Polypropylene

Products and Properties
America

Braskem

December 2013

PP · Polypropylene

Nomenclature

PP

HOMO = Homopolymer
RACO = Random Copolymer
HECO = Heterophasic Copolymer
HCHP = High Crystalline Homopolymer

This information reflects typical values obtained in our laboratories, but should not be considered as absolute or as warranted values. Only the properties and values mentioned on the Certificate of Quality are considered as guarantee of the product.

The mentioned values in this report can be changed at any moment without Braskem previous communication.

For usage doubts or to discuss other applications, contact our Technical Service Engineers.

Braskem: expanding horizons with products and services

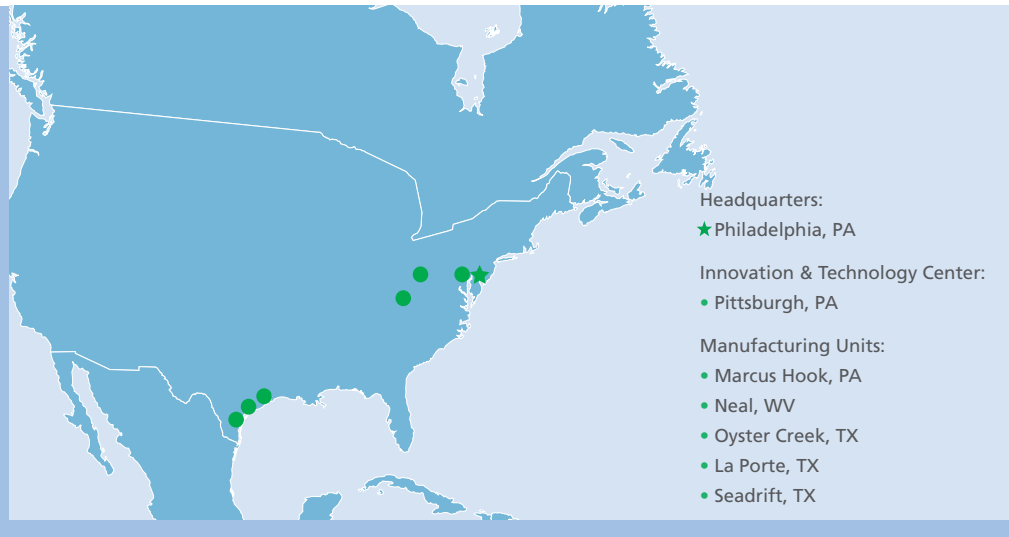
Braskem, the leading producer of thermoplastic resins in the Americas and the world's largest producer of biopolymers, has constantly innovated by launching new products in partnership with Clients, bringing about improvements to society and the environment. With installed resin production capacity of over 7 million tons a year, Braskem has supported the plastic chain by developing more modern and innovative products, sponsoring expositions and events related to the plastics industry and by providing technical know-how and expanding production capacity.

Investments are not restricted to Brazil alone. In 2011, Braskem aquired two PP plants in Europe: Schkopau and Wesseling. Braskem also invests in other projects across Latin America: the Ethylene XXI project is a petrochemical complex installed in Mexico in partnership with Idesa, which will supply 1 million tons/year of polyethylene to the market. Investments of around US$ 4.5 billion have gone into this project, which is expected to start production in 2015.

The global presence does not translate merely into investments. The operational synergy between Braskem's plants and offices around the world enables it to better meet the growing needs of both our global and local Clients through the supply of products and services.

Besides offering products and services that promote sustainability, Braskem constantly monitors and seeks ways to reduce water and energy consumption, as well as waste and effluent generation, further reducing the environmental impact of its operations in Brazil and around the world.

