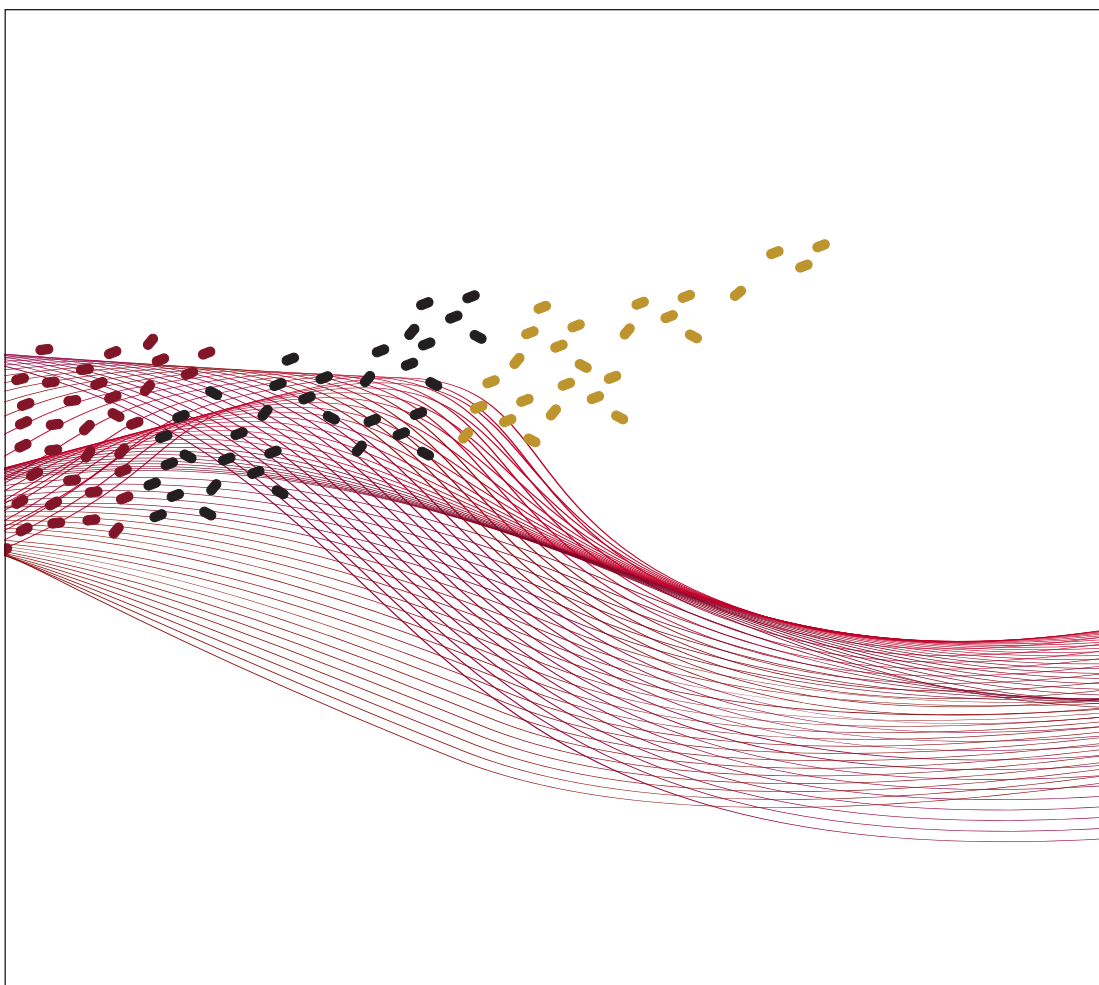




COMPOUNDING SUCCESS

STANDARD PRODUCTS CATALOG



Polymer Resources Engineering Resins

Broad portfolio of engineering resins and blends, enhanced by our Signature Service

What Differentiates Polymer Resources?

Our Commitment to You

Signature Service: In contrast to conventional engineering polymer suppliers, Polymer Resources pairs our leading-edge resins and blends with personal attention to each customer's needs. We work with you one-on-one at every stage and at every level to make sure you have an exceptional experience every time.

We are positioned to...

Accelerate Time to Market:

Achieve a competitive advantage and win with our:

- ▣ Quick quoting
- ▣ Expedited color matching
- ▣ Speedy sampling
- ▣ On-time delivery

Assure Quality:

Reduce risk with trusted products and services:

- ▣ <1% rate of return
- ▣ ISO9001 certified
- ▣ Quality guarantee

Optimize Shipping & Logistics:

Save capital with our:

- ▣ Just-in-time (JIT) capability to minimize inventory and conserve cash flow
- ▣ Flexible order sizes: 250 lbs. to truckloads
- ▣ Extensive local warehousing support
- ▣ Dependable 99% on-time delivery rate

Expedite Regulatory Approvals:

Fast-track material certification and streamline agency approvals using:

- ▣ UL- and CSA-listed standard products
- ▣ In-house expertise in navigating complex regulatory requirements

Drive Your Sustainability Goals:

Go green with our popular material alternatives and recycling expertise:

- ▣ Utility grades that incorporate recycled resins
- ▣ Closed loop reprocessing to convert your scrap into usable material

Provide Technical Expertise:

Contact our scientists and plastics engineers directly for help with:

- ▣ Material selection
- ▣ Custom formulations
- ▣ Process optimization
- ▣ Recommendations on part and tooling design

<1% Returns

Quality Guarantee

250 lbs. to Truckloads

99% On-Time Delivery

Broad Product Portfolio

We enable your success with...

Our Standard Materials

- ▣ Engineering resin grades
- ▣ Blends and alloys

Our Tailor-made Solutions

- ▣ Custom-formulated materials
- ▣ Specialized polymer expertise

Our True Colors

- ▣ Wide selection of standard colors
- ▣ Precise color matching
- ▣ Lot-to-lot consistency guarantee

Engineering Resins, Blends and Alloys

Polycarbonate (PC)
Acrylonitrile Butadiene Styrene (ABS)
PC/ABS
Acrylonitrile Styrene Acrylate (ASA)
PC/ASA
Polyetherimide (PEI)

Polyphenylene Ether (PPE)
PPE/Nylon
Polybutylene Terephthalate (PBT)
PC/PBT
Nylon 6/6
Nylon 6

Formulation Additives

Flame retardants
UV stabilizers
Impact modifiers
Self-lubricators
Mineral and glass reinforcement

Materials Optimized for:

Injection molding
Structural foam molding
Blow molding
Extrusion

We Offer Material Alternatives to:

PC

Covestro Makrolon®
Idemitsu Tarflon®
Mitsubishi Iupilon®
SABIC Lexan®
Trinseo Calibre™

PPX (PPE)

Asahi Xyron™
SABIC Noryl®

PC/TP

Covestro Makroblend®
SABIC Xenoy®

PC/ABS

Covestro Bayblend®
SABIC Cycloy®
Trinseo Emerge™
Trinseo Pulse™

PEI

SABIC Ultem®

TP (PBT)

BASF Ultradur®
DuPont™ Crastin®
Laxness Pocan®
SABIC Valox®
Ticona Celanex®

ABS

BASF Terluran®
Chi Mei Polylac®
INEOS Styrolution Lustran®
Samsung Starex®
SABIC Cyclocac®
Trinseo Magnum™

Nylon 6 and Nylon 6/6

Ascend Vdyne®
BASF Ultramid®
DuPont Zytel®
Radici Radilon®
Solvay Technyl®

**Call us today to discuss material selection, properties, colors or even issues with your mold.
No recordings – you'll reach a person who can help you right from the start.**

