar specimen molded by injection process.



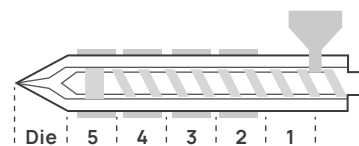
Processing Information

Durathane™ ALC-B30 TPU pellets are hygroscopic and therefore should be dried before processing. Depending on the climate, the pellets absorb moisture rapidly when exposed to the atmosphere. The moisture might cause the degradation of polymers and form bubbles or streaks in the molded and extruded parts. To ensure efficient and successful processing, the moisture content in TPU pellets is recommended to be less than 0.05%. A dehumidifying dryer is recommended for drying Durathane™ ALC-B30 TPU. The recommended drying conditions are listed below.

Durathane™ ALC-B30	ALC-90A-B30	ALC-93A-B30	ALC-95A-B30
Recommended Drying Temperature (°F)	175	175	175
Recommended Drying Temperature (°C)	80	80	80

Note: Dry for a minimum of 5 hours at -40°F/ -40°C dew point

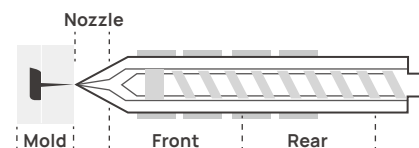
Recommended Extrusion Temperature Profile



Durathane™ ALC-B30	ALC-90A-B30 (°F / °C)	ALC-93A-B30 (°F / °C)	ALC-95A-B30 (°F / °C)
Zone 1	365/185	365/185	365/185
Zone 2	375/190	375/190	375/190
Zone 3	375/190	375/190	375/190
Zone 4	385/195	385/195	385/195
Adapter 5	385/195	385/195	385/195
Die	375-390/190-200	375-390/190-200	375-390/190-200

Screen Pack Recommendation : 50/200/100

Recommended Injection Molding Temperature Profile



Durathane™ ALC-B30	ALC-90A-B30 (°F / °C)	ALC-93A-B30 (°F / °C)	ALC-95A-B30 (°F / °C)
Rear	350/175	350/175	350/175
Front	355/180	355/180	355/180
Nozzle	365/185	365/185	365/185
Melt	400-420/205-215	400-420/205-215	400-420/205-215
Mold	70-95/20-35	70-95/20-35	70-95/20-35

DURATHANE™ ALC SERIES B40

Version: 1.0

Description

Durathane™ ALC-B40 is medical-grade aliphatic polycarbonate-based thermoplastic polyurethanes (TPU) loaded with **40% Barium Sulfate** as radiopacifier.

It exhibits better radiopacity than ALC-B20 and can be color-matched while retaining traits of clear grade ALC, including superior biocompatibility and mechanical properties as well as excellent **resistance to oxidation**, chemical, and hydrolysis. Due to the chemical structure, the aliphatic nature of ALC-B40 series products makes them more light-stable and bio-stable than the aromatic TPUs.

These products can be injection molded and extruded.

Biocompatibility

Durathane™ ALC-B40 pellets passed the

- ✓ Hemolysis test (ISO 10993-4)
- ✓ MEM Elution test (ISO 10993-5)
- ✓ 90-day implantation test
- ✓ Dermal Sensitization test (ISO 10993-10 : 2010, 2021)
- ✓ Skin Irritation test (ISO 10993-10 : 2010 & 10993-23 : 2021)

Storage



Durathane™ ALC-B40 TPU pellets should be stored in cool and dry environment in their original containers until used.



Storage temperature should not exceed 85°F/30°C.



If only a portion of TPU pellets was used, the container with the remaining TPU pellets should be tightly closed.

Products and Properties

Durathane™ ALC-B40	ASTM Test	ALC-80A-B40	ALC-85A-B40	ALC-90A-B40	ALC-95A-B40	ALC-65D-B40
Durometer (Shore hardness)	D2240	80A	85A	90A	95A	65D
Specific Gravity	D792	1.58	1.58	1.58	1.58	1.58
Flexural Modulus (psi)	D790	2,550	3,100	4,500	15,000	50,500
Ultimate Tensile (psi)	D412	2,000	2,700	3,300	3,400	3,700
Tensile Modulus at 100% Elongation (psi)	D412	460	750	1,000	1,700	2,500
Tensile Modulus at 300% Elongation (psi)	D412	580	1,000	1,700	2,400	3,550
Ultimate Elongation (%)	D412	770	570	450	400	310
Mold Shrinkage (mm/mm)	D955	0.012-0.013	0.009-0.010	0.009-0.010	0.009-0.010	0.009-0.010

Note: These test results are based on small samples of Durathane™ ALC-B40 TPUs and do not represent the results from larger test samples. The manufacturing parameters should be adjusted according to users' actual conditions. The mold shrinkage test (D955) was performed on Type A bar specimen molded by injection process.



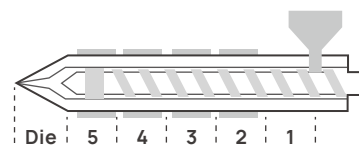
Processing Information

Durathane™ ALC-B40 TPU pellets are hygroscopic and therefore should be dried before processing. Depending on the climate, the pellets absorb moisture rapidly when exposed to the atmosphere. The moisture might cause the degradation of polymers and form bubbles or streaks in the molded and extruded parts. To ensure efficient and successful processing, the moisture content in TPU pellets is recommended to be less than 0.05%. A dehumidifying dryer is recommended for drying Durathane™ ALC-B40 TPU. The recommended drying conditions are listed below.

Durathane™ ALC-B40	ALC-80A-B40	ALC-85A-B40	ALC-90A-B40	ALC-95A-B40	ALC-65D-B40
Recommended Drying Temperature (°F)	165	165	175	175	195
Recommended Drying Temperature (°C)	75	75	80	80	90

Note: Dry for a minimum of 5 hours at -40°F/ -40°C dew point

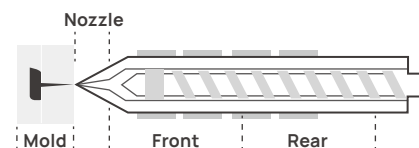
Recommended Extrusion Temperature Profile



Durathane™ ALC-B40	ALC-80A-B40 (°F / °C)	ALC-85A-B40 (°F / °C)	ALC-90A-B40 (°F / °C)	ALC-95A-B40 (°F / °C)	ALC-65D-B40 (°F / °C)
Zone 1	355/180	355/180	365/185	365/185	375/190
Zone 2	365/185	365/185	375/190	375/190	385/195
Zone 3	365/185	365/185	375/190	375/190	385/195
Zone 4	375/190	375/190	385/195	385/195	390/200
Adapter 5	375/190	375/190	385/195	385/195	390/200
Die	365-385/ 185-195	365-385/ 185-195	375-390/ 190-200	375-390/ 190-200	385-400/ 195-205

Screen Pack Recommendation : 50/200/100

Recommended Injection Molding Temperature Profile



Durathane™ ALC-B40	ALC-80A-B40 (°F / °C)	ALC-85A-B40 (°F / °C)	ALC-90A-B40 (°F / °C)	ALC-95A-B40 (°F / °C)	ALC-65D-B40 (°F / °C)
Rear	340/170	340/170	350/175	350/175	355/180
Front	350/175	350/175	355/180	355/180	365/185
Nozzle	355/180	355/180	365/185	365/185	375/190
Melt	390-410/ 200-210	390-410/ 200-210	400-420/ 205-215	400-420/ 205-215	410-430/ 210-220
Mold	60-85/15-30	60-85/15-30	70-95/20-35	70-95/20-35	70-95/20-35

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