Innovation, technology, sustainability and the unceasing quest for the best way to serve translate into dreams come true for Clients, and in each new partnership, Braskem creates new ways to look at the world



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PP · Polypropylene

BOPP

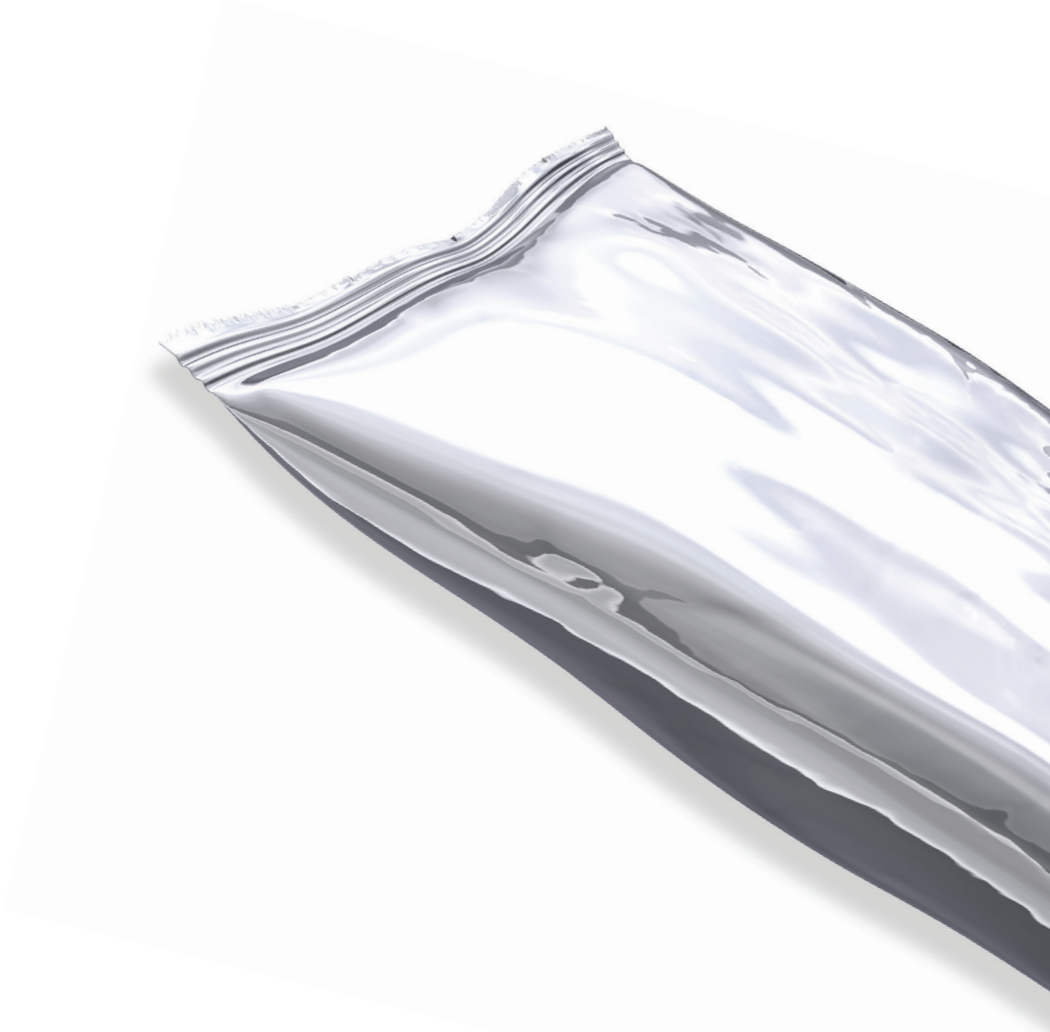
Typical Properties		Melt Flow (230 C, 2.16 kg)	Flexural Modulus (0.05in/min, 1% secant)		Notched Izod Impact Strength @ 23 C		Tensile Strength @ yield (2 in/min)	
ASTM Method		D1238	D790A		D256A		D638	
Units		g/10'	psi	MPA	ft-lb/in	J/m	psi	MPA
HOMO	FF018F	1.8	190,000	1,310	0.5	27	4,900	34
		Excellent color and processing stability, superior optical and mechanical properties, broad processing window						
RACO	6D20	1.9	148,500	1,024	1.1	59	3,900	27
		Consistent processability, good regrind, good gloss and clarity, low odor and taste transfer						
	DS6D81	5.0	79,700	550	1.7	91	2,750	19
		Consistent processability, good optical properties, low temperature heat seal						
	DR376.01	7.0	79,700	550	1.7	91	2,750	19
		Consistent processability, good optical properties, low temperature heat seal						
	DS6D82	7.0	79,700	550	1.7	91	2,750	19
		Consistent processability, good optical properties, low temperature heat seal						
	DS6D21	8.0	110,000	759	0.9	48	3,620	25
		Consistent processability, high clarity and gloss						