PRL Engineering Resins

			ASTM TEST METHOD	POLYCARBONATE (PC)									
				PC-GP1-D	PC-GP2-D	PC-GP3-D	PC-GP4	PC-UV1-D	PC-UV2-D	PC-UV3-D	PC-UV4	PC-FD1	PC-FD2
Typical Properties, Units	Description			General Purpose, Low Flow, UL	General Purpose, Medium Flow, UL	General Purpose, High Flow, UL	General Purpose, Easy Flow, UL	UV-stabilized, Low Flow, UL	UV-stabilized, Medium Flow, UL	UV-stabilized, Hight Flow, UL	UV-stabilized, Easy Flow	FDA, Low Flow	FDA, Medium Flow
	Physical	Melt Flow Rate, g/10 min	D1238	5-10	9-16	14-20	20-30	5-10	9-16	14-20	20-30	5-10	9-16
		Specific Gravity	D792	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
		Mold Shrinkage, E-3 in/in	D955	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7
	Mechanical*	Tensile Strength, Break, psi	D638	10,500	10,000	10,000	9,500	10,500	10,000	10,000	9,500	10,500	10,000
		Tensile Strength, Yield, psi	D638	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000
		Flexural Strength, psi	D790	14,000	13,900	13,900	13,400	14,000	13,900	13,900	13,400	14,000	13,900
		Flexural Modulus, psi x 1000	D790	335	335	335	330	335	335	335	330	335	335
		Notched Izod Impact Strength, ft-lb/in.	D256	17.0	15.0	13.0	12.0	17.0	15.0	13.0	12.0	17.0	15.0
		Gardner Falling Dart Impact, in-lbs.	D5420	320	320	320	320	320	320	320	320	320	320
	Thermal*	HDT @ 66 psi, °F	D648	280	275	270	265	280	275	270	265	280	275
HDT @ 264 psi, °F		D648	270	265	260	255	270	265	260	255	270	265	
Flammability	UL 94 @ 1/16"	UL94	V-2	V-2	V-2	V-2	V-2	V-2	V-2	V-2	V-2	V-2	
	UL 94 @ 1/8"	UL94	V-2	V-2	V-2	V-2	V-2	V-2	V-2	V-2	V-2	V-2	
Typical Processing Conditions, Units	Processing Method****		—	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM
	Drying Temperature, °F		—	245-255	245-255	245-255	245-255	245-255	245-255	245-255	245-255	245-255	245-255
	Drying Time, Hours		—	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**
	Melt Temperature, °F		—	560-620	550-600	550-600	510-560	560-620	550-600	550-600	510-560	560-620	550-600
	Mold/Die Temperature, °F		—	180-240	160-200	160-200	150-200	180-240	160-200	160-200	150-200	180-240	160-200
	Front Zone, °F		—	590-630	560-600	540-580	520-560	590-630	560-600	540-580	520-560	590-630	560-600
	Middle Zone, °F		—	570-610	540-580	520-560	500-540	570-610	540-580	520-560	500-540	570-610	540-580
	Rear Zone, °F		—	550-590	520-560	500-540	480-520	550-590	520-560	500-540	480-520	550-590	520-560
	Vent Depth, in (minimum)		—	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005

* All mechanical and thermal testing conducted on 1/8 inch thick unpigmented test samples

** Do not exceed 8 hours

*** Do not exceed 24 hours

**** Processing Methods: Injection Molding (IM), Structural Foam (SF), and Extrusion (E)

† Notched Izod @ – 40°F, ft-lb/in., ASTM D256

f UL listing of foamed thickness at 1/4"

Nomenclature Structure (Grade/Color/Additive)

-1 indicates mold release

-2 indicates lube

-3 indicates UV

-4 indicates UV and release

-5 indicates FDA

-6 indicates FDA and release

-7 indicates low gloss and UV

POLYCARBONATE (PC)

PC-FD3	PC-FD4	PC-FR1-D	PC-FR2-D	PC-FR3-D	PC-FR1A-D	PC-FR2A-D	PC-FR3A-D	PC-IM1	PC-IM2	PC-IM3	PC-IM4	PC-FRUV2	PC-FR-TFE	PC-HH	PCSF-FR	PCSF-FR1
FDA, High Flow	FDA, Easy Flow	Improved Flame Retardant, Low Flow, UL	Improved Flame Retardant, Medium Flow, UL	Improved Flame Retardant, High Flow, UL	Flame Retardant, Low Flow, UL	Flame Retardant, Medium Flow, UL	Flame Retardant, High Flow, UL	Low Temperature Impact Modified, Low Flow	Low Temperature Impact Modified, Medium Flow	Low Temperature Impact Modified, High Flow	Low Temperature Impact Modified, Easy Flow	Non-Halogen FR, Medium flow, UV-stabilized, UL	5% PTFE Filled, Medium flow, FR, UL	High Heat, Low Flow	5% Glass Filled Structural Foam Grade, UL	10% Glass Filled Structural Foam Grade, UL
14-20	20-30	5-10	9-16	14-20	5-10	9-16	14-20	5-10	9-16	14-20	20-30	9-16	9-16	2-5	5-12	5-12
1.20	1.20	1.21	1.21	1.21	1.21	1.21	1.21	1.19	1.19	1.19	1.19	1.2	1.26	1.19	1.21	1.27
5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-10	6-8	5-7	3-6
10,000	9,500	8,000	8,000	8,000	8,000	8,000	8,000	8,000	7,500	8,300	7,700	9,000	8,250	10,800	8,500	9,500
9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	7,900	8,000	8,300	7,500	10,000	8,250	9,600	8,100	9,150
13,900	13,400	13,000	13,000	13,000	13,000	13,000	13,000	11,500	12,000	12,000	10,000	13,900	12,000	14,000	14,000	15,800
335	330	320	320	320	320	320	320	290	320	295	290	335	350	310	460	550
13.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	17.0	16.0	13.0	12.0	15.0	2.2	7.0	3.0	2.0
320	320	320	320	320	320	320	320	10.0†	320	320	320	320	320	100	—	—
270	265	275	275	275	275	275	275	275	275	255	255	275	275	310	280	290
260	255	265	265	265	265	265	265	255	255	245	245	265	265	295	268	280
V-2	V-2	V-0	V-0	V-0	V-2	V-2	V-2	HB	HB	HB	HB	V-0	V-2	—	—	—
V-2	V-2	V-0, 5VA	V-0, 5VA	V-0, 5VA	V-0	V-0	V-0	HB	HB	HB	HB	V-0, 5VA	V-0	—	V-0 ^f , 5VA	V-0 ^f
IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	SF	SF
245-255	245-255	245-255	245-255	245-255	245-255	245-255	245-255	245-255	245-255	245-255	245-255	245-255	245-255	250-265	245-255	245-255
3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**
550-600	510-560	560-620	550-600	540-590	560-620	550-600	540-590	540-600	525-575	525-575	525-575	550-600	550-600	600-650	550-600	550-600
160-200	150-200	180-240	170-210	160-200	180-240	170-210	160-200	160-200	160-200	160-200	160-200	160-200	170-210	170-210	170-210	160-220
540-580	520-560	590-630	560-600	550-590	590-630	560-600	550-590	560-600	530-570	530-570	530-570	560-600	560-600	620-700	560-590	560-590
520-560	500-540	570-610	540-580	530-570	570-610	540-580	530-570	540-580	510-550	510-550	510-550	540-580	540-580	570-640	560-590	560-590
500-540	480-520	550-590	520-560	510-550	550-590	520-560	510-550	520-560	490-530	490-530	490-530	520-560	520-560	570-640	490-510	490-510
0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005

The information contained herein is based on our best knowledge, and we believe it to be true and accurate. Please read all statements and recommendations in conjunction with our conditions of sale which apply to all goods supplied by us. We assume no responsibility for the use or misuse of these statements, recommendations or suggestions, nor do we intend them as recommendations for any use which would infringe any patent or copyright. Furthermore, since we have no control over the use of our products, we accept no liability for their use or misuse. The compatibility of our products in your process is the sole responsibility of the buyer. This data is not intended for specification purposes.