Blow Molding

Typical Properties		Melt Flow (230 C, 2.16 kg)	Flexural Modulus (0.05in/min, 1% secant)		Notched Izod Impact Strength @ 23 C		Tensile Strength @ yield (2 in/min)	
ASTM Method		D1238	D790A		D256A		D638	
Units		g/10'	psi	MPA	ft-lb/in	J/m	psi	MPA
RACO	6D20	1.9	148,500	1024	1.1	59	3,900	27
		Consistent processability, good regrind, good gloss and clarity, low odor and taste transfer						
	R131-02A	1.9	149,000	1028	1.1	59	3,900	27
		Consistent processability, good regrind stability, good gloss and clarity, low odor and taste transfer, contains an antistatic additive						
	6D83G	1.9	155,000	1069	5.5	294	4,100	28
		Consistent processability, low plate-out, low odor and taste, high gloss, good regrind stability, contains clarifying additive						
	6D83K	1.9	155,000	1069	5.5	294	4,100	28
		Consistent processability, low odor and taste transfer, high gloss, good regrind stability, contains clarifying additive						
	RP650	2.0	170,000	1172	1.2	64	4,600	32
		High Flexural Modulus, next generation clarifier providing superior aesthetics and enhanced optical properties						
	TR3015WV2	2.5	140,000	966	2.0	107	4,000	28
		Nucleated, antistatic, very good mold release						

Cast Film

Typical Properties		Melt Flow (230 C, 2.16 kg)	Flexural Modulus (0.05in/min, 1% secant)		Notched Izod Impact Strength @ 23 C		Tensile Strength @ yield (2 in/min)	
ASTM Method		D1238	D790A		D256A		D638	
Units		g/10'	psi	MPA	ft-lb/in	J/m	psi	MPA
HOMO	INSPIRE 216	8.0	250,000	1,724	0.5	27	5,500	38
		Contains an antiblock agent						
	D218	8.0	304,000	2,097	0.6	32	5,800	40
		Contains antiblock and nucleating additives						
HECO	TI4015F	1.6	175,000	1,207	NB	NB	3,800	26
		Superior balance of stiffness and impact strength						
	KN-501	8.0	170,000	1,172	2.5	133	3,700	26
		Excellent color and processing stability, excellent long term heat aging properties, wet/dry environment resistance						



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Extrusion

Typical Properties		Melt Flow (230 C, 2.16 kg)	Flexural Modulus (0.05in/min, 1% secant)		Notched Izod Impact Strength @ 23 C		Tensile Strength @ yield (2 in/min)	
ASTM Method		D1238	D790A		D256A		D638	
Units		g/10'	psi	MPA	ft-lb/in	J/m	psi	MPA
HOMO	F006EC2	0.5	200,000	1,379	1.3	69	4,900	34
		Enhanced long term heat aging						
	F013M	1.3	185,000	1,276	0.5	27	4,800	33
		General Purpose						
	H110-02N	2.0	230,000	1,586	0.95	51	5,100	35
		Contains a nucleating agent, high clarity, good melt strength						
	FT021N	2.6	250,000	1,724	0.7	37	5,500	38
		Contact clarity, nucleated, high flexural modulus						
	H521	3.6	240,000	1,655	0.7	37	5,400	37
		Injection molding, general purpose, low water carryover						
	INSPIRE 216	8.0	250,000	1,724	0.5	27	5,500	38
		Contains an antiblock agent						
	D218	8.0	304,000	2,097	0.6	32	5,800	40
		Contains antiblock and nucleating additives						