PRL Engineering Resins

			ASTM TEST METHOD	POLYCARBONATE (PC)										
				PCSF-FRG20	PCSF-FRG30	PC-HM-FR1	PC-G10	PC-G20	PC-G30	PC-G40	PC-BR1	PC-BR1-UV	PC-UT1	PC-UT2
Typical Properties, Units	Description			20% Glass Filled Structural Foam Grade	30% Glass Filled Structural Foam Grade	10% Glass Filled, Flame Retardant, UL	10% Glass Filled, UL	20% Glass Filled, UL	30% Glass Filled, UL	40% Glass Filled	Branched for Extrusion and Blow Molding	Branched for Extrusion and Blow Molding, UV-, UL	Utility, Low Flow, Wide Spec	Utility, Mid Flow, Wide Spec
	Physical	Melt Flow Rate, g/10 min	D1238	4-10	3-12	5-12	5-12	4-10	3-12	2-10	1-5	1-5	5-10	10-20
		Specific Gravity	D792	1.35	1.43	1.26	1.27	1.35	1.43	1.50	1.20	1.20	1.20	1.20
		Mold Shrinkage, E-3 in/in	D955	1-4	1-3	2-5	3-6	1-4	1-3	1-3	5-8	5-8	5-7	5-7
	Mechanical*	Tensile Strength, Break, psi	D638	17,000	18,000	9,500	9,500	17,000	18,000	24,000	9,600	9,600	9,500	9,500
		Tensile Strength, Yield, psi	D638	17,000	18,000	8,100	9,100	17,000	18,000	24,000	9,000	9,000	9,000	9,000
		Flexural Strength, psi	D790	18,000	22,000	14,900	15,800	19,200	22,000	27,000	13,500	13,500	13,400	13,400
		Flexural Modulus, psi x 1000	D790	750	1,000	490	550	750	1,000	1,400	335	335	330	330
		Notched Izod Impact Strength, ft-lb/in.	D256	1.5	1.5	2.0	2.0	1.5	1.5	1.5	14.0	14.0	10 min	10 min
		Gardner Falling Dart Impact, in-lbs.	D5420	—	—	—	—	—	—	—	320	320	320	320
	Thermal*	HDT @ 66 psi, °F	D648	300	305	290	290	300	305	305	275	275	265	265
		HDT @ 264 psi, °F	D648	285	295	280	280	285	295	295	265	265	255	255
	Flammability	UL 94 @ 1/16"	UL94	V-2	—	V-0	V-2	V-2	V-2	V-1	—	HB	—	—
		UL 94 @ 1/8"	UL94	V-0 ^f	V-0 ^f	V-0, 5VA	V-0	V-0	V-0	V-0	—	HB	—	—
Typical Processing Conditions, Units	Processing Method****		—	SF	SF	IM	IM	IM	IM	IM	E	E	IM	IM
	Drying Temperature, °F		—	245-255	245-255	245-255	245-255	245-255	245-255	245-255	245-255	245-255	245-255	245-255
	Drying Time, Hours		—	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**
	Melt Temperature, °F		—	575-625	550-600	575-625	575-625	575-625	575-625	575-625	600-650	600-650	510-560	510-560
	Mold/Die Temperature, °F		—	180-240	160-220	180-240	180-240	180-240	180-240	180-240	180-240	180-240	150-200	150-200
	Front Zone, °F		—	600-640	560-590	600-640	600-640	600-640	600-640	600-640	610-650	610-650	520-560	520-560
	Middle Zone, °F		—	580-620	560-590	580-620	580-620	580-620	580-620	580-620	590-630	590-630	500-540	500-540
	Rear Zone, °F		—	560-600	490-510	560-600	560-600	560-600	560-600	560-600	570-610	570-610	480-520	480-520
	Vent Depth, in (minimum)		—	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005

- * All mechanical and thermal testing conducted on 1/8 inch thick unpigmented test samples
- ** Do not exceed 8 hours
- *** Do not exceed 24 hours
- **** Processing Methods: Injection Molding (IM), Structural Foam (SF), and Extrusion (E)
- † Notched Izod @ – 40°F, ft-lb/in., ASTM D256
- f UL listing of foamed thickness at 1/4"

Nomenclature Structure (Grade/Color/Additive)

- 1 indicates mold release
- 2 indicates lube
- 3 indicates UV
- 4 indicates UV and release
- 5 indicates FDA
- 6 indicates FDA and release
- 7 indicates low gloss and UV

1-800-243-5176

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	ACRYLONITRILE BUTADIENE STYRENE (ABS)								PC/ABS							
PC-UT3	ABS-GP1	ABS-GP-IM	ABS-GP-HH	ABS-G10	ABS-G20	ABS-G30	ABS-FRUV (f2)	ABS-FR	PC/ABS-GP1	PC/ABS-GP2	PC/ABS-FR1	PC/ABS-FR2	PC/ABS-G10	PC/ABS-G20	PC/ABS-G30	PC/ABS-FRUV
Utility, High Flow, Wide Spec	General Purpose Resin, UL	General Purpose Resin, Impact Modified	General Purpose Resin, High Heat	10% Glass Filled, General Purpose	20% Glass Filled General Purpose	30% Glass Filled General Purpose	Flame Retardant Resin, UV stabilized UL	Flame Retardant Resin, UL	General Purpose	General Purpose, High Flow UL	Flame Retardant, Standard Flow, UL	Flame Retardant, High Flow, UL	10% Glass Filled, General Purpose	20% Glass Filled General Purpose	30% Glass Filled General Purpose	Flame Retardant, UV stabilized, UL
20-30	3-14	1-3	1-5	0.1-5	0.1-5	0.1-5	4-16	4-16	3-14	15-25	25-45	40-60	3-14	2-12	1-10	25-50
1.20	1.05	1.02	1.05	1.1	1.19	1.26	1.22	1.22	1.15	1.15	1.18	1.18	1.2	1.25	1.29	1.18
5-7	5-7	5-7	5-7	1-4	1-3	1-2	5-7	5-7	5-7	5-7	5-7	4-6	3-6	2-5	1-4	5-7
9,500	6,000	4,400	6,100	6,700	12,500	14,000	5,500	5,500	8,200	8,150	8,200	8,000	8,700	10,500	12,000	8,200
9,000	7,000	5,500	6,500	6,900	12,500	14,000	5,900	5,900	8,400	8,350	9,000	8,800	9,400	10,500	12,000	9,000
13,400	9,300	8,510	11,500	11,000	17,000	19,500	9,000	9,000	12,500	12,000	13,500	13,500	16,000	17,500	19,000	13,500
330	350	274	360	445	905	1200	345	345	330	330	380	370	580	750	900	380
10 min	4.0	7.0	3.5	1.0	1.0	1.0	4.0	4.0	12.0	11.0	12.0	10.0	1.5	1.4	1.3	12.0
320	200	200	200	—	—	—	150	150	320	320	320	320	—	—	—	320
265	190	190	215	210	225	235	190	190	250	250	195	185	256	260	265	195
255	180	180	195	195	213	225	180	180	225	225	185	175	240	245	250	175
—	HB	—	—	—	—	—	V-0	V-0	HB	HB	V-0	V-0	—	—	—	V-0
—	HB	—	—	—	—	—	V-0,5VA	V-0, 5VA	HB	HB	V-0, 5VA	V-0	—	—	—	5VA,2mm
IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM
245-255	180-200	180-200	180-200	175-185	175-185	175-185	180-200	180-200	170-180	170-180	170-180	170-180	175-185	175-185	175-185	170-180
3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	2-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**
510-560	450-500	450-525	450-525	440-460	410-460	410-460	450-500	400-450	525-575	525-575	475-525	475-525	520-570	520-570	520-570	475-525
150-200	120-160	120-180	120-180	120-140	120-140	120-140	120-160	120-160	160-200	160-200	120-180	120-180	160-200	160-200	160-200	120-180
520-560	420-460	440-490	440-490	410-440	410-440	410-440	410-430	410-430	500-575	500-575	470-530	470-530	500-575	500-570	500-570	470-530
500-540	400-440	420-460	420-460	410-430	410-430	410-430	390-410	390-410	490-560	490-560	450-510	450-510	490-560	490-560	490-560	450-510
480-520	370-410	380-410	380-410	375-390	375-390	375-390	340-360	340-460	480-550	480-550	430-490	430-490	480-550	480-550	480-550	430-490
0.0005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.002

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PRL Engineering Resins

			ASTM TEST METHOD	ASA and PC/ASA				POLYETHERIMIDE (PEI)					
				ASA GP1	PC/ASA GP2	PC/ASA GP3	PC/ASA FR1	PEI-GP1	PEI-G10	PEI-G20	PEI-G30	PEI-G40	
Typical Properties, Units	Description			General Purpose, Outdoor weatherable	Medium Flow blend with PC	High Flow blend with PC	Flame Retardant, Non Halo FR, UL	General Purpose, UL	10% Glass Filled, UL	20% Glass Filled, UL	30% Glass Filled, UL	40% Glass Filled, UL	General Purpose, HDT of 265°F, UL
	Physical	Melt Flow Rate, g/10 min	D1238	5-15	8-18	14-20	25-35	5-30	5-22	5-22	5-22	5-22	4-9
		Specific Gravity	D792	1.07	1.14	1.14	1.18	1.27	1.34	1.42	1.51	1.60	1.06
		Mold Shrinkage, E-3 in/in	D955	4-7	5-7	4-6	5-9	5-7	4-6	2-5	1-4	1-3	5-7
	Mechanical*	Tensile Strength, Break, psi	D638	6,500	7,500	8,000	8,000	15,000	16,500	20,000	23,500	25,600	7,000
		Tensile Strength, Yield, psi	D638	6,800	8,500	8,800	9,400	15,000	16,500	20,000	23,500	25,000	8,000
		Flexural Strength, psi	D790	11,000	11,000	13,500	14,000	23,000	27,000	32,000	32,000	34,000	13,000
		Flexural Modulus, psi x 1000	D790	320	377	370	380	500	650	990	1,290	1,600	350
		Notched Izod Impact Strength, ft-lb/in.	D256	3.5	10.0	8.0	5.0	1.0	1.0	1.3	1.5	1.8	4.0
		Gardner Falling Dart Impact, in-lbs.	D5420	200	320	320	320	20	—	—	—	—	150
	Thermal*	HDT @ 66 psi, °F	D648	205	215	215	205	400	405	410	412	418	265
		HDT @ 264 psi, °F	D648	190	190	190	180	385	400	405	410	413	250
	Flammability	UL 94 @ 1/16"	UL94	—	—	—	V-0	V-0	V-0	V-0	V-0	V-0	HB
		UL 94 @ 1/8"	UL94	—	—	—	V-0	V-0	V-0	V-0	V-0	V-0	HB
Typical Processing Conditions, Units	Processing Method****		—	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM
	Drying Temperature, °F		—	180-200	190-210	170-180	175-195	290-300	290-300	290-300	290-300	290-300	220-230
	Drying Time, Hours		—	3-4**	3-4**	3-4**	3-4**	4-6***	4-6***	4-6***	4-6***	4-6***	3-4**
	Melt Temperature, °F		—	425-500	490-520	490-520	445-520	640-750	640-750	640-750	640-750	640-750	550-600
	Mold/Die Temperature, °F		—	120-160	130-160	130-160	125-160	225-350	225-350	225-350	225-350	225-350	160-200
	Front Zone, °F		—	420-460	490-520	490-520	445-520	650-750	650-750	650-750	650-750	650-750	520-590
	Middle Zone, °F		—	400-440	470-490	470-490	430-500	640-750	640-750	640-750	640-750	640-750	500-580
	Rear Zone, °F		—	370-410	450-470	450-470	390-470	630-750	630-750	630-750	630-750	630-750	480-570
	Vent Depth, in (minimum)		—	0.001	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.002

* All mechanical and thermal testing conducted on 1/8 inch thick unpigmented test samples

** Do not exceed 8 hours

*** Do not exceed 24 hours

**** Processing Methods: Injection Molding (IM), Structural Foam (SF), and Extrusion (E)

† Notched Izod @ – 40°F, ft-lb/in., ASTM D256

f UL listing of foamed thickness at 1/4"

Nomenclature Structure (Grade/Color/Additive)

- 1 indicates mold release
- 2 indicates lube
- 3 indicates UV
- 4 indicates UV and release
- 5 indicates FDA
- 6 indicates FDA and release
- 7 indicates low gloss and UV

MODIFIED POLYPHENYLENE ETHER (PPX)

PPX-GP2	PPX-GP3	PPX-GP3-IM	PPX-GP4	PPX-GP5	PPX-GP6	PPX-GP7	PPX-GP1-(COLOR) EN	PPX-G10	PPX-G20	PPX-G30	PPX-FRG10	PPX-FRG20	PPX-FRG30	PPX-SF1	PPX-SF2	PPX-MF-FR1
General Purpose, HDT of 250°F	General Purpose, HDT of 235°F	Impact Modified, HDT of 235°F	General Purpose, HDT of 210°F	General Purpose, HDT of 270°F	General Purpose, HDT of 290°F	General Purpose, HDT of 300°F	Extrusion Grade, HDT of 265°F, UL	10% Glass Filled	20% Glass Filled	30% Glass Filled, UL	10% Glass Filled, V-1, UL	20% Glass Filled, V-1, UL	30% Glass Filled, V-1, UL	Structural Foam Grade, Easy Flow, UL	Structural Foam Grade, Standard Flow, UL	V-0 with HDT of 190°F, Mineral Filled
6-10	12-18	12-18	20-30	2-7	0.1-4	0.1-4	4-9	2-6	1-4	1-4	1-6	1-4	1-4	30-50	25-45	15-25
1.05	1.05	1.05	1.06	1.06	1.06	1.07	1.06	1.14	1.20	1.28	1.15	1.23	1.31	1.12	1.09	1.24
5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	2-5	2-5	1-4	2-5	2-5	1-4	6-9	6-9	5-7
7,750	6,300	6,300	5,000	8,700	8,500	9,200	7,000	10,500	13,500	16,000	11,000	14,000	16,000	9,000	7,500	8,000
8,250	6,800	6,800	5,000	9,000	8,900	9,500	8,000	10,500	13,500	16,000	11,200	14,000	17,000	9,200	7,600	9,000
11,500	10,500	10,500	7,000	14,200	12,300	14,500	13,000	15,000	20,000	23,000	16,900	20,000	20,500	12,000	12,000	13,500
340	320	320	255	345	320	345	350	500	750	1,100	540	720	1,050	460	350	415
4.0	4.0	8.0	5.0	4.0	5.0	4.0	4.0	2.0	1.5	1.5	1.6	1.7	1.8	2.0	3.0	2.0
150	150	150	125	150	200	200	150	—	—	—	—	—	—	—	—	—
250	235	235	210	270	290	300	265	260	280	300	270	270	275	220	220	190
240	225	225	200	260	280	290	250	250	270	290	260	260	265	210	210	180
HB	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB	V-1	V-1	V-1	—	—	V-0
HB	HB	HB	HB	HB	HB	HB	HB	HB	HB	HB	V-1	V-1	V-1, 5VA	V-0 ^f , 5VA	V-0 ^f	V-0
IM	IM	IM	IM	IM	IM	IM	E	IM	IM	IM	IM	IM	IM	SF	SF	IM
220-230	220-230	220-230	180-220	220-230	220-230	220-230	220-230	220-230	220-230	220-230	220-230	220-230	220-230	160-180	160-180	220-230
3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**
540-590	525-575	475-525	475-525	550-600	560-600	575-600	550-600	550-600	550-600	560-600	540-590	550-600	550-600	500-550	520-580	475-540
160-200	150-210	160-210	160-210	150-210	170-210	160-220	—	160-220	160-220	180-240	170-210	160-210	160-210	150-180	150-180	150-180
520-590	510-580	520-590	520-590	540-600	540-600	540-600	—	540-600	540-600	540-600	520-590	520-590	520-590	520-580	520-580	470-540
500-580	490-570	500-580	500-580	520-590	520-590	520-590	—	520-590	520-590	520-590	500-580	500-580	500-580	520-580	520-580	450-530
480-570	470-560	480-570	480-570	500-580	500-580	500-580	—	500-580	500-580	500-580	480-570	480-570	480-570	450-500	450-500	430-520
0.002	0.002	0.002	0.002	0.002	0.002	0.002	—	0.002	0.002	0.002	0.001	0.001	0.001	—	—	0.002

The information contained herein is based on our best knowledge, and we believe it to be true and accurate. Please read all statements and recommendations in conjunction with our conditions of sale which apply to all goods supplied by us. We assume no responsibility for the use or misuse of these statements, recommendations or suggestions, nor do we intend them as recommendations for any use which would infringe any patent or copyright. Furthermore, since we have no control over the use of our products, we accept no liability for their use or misuse. The compatibility of our products in your process is the sole responsibility of the buyer. This data is not intended for specification purposes.