Extrusion

Typical Properties		Melt Flow (230 C, 2.16 kg)	Flexural Modulus (0.05in/min, 1% secant)		Notched Izod Impact Strength @ 23 C		Tensile Strength @ yield (2 in/min)	
ASTM Method		D1238	D790A		D256A		D638	
Units		g/10'	psi	MPA	ft-lb/in	J/m	psi	MPA
HECO	TI4003F	0.3	210,000	1,448	NB	NB	4,200	29
		Extra high izod impact, very high flexural modulus, good low temperature drop impact						
	INSPIRE 114	0.5	215,000	1,483	NB	NB	4350	30
		High Melt Strength, High Toughness, Excellent Processability, High Impact and Puncture Resistance, High Film Stiffness/Machinability, High Heat Resistance						
	TI4007G	0.7	175,000	1,207	NB	NB	4,200	29
		Extra high izod impact, superior low temperature drop impact						
	TI4015F	1.6	175,000	1,207	NB	NB	3,800	26
		Superior balance of stiffness and impact strength						
	TI4020N	2.0	180,000	1,241	NB	NB	4,000	28
		Extra high Izod impact, excellent low temperature drop impact, good organoleptic properties, nucleated						
	C144-04NA	4.0	230,000	1,586	2.0	107	4,800	33
		Excellent balance of stiffness and impact strength, contains nucleating and antistatic additives						
	C7054-07NA	7.0	155000	1,069	12	641	3,220	22
		High stiffness, high toughness, contains a nucleating and antistatic additive						
RACO	RP650	2.0	170,000	1,172	1.2	64	4,600	32
		High Flexural Modulus, next generation clarifier providing superior aesthetics and enhanced optical properties						
	TR3015WV2	2.5	140,000	966	2	107	4,000	28
		Nucleated, antistatic, very good mold release						

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Fiber

Typical Properties		Melt Flow (230 C, 2.16 kg)	Flexural Modulus (0.05in/min, 1% secant)		Notched Izod Impact Strength @ 23 C		Tensile Strength @ yield (2 in/min)	
ASTM Method		D1238	D790A		D256A		D638	
Units		g/10'	psi	MPA	ft-lb/in	J/m	psi	MPA
HOMO	D080T	8.0	230,000	1,586	0.6	37	5,400	37
		General purpose						
	D115A	11.0	230,000	1,586	0.5	37	5,200	36
		Multi purpose, good color and process stability						
	D130C	14.0	220,000	1,517	0.5	27	5,400	37
		High bulk						
	D180A2	18.0	220,000	1,517	0.7	37	5,100	35
		Excellent Melt Stability						
	D180M	18.0	190,000	1,310	0.5	37	5,100	35
		Low Gas Fade						
	CP250H	25.0	170,000	1,172	0.4	27	4,700	32
		Narrow MWD, low smoke / condensate						
	CP360H	34.0	170,000	1,172	0.4	32	4,700	32
		Narrow MWD, low smoke / condensate						
	CP380G	38.0	205,000	1,414	0.7	21	4,800	33
		Excellent high melt flow characteristics						