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			ASTM TEST METHOD	MODIFIED POLYPHENYLENE ETHER (PPX)									
				PPX-MF-FR3	PPX-FR1	PPX-FR2	PPX-FR3	PPX-FR4	PPX-FR5	PPX-FR6	PPX-FR1- (COLOR) EN	PPX-FR2- (COLOR) EN	PPX-EN-FR3
Typical Properties, Units	Description			V-0 with HDT of 230°F, Mineral Filled, UL	V-0 with HDT of 190°F, UL	V-1 with HDT of 210°F, UL	V-1 with HDT of 265°F, UL	V-1 Grade with HDT of 185°F	V-0 with HDT of 225°F, UL	V-0 with HDT of 260°F, UL	V-0 with HDT of 190°F, Extrusion Grade, UL	V-0 with HDT of 210°F, Extrusion Grade, UL	V-1 with HDT of 265°F, Extrusion Grade, UL
	Physical	Melt Flow Rate, g/10 min	D1238	3-10	25-50	20-40	4-8	35-50	15-25	4-8	15-40	20-40	4-8
		Specific Gravity	D792	1.23	1.08	1.09	1.06	1.10	1.09	1.10	1.08	1.09	1.06
		Mold Shrinkage, E-3 in/in	D955	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7
	Mechanical*	Tensile Strength, Break, psi	D638	8,500	7,000	7,100	9,000	6,800	7,700	8,000	6,800	7,100	9,000
		Tensile Strength, Yield, psi	D638	10,500	8,000	8,200	9,300	7,000	8,000	9,000	8,200	7,300	9,300
		Flexural Strength, psi	D790	16,000	13,000	12,000	13,000	10,500	11,500	16,000	13,000	12,000	13,000
		Flexural Modulus, psi x 1000	D790	500	330	350	350	320	340	380	330	350	350
		Notched Izod Impact Strength, ft-lb/in.	D256	2.0	5.0	5.0	4.0	5.0	5.0	3.0	7.0	5.0	4.0
		Gardner Falling Dart Impact, in-lbs.	D5420	—	150	150	150	125	150	200	150	150	150
	Thermal*	HDT @ 66 psi, °F	D648	230	190	210	265	185	225	260	190	210	265
		HDT @ 264 psi, °F	D648	220	180	200	250	170	215	250	180	200	250
	Flammability	UL 94 @ 1/16"	UL94	V-0	V-0	V-1	V-1	V-1	V-0	V-0	V-0	V-1	V-1
		UL 94 @ 1/8"	UL94	V-0	V-0	V-1	V-1	V-1	V-0, 5VA	V-0	V-0	V-1	V-1
Typical Processing Conditions, Units	Processing Method ^{1****}		—	IM	IM	IM	IM	IM	IM	IM	E	E	E
	Drying Temperature, °F		—	220-230	160-180	170-180	220-230	170-180	200-210	220-230	160-180	210-220	220-230
	Drying Time, Hours		—	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**
	Melt Temperature, °F		—	550-600	475-525	480-530	550-600	475-525	500-550	550-600	475-525	400-450	450-500
	Mold/Die Temperature, °F		—	160-200	130-170	130-170	160-210	150-180	160-200	160-210	—	—	—
	Front Zone, °F		—	520-590	460-530	460-530	520-590	460-530	480-550	520-590	—	—	—
	Middle Zone, °F		—	500-580	440-520	440-520	500-580	440-520	460-540	500-580	—	—	—
	Rear Zone, °F		—	480-570	420-510	420-510	480-570	420-510	440-530	480-570	—	—	—
	Vent Depth, in (minimum)		—	0.002	0.001	0.001	0.001	0.001	0.001	0.001	—	—	—

* All mechanical and thermal testing conducted on 1/8 inch thick unpigmented test samples

** Do not exceed 8 hours

*** Do not exceed 24 hours

**** Processing Methods: Injection Molding (IM), Structural Foam (SF), and Extrusion (E)

† Notched Izod @ – 40°F, ft-lb/in., ASTM D256

f UL listing of foamed thickness at 1/4"

Nomenclature Structure (Grade/Color/Additive)

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PPX/NYLON					POLYBUTYLENE TEREPHTHALATE (PBT)												
PPX/NY GP1	PPX/NY GP2	PPX/NY G10	PPX/NY G20	PPX/NY G30	TP-GP1	TP-GP2	TP-FR IM	TP-FR IM2	TP-FR2	TP-G15	TP-G30	TP-G40	TP-FRG15	TP-FRG30	TP-IGFR-G30	TP-IG30	TPSF-G10
Blend with nylon 66, Good Chemical Resistance	High Heat blend with nylon 66, Good chemical resistance	10% glass filled blend with nylon 66	20% glass filled blend with nylon 66	30% glass filled blend with nylon 66	General Purpose with Lubricant and Mold Release	General Purpose, UL	Flame Retardant, Impact Modified, Low Flow, UL	Flame Retardant, Impact Modified, High Flow, UL	Flame Retardant, UL	15% Glass Filled	30% Glass Filled, UL	40% Glass Filled	15% Glass Filled, Flame Retardant, UL	30% Glass Filled, Flame Retardant, UL	30% Glass Filled, Flame Retardant, Reduced Warpage, UL	30% Glass Filled, Reduced Warpage	10% Glass Filled Structural Foam Grade
20-40	10-30	2-8	1-4	1-4	12-25	12-20	3-9	8-15	10-18	8-16	8-20	5-15	10-18	9-20	5-18	5-18	8-18
1.08	1.1	1.18	1.25	1.33	1.31	1.31	1.34	1.33	1.39	1.40	1.52	1.61	1.54	1.62	1.57	1.50	1.26
9-12	10-13	5-10	4-7	2-4	16-22	16-22	10-14	10-14	15-20	6-10	6-9	5-8	5-9	4-8	4-8	4-8	4-6
8,000	8,000	12,500	16,500	21,500	7,500	7,500	6,500	5,500	8,400	13,500	17,000	18,500	13,500	17,500	16,000	16,000	10,500
8,400	8,400	12,500	16,500	21,500	7,500	7,500	6,500	5,500	8,400	13,500	17,000	18,500	13,500	17,500	16,000	16,000	10,500
12,000	13,500	20,500	24,500	32,000	11,500	11,500	11,300	9,500	14,000	21,000	28,000	29,000	21,000	27,000	26,000	27,000	15,000
300	320	510	780	1,180	335	335	300	305	375	700	1,100	1,200	725	1,400	1,000	1,000	430
4.0	3.5	0.9	0.9	1.5	1.0	1.0	10.0	12.0	1.0	1.0	1.0	1.5	1.0	1.2	1.5	1.5	1.0
250	250	—	—	—	320	320	320	320	320	—	—	—	—	—	—	—	—
285	310	420	430	450	300	300	270	260	300	400	425	430	400	410	390	415	280
235	265	400	410	440	127	140	190	190	155	370	395	410	345	390	315	340	250
—	—	—	—	—	HB	HB	V-0	V-0	V-0	HB	HB	HB	V-0	V-0	V-0	HB	HB
—	—	—	—	—	HB	HB	V-0	V-0, 5VA	V-0, 5VA	HB	HB	HB	V-0, 5VA	V-0, 5VA	V-0	HB	HB
IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	SF
200-225	200-225	200-225	200-225	200-225	240-250	240-250	240-250	240-250	240-250	240-250	240-250	240-250	240-250	240-250	240-250	240-250	180-250
3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**
530-570	535-575	535-575	535-575	540-580	450-500	450-500	450-500	475-525	450-500	450-500	450-500	450-500	475-525	450-500	450-500	450-500	480-500
150-200	170-250	175-250	175-250	175-250	110-170	110-170	110-180	120-170	110-140	160-190	150-190	150-190	160-190	160-190	160-190	160-190	160-200
530-570	535-575	535-575	535-575	530-600	470-500	470-500	480-510	480-510	470-500	480-510	480-510	480-510	480-510	480-510	480-510	480-510	480-510
520-570	520-575	525-575	525-575	520-580	460-490	460-490	470-500	470-500	460-490	470-500	470-500	470-500	470-500	470-500	470-500	470-500	470-500
500-570	510-575	515-575	515-575	510-580	450-480	450-480	460-490	460-490	450-480	460-490	460-490	460-490	460-490	460-490	460-490	460-490	460-490
0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	—