Injection Molding

Typical Properties		Melt Flow (230 C, 2.16 kg)	Flexural Modulus (0.05in/min, 1% secant)		Notched Izod Impact Strength @ 23 C		Tensile Strength @ yield (2 in/min)	
ASTM Method		D1238	D790A		D256A		D638	
Units		g/10'	psi	MPA	ft-lb/in	J/m	psi	MPA
HOMO	F006EC2	0.5	200,000	1,379	1.3	69	4,900	34
		Enhanced long term heat aging						
	H521	3.6	240,000	1,655	0.7	37	5,400	37
		Injection molding, general purpose, low water carryover						
	D115A	11.0	230,000	1,586	0.5	27	5,200	36
		Multi purpose, good color and process stability						
	FT120WB2	12.0	230,000	1,586	0.6	32	5,400	37
		Superior antistatic properties, excellent mold release						
	FT120WV	12.0	240,000	1,655	0.7	37	5,600	38
		Antistatic, nucleated, good mold release						
	F180A	17.0	220,000	1,517	0.7	37	5,100	35
		Multipurpose						
	FT200WV	20.0	255,000	1,759	0.7	37	5,600	39
		Good mold release, nucleated, excellent rigidity and hardness						
	ZS-751	22.0	270,000	1,655	0.4	27	5,500	38
		Superior stiffness, excellent mold release, nucleated						
	FPT300F	30.0	200,000	1,379	0.7	37	4,800	33
		Good mold release, excellent part finish (low bloom)						
	CP360H	34.0	170,000	1,172	0.4	21	4,700	32
		Narrow MWD, low smoke / condensate						
	FPT350WV3	35.0	240,000	1,655	0.5	27	5,500	38
		Narrow molecular weight distribution, antistatic, nucleated, very good mold release						
	5E16S	40.0	196,000	1,352	0.5	27	4,600	32
		Good processability, contains antistatic additive						
	FP450WV	45.0	240,000	1,655	0.3	16	5,500	38
		Excellent processability, nucleated						
	FP650WV	65.0	240,000	1,655	0.3	16	5,500	38
		Excellent processability, nucleated						

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Injection Molding

Typical Properties		Melt Flow (230 C, 2.16 kg)	Flexural Modulus (0.05in/min, 1% secant)		Notched Izod Impact Strength @ 23 C		Tensile Strength @ yield (2 in/min)	
ASTM Method		D1238	D790A		D256A		D638	
Units		g/10'	psi	MPA	ft-lb/in	J/m	psi	MPA
HECO	TI4007G	0.7	175,000	1,207	NB	NB	4,200	29
		Extra high izod impact, superior low temperature drop impact						
	TI4020N	2.0	180,000	1,241	NB	NB	4,000	28
		Extra high Izod impact, excellent low temperature drop impact, good organoleptic properties, nucleated						
	TI6035NB	3.8	140,000	966	NB	NB	3,100	21
		Extra high izod impact, superior low temperature drop impact						
	TI4040WT	4.0	205,000	1,414	3.5	187	4,400	30
		Superior drop impact at refrigeration temperature, very high flexural modulus, nucleated, good mold release						
	C7054-07NA	7.0	155,000	1,069	12.0	641	3,220	22
		High stiffness, high toughness, contains a nucleating and antistatic additive						
	KN-501	8.0	170,000	1,172	2.5	133	3,700	26
		Excellent color and processing stability, excellent long term heat aging properties, wet/dry environment resistance						
	TI4150WR	15.0	220,000	1,517	1.5	80	4,600	32
		Very good mold release, very high flexural modulus						
	C702-20	18.0	150,000	1,034	3.5	187	3,000	21
		High Impact						
	C702-20NA	18.0	180,000	1,241	3.5	187	3,300	23
		High impact performance, contains a nucleating and antistatic additive						
	C7079-25RNA	25.0	154,000	1,062	NB	NB	3,200	22
		Consistent processability, excellent toughness, good surface gloss						
	C719-35RN HP	35.0	155,000	1,069	3.5	187	3,000	21
		High impact, contains nucleating agent, controlled rheology product						
	C700-35N	35.0	220,000	1,517	1.2	64	4,000	28
		Good mold fillability, high stiffness, fast set-up, contains a nucleating agent						
	TI6350WV	35.0	135,000	931	4.2	224	2,800	19
		Superior low temperature impact, nucleated, antistatic						
	C705-44NA	44.0	198,000	1366	1.0	53	3,180	22
		High stiffness, nucleated for fast set-up, good impact resistance, contains antistat for mold release						
	C7100-50NA	50.0	138,000	952	3.0	160	3,200	22
		Freezer temperature impact resistance, high flow processing ease, easy mold release, fast cycle time, good organoleptic properties, contains nucleating and antistatic additives						
	TI4700P2	70.0	180,000	1,241	1.2	64	3,900	27
		High stiffness, nucleated						
	TI6800WV	80.0	155,000	1,069	2.3	123	3,000	21
		Nucleated, excellent mold release, high impact properties						
	C758-80NA	80.0	200,000	1,379	1.4	75	3,730	26
		Very easy mold filling with good balance of impact strength and stiffness, contains a nucleating and antistatic additive						