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			ASTM TEST METHOD	POLYBUTYLENE TEREPHTHALATE (PBT)										
				TP-IG30	TPSF-G10	TPSF-G30	TPSF-FRG10	TPSF-FRG30	TP-HG15	TP-HG30	TP-FRHG15	TP-FRHG30	TP-GFMF1	TP-GFMF2
Typical Properties, Units	Description			30% Glass Filled, Reduced Warpage	10% Glass Filled Structural Foam Grade	30% Glass Filled Structural Foam Grade	Flame Retardant, 10% Glass Filled Structural Foam Grade UL	Flame Retardant, 30% Glass Filled Structural Foam Grade UL	15% Glass Filled Alloy	30% Glass Filled Alloy	15% Glass Filled Alloy, Flame Retardant	30% Glass Filled Alloy, Flame Retardant	40% Glass/Mineral Filled, Flame Retardant, UL	40% Glass/Mineral Filled
	Physical	Melt Flow Rate, g/10 min	D1238	5-18	8-18	4-12	8-18	4-12	10-20	8-20	2-8	1-5	2-8	2-10
		Specific Gravity	D792	1.50	1.26	1.50	1.27	1.62	1.45	1.50	1.52	1.65	1.75	1.62
		Mold Shrinkage, E-3 in/in	D955	4-8	4-6	2-5	4-6	3-5	6-10	6-9	6-9	3-9	4-8	4-8
	Mechanical*	Tensile Strength, Break, psi	D638	16,000	10,500	17,000	10,000	16,500	13,000	15,500	13,000	17,000	14,000	10,500
		Tensile Strength, Yield, psi	D638	16,000	10,500	17,000	10,000	16,500	13,000	15,500	13,000	17,000	14,000	10,500
		Flexural Strength, psi	D790	27,000	15,000	27,000	14,800	25,500	20,000	25,000	20,000	26,000	23,000	17,500
		Flexural Modulus, psi x 1000	D790	1,000	430	1,000	420	1,050	645	1,000	730	1,100	1,450	1,150
		Notched Izod Impact Strength, ft-lb/in.	D256	1.5	1.0	1.0	1.0	1.0	0.5	1.3	1.0	1.0	1.0	1.0
		Gardner Falling Dart Impact, in-lbs.	D5420	—	—	—	—	—	—	—	—	—	—	—
	Thermal*	HDT @ 66 psi, °F	D648	415	280	410	280	410	405	420	385	395	400	410
		HDT @ 264 psi, °F	D648	340	250	395	250	390	315	370	360	370	370	385
	Flammability	UL 94 @ 1/16"	UL94	HB	HB	HB	—	—	HB	HB	V-0	V-0	V-0	HB
		UL 94 @ 1/8"	UL94	HB	HB	HB	V-0 ^f , 5VA	V-0 ^f	HB	HB	V-0	V-0	V-0	HB
Typical Processing Conditions, Units	Processing Method ^{d****}		—	IM	SF	SF	SF	SF	IM	IM	IM	IM	IM	IM
	Drying Temperature, °F		—	240-250	180-250	240-250	180-250	240-250	240-250	240-250	240-250	240-250	240-250	240-250
	Drying Time, Hours		—	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4"	3-4**	3-4**	3-4**	3-4**
	Melt Temperature, °F		—	450-500	480-500	450-500	480-500	450-500	450-500	450-500	450-500	450-500	480-530	475-525
	Mold/Die Temperature, °F		—	160-190	160-200	160-190	160-200	160-190	160-190	160-190	150-190	160-190	160-200	160-200
	Front Zone, °F		—	480-510	480-510	480-510	480-510	480-510	480-510	480-510	480-510	480-510	490-510	490-510
	Middle Zone, °F		—	470-500	470-500	470-500	470-500	470-500	470-500	470-500	470-500	470-500	480-500	480-500
	Rear Zone, °F		—	460-490	460-490	460-490	460-490	460-490	460-490	460-490	460-490	460-490	470-490	470-490
	Vent Depth, in (minimum)		—	0.0005	—	—	—	—	0.001	0.001	0.001	0.001	0.001	0.001

* All mechanical and thermal testing conducted on 1/8 inch thick unpigmented test samples

** Do not exceed 8 hours

*** Do not exceed 24 hours

**** Processing Methods: Injection Molding (IM), Structural Foam (SF), and Extrusion (E)

† Notched Izod @ – 40°F, ft-lb/in., ASTM D256

f UL listing of foamed thickness at 1/4"

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- 7 indicates low gloss and UV

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PC/POLYESTER								NYLON 6 AND NYLON 66									
PC/TP-GP1	PC/TP-GP2	PC/TP-GP3	PC/TP-GP2 G20	PC/TP-GP3 G10	PC/TP-GP3 G30	PC/TP-FR2	PC/TP-FR3	NY6-GP1	NY6 IM1	NY6 G13	NY6 G33	NY66 GP1	NY66 IM2	NY66 G13	NY66 G33	NY66 G43	NY66 MD1
General Purpose, Good Chemical Resistance	High Impact, Excellent Chemical Resistance, UL	High Impact, Superior Chemical Resistance	20% Glass Filled, Excellent Chemical Resistance	10% Glass Filled, Superior Chemical Resistance	30% Glass Filled, Superior Chemical Resistance	Flame Retardant, High Impact, Excellent Chemical Resistance, UL	Flame Retardant, High Impact, Superior Chemical Resistance	Nylon 6 General Purpose UL	Nylon 6 General Purpose Impact Modified	Nylon 6 13% Glass Filled General Purpose	Nylon 6 33% Glass Filled General Purpose	Nylon 66 General Purpose UL	Nylon 66 Impact Modified UL	Nylon 66 13% Glass Filled General Purpose	Nylon 66 33% Glass Filled General Purpose	Nylon 66 43% Glass Filled General Purpose	Nylon 66 Molybdenum Disulfide Lubricant
5-15	5-15	5-15	5-10	2-10	1-8	5-12	12-20	—	—	—	—	—	—	—	—	—	—
1.22	1.22	1.24	1.35	1.3	1.44	1.25	1.29	1.13	1.09	1.22	1.38	1.14	1.07	1.22	1.38	1.5	1.15
5-8	6-9	13-18	3-6	7-10	4-6	6-9	11-13	11-15	16-20	4-6	2-4	12-18	17-20	4-6	2-4	2-4	12-18
7,900	8,200	6,400	10,500	9,000	13,000	7,000	6,200	11,000	9,000	19,000	28,000	1,200	7,300	16,000	26,500	29,000	12,000
8,000	8,400	6,700	10,500	9,000	13,000	7,300	7,100	11,000	9,000	19,000	28,000	1,200	7,500	16,000	26,500	29,000	12,000
12,500	13,000	9,600	17,500	14,000	19,500	11,000	11,000	15,400	11,000	24,000	42,000	1,700	9,000	23,000	36,000	40,000	17,000
315	300	260	680	400	775	290	300	400	300	760	1,300	450	245	685	1,200	1,590	450
15.0	16.0	15.0	2.0	3.5	2.7	13.0	11.0	1.0	3.0	1.1	2.2	1	16	1.2	2	2.3	1
320	10†	320	—	—	NA	7.0†	320	320	320	—	—	—	320	—	—	—	—
250	210	240	240	325	390	195	210	350	335	400	425	445	415	480	495	500	445
230	200	170	230	225	290	180	180	150	145	390	410	190	155	465	477	485	190
HB	HB	HB	—	—	—	V-0	—	V-2	—	—	—	V-2	HB	—	—	—	—
HB	HB	HB	—	—	—	V-0	—	V-2	—	—	—	V-2	HB	—	—	—	—
IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM	IM
220-230	220-230	220-230	220-230	220-230	225-235	220-230	230-240	165-185	165-185	165-185	165-185	165-185	165-185	165-185	165-185	165-185	165-185
4-6**	4-6**	4-6**	4-6**	4-6**	4-6**	4-6**	4-6**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**	3-4**
475-525	475-525	460-500	500-550	500-550	500-550	475-525	475-525	460-535	460-515	460-515	480-515	530-560	530-560	550-570	550-570	550-570	530-560
150-190	150-190	120-180	150-190	150-190	150-200	150-190	120-180	150-180	150-180	150-220	150-220	150-200	150-200	150-220	150-220	150-220	150-200
500-540	500-540	460-500	525-565	500-540	500-540	500-540	460-500	470-500	470-500	480-515	480-515	530-550	530-550	560-580	560-580	560-580	530-550
490-530	490-530	450-480	515-555	490-530	490-530	490-530	490-530	460-490	460-490	480-515	480-515	520-540	520-540	530-550	530-550	530-550	520-540
480-520	480-520	440-470	505-545	480-520	480-520	480-520	480-520	430-475	430-475	470-500	470-500	510-530	510-530	520-540	520-540	520-540	510-530
0.002	0.002	0.002	0.001	0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001