Injection Molding

Typical Properties		Melt Flow (230 C, 2.16 kg)	Flexural Modulus (0.05in/min, 1% secant)		Notched Izod Impact Strength @ 23 C		Tensile Strength @ yield (2 in/min)	
ASTM Method		D1238	D790A		D256A		D638	
Units		g/10'	psi	MPA	ft-lb/in	J/m	psi	MPA
RACO	RP350	12.0	155,000	1,069	1.1	59	4,300	30
		Processing stability, low odor, good flow and set-up behavior, superior clarity, aesthetics and enhanced optical properties, excellent mold release						
	TR3350MS	35.0	125,000	862	1.0	53	3,600	25
		Good mold release, superior processing stability, superior clarity, nucleated, superior aesthetics and enhanced optical properties						
	TR3350MS	35.0	125,000	862	1.0	53	3,600	25
		High impact performance, excellent mold release, superior clarity, excellent processability						
	RP250	35.0	170,000	1172	1	53	4,500	31
		Superior processing stability, superior clarity, aesthetics and enhanced optical properties, excellent mold release						
	R7021-50RNA	50.0	155,000	1069	1.0	53	4,000	28
		Good impact properties, excellent optics, fast cycle times, contains clarifier and antistat additives						
	D5001-80	80.0	150,000	1034	0.9	48	4,000	28
		High flow for processing ease, fast set-up, superior clarity and gloss, good mold release						

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Thermoforming

Typical Properties		Melt Flow (230 C, 2.16 kg)	Flexural Modulus (0.05in/min, 1% secant)		Notched Izod Impact Strength @ 23 C		Tensile Strength @ yield (2 in/min)	
ASTM Method		D1238	D790A		D256A		D638	
Units		g/10'	psi	MPA	ft-lb/in	J/m	psi	MPA
HOMO	H110-02N	2.0	230,000	1,586	1.0	51	5,100	35
		Contains a nucleating agent, high clarity, good melt strength						
	INSPIRE 222	2.0	211,000	1,455	1.3	69	5,100	35
		Contains a nucleating agent, high clarity						
	FT021NH	2.0	220,000	1,517	1.3	69	5,100	35
		High clarity, improved appearance						
	INSPIRE 224	2.0	211,000	1,455	1.1	59	5,100	35
		Superb clarity, high gloss, nucleated						
	FT021N	2.6	250,000	1,724	0.7	37	5,500	38
		Contact clarity, nucleated, high flexural modulus						
HCHP	F020HC	2.0	300,000	2,069	0.5	27	5,700	39
		Very high flexural modulus, high clarity						
HECO	TI4005P2	0.5	210,000	1,448	NB	N	4,200	29
		Extra high Izod impact, very high flexural modulus, good low temperature drop impact, nucleated						
	INSPIRE 114	0.5	215,000	1,483	NB	NB	4,350	30
		High Melt Strength, High Toughness, Excellent Processability, High Impact and Puncture Resistance, High Film Stiffness/Machinability, High Heat Resistance						
	TI4020N	2.0	180,000	1,241	NB	NB	4,000	28
		Extra high Izod impact, excellent low temperature drop impact, good organoleptic properties, nucleated						
	C144-04NA	4.0	230,000	1,586	2	107	4,800	33
		Excellent balance of stiffness and impact strength, contains nucleating and antistatic additives						
	TI4040WT	4.0	205,000	1,414	3.5	187	4,400	30
		Superior drop impact at refrigeration temperature, very high flexural modulus, nucleated, good mold release						
	C7054-07NA	7.0	155,000	1,069	12.0	641	3,220	22
		High stiffness, high toughness, contains a nucleating and antistatic additive						