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ETP Reference Table

POLYCARBONATE (PC)				
PRL PC	COMPETITIVE PRODUCTS			PRL PRODUCT DESCRIPTION
	SABIC LEXAN®	TRINSEO CALIBRE®	COVESTRO MAKROLON®	
PC-GP1-D	101, 201	300-6, 300V-6	3105	General Purpose, Low Flow, UL
PC-GP2-D	141, 241	300-10, 300V-10	2605, 2805	General Purpose, Medium Flow, UL
PC-GP3-D	121, 221	280-15, 300-15, 300V-15	2505	General Purpose, High Flow, UL
PC-GP4	HF1110	280-25, 300-22, 300V-22	2405	General Purpose, Easy Flow, UL
PC-UV1-D	103, 203, LS3	302-6, 302V-6	3103, 3107	UV-Stabilized, Low Flow, UL
PC-UV2-D	143, 243, LS2	302-10, 302V-10	2607, 2807, AL 2647	UV-Stabilized, Medium Flow, UL
PC-UV3-D	123, 223, LS1	302-15, 302V-15	2507, AL2447	UV-Stabilized, High Flow, UL
PC-UV4	HF1130, LSHF	302-22, 302V-22	2407, AL2247, AL2447	UV-Stabilized, Easy Flow, UL
PC FD1	104, 204	200-6, 200V-6	3108, 3158	FDA-Compliant Feedstocks, Low Flow
PC FD2	144, 244	200-10, 200V-10	2658, 2858	FDA-Compliant Feedstocks, Medium Flow
PC FD3	124, 224	200-15, 200V-15	2558	FDA-Compliant Feedstocks, High Flow
PC FD4	HF1140	200-22, 200V-22	2458	FDA-Compliant Feedstocks, Easy Flow
PC-FR1-D	950	890-6	—	Low Flow, V-0@1/16" UL
PC-FR2-D	940	890-10	6465, 6485	Medium Flow, V-0@1/16" UL
PC-FR3-D	920	890-15, 890-20	6265	High Flow, V-0@1/16" UL
PC-FR1A-D	950A	700-6	—	Low Flow, V-0@1/8" UL
PC-FR2A-D	940A	700-10	6455, 6555	Medium Flow, V-0@1/8" UL
PC-FR3A-D	920A	700-15	6255, 6355	High Flow, V-0@1/8" UL
PC-IM1	EM1210, EXL6414	—	1260, 1881	Impact Modified, Low Flow
PC-IM2	EXL1414, EXL1434	IM 401-11	T7855, 1837	Impact Modified, Medium Flow
PC-IM3	EM3110, EXL1112	IM 401-18	T7435	Impact Modified, High Flow
PC-IM4	—	—	—	Impact Modified, Easy Flow
PCSF-FR	FL900, FL1600	SF7070	SF800	Structural Foam, V-0 ^f , 5VA, 5% glass filled, UL
PCSF-FR1	FL410, FL910	SF7100	SF810	Structural Foam, V-0 ^f , 10% glass filled, UL
PCSF-FRG20	FL920	—	—	Structural Foam, V-0 ^f , 20% glass filled, UL
PCSF-FRG30	FL930	—	—	Structural Foam, V-0 ^f , 30% glass filled, UL
PC-HM-FR1	500	7100	9415	10% Glass Filled, V-0 ^f , 5VA, UL
PC-HM-FR2	500	7100	9415	10% Glass Filled, V-0, UL
PC-G10	—	5200, 7200	8325, 9425	10% Glass Filled, UL
PC-G20	3412	—	—	20% Glass Filled, UL
PC-G30	3413	—	—	30% Glass Filled, UL
PC-G40	3414	—	—	40% Glass Filled
PC-BR1	151	600-2, 600-3	—	Branched for Extrusion, Blow Molding
PC-BR1-UV	153	602-2, 602-3	—	Branched for Extrusion, Blow Molding, UV, UL
PC FRUV2	925, 945, 955	—	2665	Non Halogen FR UL 94 V-0
PC HH	XHT1141	—	Apec® 1603	High Heat, Low Flow
PC FR TFE	Lubricomp® DL 4020 FR	—	—	PTFE® Filled, Medium Flow, UL
PC UT1	ZLL01CP, PC RC T2	—	—	Low Flow Wide Specification Recycle feed-stocks
PC UT2	ZLL12CP, PCRCT	—	—	Medium Flow Wide Specification Recycle feed-stocks
PC UT3	ZLL19CP, PCRCTC	—	—	High Flow Wide Specification Recycle feed-stocks

ETP Reference Table

ACRYLONITRILE BUTADIENE STRYENE (ABS)				
PRL ABS	COMPETITIVE PRODUCTS			PRL PRODUCT DESCRIPTION
	SABIC	INEOS	TRINSEO	
ABS-GP1	MG38, MG47, MG94	Lustran® 248, 448, 648	—	General Purpose, UL
ABS GP IM	Cycolac® MG38	Absolac® 100	Magnum® 3504; 3513	High Impact
ABS GP HH	Cycolac® X15, X17, X37	Elix® ABS H801	Magnum® 375HH	High Heat
ABS FR	FR15, FR23, FR30	—	—	V-0, 5VA, UL
ABS G10	Thermocomp® AF002	—	—	10% Glass filled
ABS G20	Thermocomp® AF004	Absolac® 30 GF20	Celex® 720	20% Glass filled
ABS G30	Thermocomp® AF006	Absolac® 30 GF30	Celex® 730	30% Glass Filled
ABSFRTUV (f2)	Cycolac® FR15U	Lustran® 448		V-0, 5VA, ABS, UV stabilized, UL
PC/ABS				
PRL PC/ABS	COMPETITIVE PRODUCTS			PRL PRODUCT DESCRIPTION
	SABIC CYCOLOY®	TRINSEO EMERGE®/PULSE®	COVESTRO BAYBLEND®	
PC/ABS GP1	C1110, MC8002	Pulse® 830, 1300series	T45, T65, T85	General Purpose 3-14 MFI
PC/ABS GP2	C1110HF, C1950	—	T45, T65, T85	General Purpose 13-25 MFI, UL
PC/ABS FR1	C2950, C2951, C6200, C6600, C6800	Emerge® 7100	FR110, FR2010, FR3000	V-0, 5VA, 25-45 MFI, UL
PC/ABS FR2	C2800, C2950 HF, C6600, C6840	Emerge® 7560, 7590	FR3005 HF	V-0, 40-60 MFI, UL
PC/ABS FRUV	C6600	Emerge® 7700	—	5VA, 2MM, 25-50 MFI, UV stabilized, UL
PC/ABS G10	C4210	—	Bayblend® T88-GF10	PC/ABS blend, 10% glass filled
PC/ABS G20	C4220; CM4300	Pulse® 630GF	Bayblend® T88-GF20	PC/ABS blend, 20% glass filled
PC/ABS G30	—	—	Bayblend® T88-GF30	PC/ABS blend, 30% glass filled
PC/ACRYLONITRILE STYRENE ACRYLATE (ASA)				
PRL PC/ASA	COMPETITIVE PRODUCTS			PRL PRODUCT DESCRIPTION
	SABIC GELOY®	INEOS	COVESTRO BAYBLEND®	
ASA GP1	CR7020	Luran® 757	—	General Purpose ASA, 5-15 MFI, Weatherable
PC/ASA GP2	XP 4025; XP 7560	Luran® KR2861	Bayblend® W85 HI	General Purpose PC/ASA blend, Medium Flow
PC/ASA GP3	XP7550	Luran® KR2864	Bayblend® W85; W90 XG	General Purpose PC/ASA blend, High Flow
PC/ASA FR1	HRA 222	Luran® KR 2867	—	V-0, PC/ASA blend, UL
POLYETHERIMIDE (PEI)				
PRL PEI	COMPETITIVE PRODUCTS			PRL PRODUCT DESCRIPTION
	SABIC ULTEM®			
PEI-GP1	1000, 1010			General Purpos, Unreinforced, UL
PEI-G10	2100, 2110			10% Glass Filled, UL
PEI-G20	2200, 2210			20% Glass Filled, UL
PEI-G30	2300, 2310			30% Glass Filled, UL
PEI-G40	2400, 2410			40% Glass Filled, UL

Trademarks and registered trademarks used here are the property of each individual company.

ETP Reference Table

MODIFIED POLYPHENYLENE ETHER (PPX)			
PRL PC	COMPETITIVE PRODUCTS		PRL PRODUCT DESCRIPTION
	SABIC NORYL®	ASAHI XYRON®	
PPX-GP1	731	500H, 600H	General Purpose, 265 HDT, UL
PPX-GP2	PX0888	500H, 600H	General Purpose, 250 HDT
PPX-GP3	PX0844, SPN420	400H, 450H	General Purpose, 235 HDT
PPX-GP3-IM	EM6100, EM6101	—	Impact Modified, 235 HDT
PPX-GP4	EM7100, SPN410	200H, 300H	General Purpose, 210 HDT
PPX-GP5	PX1265	600H	General Purpose, 270 HDT
PPX-GP6	PX1390	X9108, 650H	General Purpose, 290 HDT
PPX-GP7	PX1391	X9108, 650H	General Purpose, 300 HDT
PPX-GP8	PX1222	—	Impact Modified
PPX-GP1 [COLOR]EN	ENG265	600H	Extrusion Grade, 265 HDT, UL
PPX-G10	GFN1	G701H	10% Glass Filled
PPX-G20	GFN2	G702H	20% Glass Filled
PPX-G30	GFN3	G703H	30% Glass Filled
PPX-FRG10	SE1GFN1	G701V	10% Glass Filled, V-1, UL
PPX-FRG20	SE1GFN2	G702V	20% Glass Filled, V-1, UL
PPX-FRG30	SE1GFN3	G703V	30% Glass Filled, V-1, UL
PPX-SF1	FN150X, FN170X, FN215X	F100Z, F220Z	Structural Foam Grade, Easy Flow, UL
PPX-SF2	FN215X	F200Z	Structural Foam Grade, Standard Flow, UL
PPX-MF-FR1	HX1000X	—	V-0, 190F HDT, Mineral Filled
PPX-MF-FR3	HX2000X	—	V-0, 230F HDT, Mineral Filled, UL
PPX-FR1	N190X, PX1600 PX1005, PX5622	100Z, 140Z, 220Z, 240Z	V-0, 190F HDT, UL
PPX-FR2	SE100X, PX1700	100V, 140V, 220V, 240V 240W, 300V, 340V, 340W	V-1, 210F HDT, UL
PPX-FR3	SE1X	500V, 540V, 640V, 740V	V-1, 265F HDT, UL
PPX-FR4	PC180X	100V, 140V	V-1, 185F HDT
PPX-FR5	N225X	300Z, 340Z, 500Z, 540Z	V-0, 225F HDT, UL
PPX-FR6	PX9406	500Z, 540Z, 640Z	V-0, 260F HDT, UL
PPX-FR1 [COLOR] EN	EN185	100Z, 140Z, 220Z, 240Z	Extrusion Grade, V-0, 190F HDT, UL
PPX-FR2 [COLOR] EN	EN212	100V, 140V, 220V, 240V 240W, 300V, 340V, 340W	Extrusion Grade, V-1, 265 F HDT, UL
PPX-EN-FR3	EN265	500V, 540V, 640V, 740V	Extrusion Grade, V-1, 265°F HDT, UL
PPX/NY GP1	GTX 902; GTX 918	AT 610	PPE/Nylon 66, High flow
PPX/NY GP2	GTX 910	AT 600	PPE/Nylon 66 blend, Medium flow
PPX/NY G10	GTX 810	AG511	PPE/Nylon 66 blend, 10% glass filled
PPX/NY G20	GTX 820	AG512	PPE/Nylon 66 blend, 20% glass filled
PPX/NY G30	GTX 830	AG213	PPE/Nylon 66 blend, 30% glass filled

ETP Reference Table

POLYBUTYLENE TEREPHTHALATE (PBT)				
PRL TP	COMPETITIVE PRODUCTS			PRL PRODUCT DESCRIPTION
	SABIC VALOX®	TICONA CELANEX®	BASF ULTRADUR®	
TP-GP1	325	2002-2	—	General Purpose, Flow Modified
TP-GP2	310	2002	B4500, B4520	General Purpose, UL
TP-GP1-IM	327	—	—	Impact Modified
TP-FR IM	357, 365	VANDAR 8000	—	Impact Modified, V-0, UL
TP-FR IM2	357, 365	—	—	Impact Modified, V-0, 5VA, UL
TP-FR2	310SEO	2012, 2014, 2016	—	V-0, 5VA, UL
TP-G15	DR51	3200, 3201	B4300 G3	15% Glass Filled
TP-G30	420	3300	B4300 G6	30% Glass Filled
TP-IM-G30	430	—	—	30% Glass Reinforced, Impact Modified
TP-G40	414	3400	B4300 G8	40% Glass Filled
TP-FR G7.5	457	3114, 3116	—	V-0, 5VA, 7.5% Glass Filled
TP-FR G15	DR48	3214, 3216	B4406 G4 (20% GF)	V-0, 5VA, 15% Glass Filled, UL
TP-FR G30	420SEO	3310, 3314, 3316	B4406 G6	V-0, 5VA, 30% Glass Filled, UL
TP-IGFR-G30	553	—	—	V-0, 30% Glass Filled, Reduced Warpage, UL
TP-IG30	508	—	—	30% Glass Filled, Reduced Warpage
TPSF-G10	FV649	—	—	Structural Foam, 10% Glass Filled
TPSF-G30	FV608	—	—	Structural Foam, 30% Glass Filled
TPSF-FRG10	FV699	—	—	Structural Foam, V-0 ^f , 5VA, 10% Glass Filled
TPSF-FRG30	FV620	—	—	Structural Foam, V-0 ^f , 30% Glass Filled
TP-HG15	815	—	—	15% Glass Filled Alloy
TP-HG30	830	—	—	30% Glass Filled Alloy
TP-FRHG15	855	—	—	V-0, 15% Glass Filled Alloy
TP-FRHG30	865	—	—	V-0, 30% Glass Filled Alloy
TP-GFMF1	780	—	—	V-0, 40% Glass/Mineral Filled, UL
TP-GFMF2	735	—	—	40% Glass/Mineral Filled
PC/POLYESTER				
PRL PC/TP	COMPETITIVE PRODUCTS			PRL PRODUCT DESCRIPTION
	SABIC XENOV®	COVESTRO MACROBLEND®		
PC/TP GP1	2230, 2730, 2735	UT250, UT40		Good Chemical Resistance, High Impact
PC/TP GP2	1102, 1731, 1732, 5220, 5230, 5720	UT 1018		Excellent Chemical Resistance, High Impact, UL
PC/TP FR2	Valox® 364	—		V-0, Excellent Chemical Resistance, High Impact, UL
PC/TP GP3	1200, 6123, 6127, 6620	—		Superior Chemical Resistance, High Impact
PC/TP GP2 G10	1760	UT 620G		Excellent Chemical Resistance, 10% Glass Filled
PC/TP GP2 G20	5770	UT 640G		Excellent Chemical Resistance, 20% Glass Filled
PC/TP GP3 G10	6240	—		Superior Chemical Resistance, 10% Glass Filled
PC/TP GP3 G30	6370	—		Superior Chemical Resistance, 30% Glass Filled
PC/TP FR3	Valox® 3706	—		Flame Retardant, Superior Chemical Resistance, High Impact
NYLON				
PRL NY	COMPETITIVE PRODUCTS			PRL PRODUCT DESCRIPTION
	DUPONT	ASCEND	DSM	
NY6 GP1	Zytel® FG 7301	—	Akulon® F-128	General Purpose nylon 6, UL
NY6 IM1	Zytel® ST 7301	—	—	Impact Modified nylon 6
NY6 G13	Zytel® 73 G15	—	—	General Purpose nylon 6, 13% glass filled
NY6 G33	Zytel® 73 G30	—	Akulon® M-1016	General Purpose nylon 6, 33% glass filled
NY66 GP1	Zytel® 101	Vydyne® 21	—	General Purpose nylon 66, UL
NY66 IM2	Zytel® ST 801	Vydyne® 47	—	General Purpose nylon 66
NY66 G13	Zytel® 70 G13	Vydyne® R513	—	General Purpose nylon 66, 13% glass filled
NY66 G33	Zytel® 70 G33	Vydyne® R533	—	General Purpose nylon 66, 33% glass filled
NY66 G43	Zytel® 70 G43	Vydyne® R543	—	General Purpose nylon 66, 43% glass filled

Trademarks and registered trademarks used here are the property of each individual company.

Injection Molding Troubleshooting Guide

How to use this guide:

- Follow the steps listed from 1-10 for the issue you are experiencing.
- Change only one item at a time.
- Document your changes.

	Check melt temperature	Check mold temperature	Check backpressure	Check ring assembly	Check cleanliness of machine and area	Check condition of screw	Check contamination	Check cushion	Check dead spot potential	Check dryer	Check filler	Check for excessive fines	Check for hang ups in melt delivery system	Check for moisture on surface of mold	Check for uniform filling	Check gate angle for proper impingement	Check gate freeze	Check gate location	Check heater bands and thermocouples
Black Specks	✓	✓		5	8	4	1					2	6						7
Blisters and Bubbles	✓	✓	5									2							
Brittleness	✓	✓					2			3									
Burns	✓	✓	6						5				4						8
Crazing/Cracking	✓	✓					1												
Delamination	✓	✓					1												
Dimensional Issues	✓	✓															3		
Flash	✓	✓																	
Gate Blush	✓	✓														4	2		
Jetting/Worming	✓	✓														1			
Nozzle Issues (Drool/Freeze/Stringing)	✓	✓																	4
Poor Surface Finish	✓	✓					1	3		2								6	
Race Tracking	✓	✓																2	
Sinks/Voids	✓	✓															5	3	
Splay	✓	✓	4						7	1				10					8
Sticking - Parts	✓	✓						4											
Warp	✓	✓															2		
Weld/Knit Lines	✓	✓									4				3				

Items to consider when addressing your problem:

- Ensure equipment is working properly. (dryers, heater bands, thermocouples, etc).
- Start at the mid-points of PRL processing recommendations.
- Accurate melt and mold temperature measurement is critical. Always use a pre-heated pyrometer (20-30°F above the expected temperature) and hold in place for at least 30 seconds.

[illegible]

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