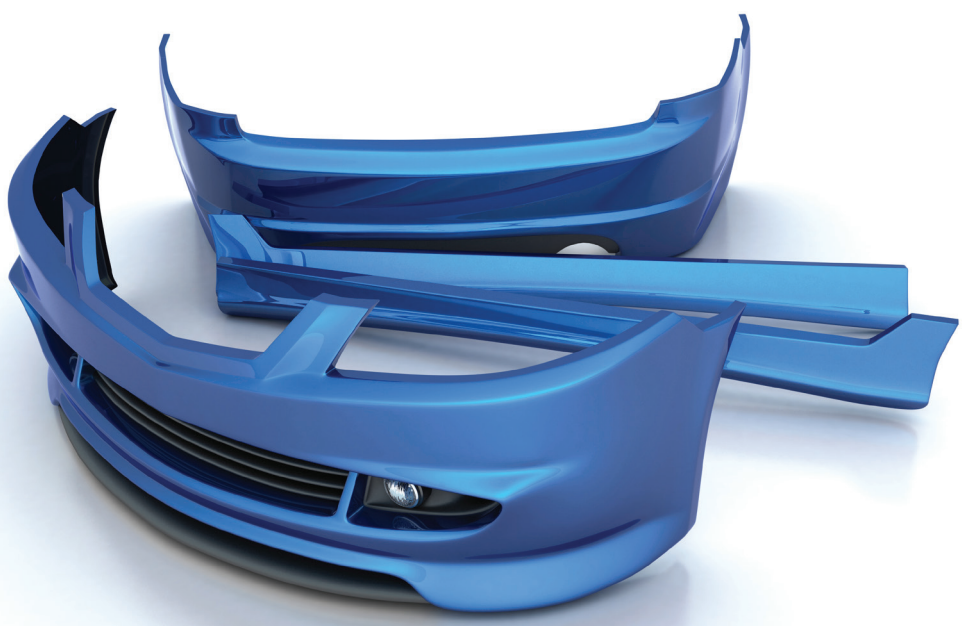
Compounding

Typical Properties		Melt Flow (230 C, 2.16 kg)	Flexural Modulus (0.05in/min, 1% secant)		Notched Izod Impact Strength @ 23 C		Tensile Strength @ yield (2 in/min)	
ASTM Method		D1238	D790A		D256A		D638	
Units		g/10'	psi	MPA	ft-lb/in	J/m	psi	MPA
HOMO	F006EC2	0.5	200,000	1,379	1.3	69	4,900	34
		Enhanced long term heat aging						
	F008F	0.8	190,000	1,310	0.8	43	5,200	36
		High melt strength, excellent rigidity						
	H521	3.6	240,000	1,655	0.7	37	5,400	37
		Injection molding, general purpose, low water carryover						
	D080T	8.0	230,000	1,586	0.6	32	5,400	37
		General purpose						
	D115A	11.0	230,000	1,586	0.5	27	5,200	36
		Multi purpose, good color and process stability						
	F180A	17.0	220,000	1,517	0.7	37	5,100	35
		Multipurpose						
	CP360H	34.0	170,000	1,172	0.4	21	4,700	32
		Narrow MWD, low smoke / condensate						
	FP450WV	45.0	240,000	1,655	0.3	16	5,500	38
		Excellent processability, nucleated						
	FP650WV	65.0	240,000	1,655	0.3	16	5,500	38
		Excellent processability, nucleated						
	CP1200B	126.0	180,000	1,241	0.3	16	4,700	32
		General Purpose						

PP · Polypropylene

Compounding

Typical Properties		Melt Flow (230 C, 2.16 kg)	Flexural Modulus (0.05in/min, 1% secant)		Notched Izod Impact Strength @ 23 C		Tensile Strength @ yield (2 in/min)	
ASTM Method		D1238	D790A		D256A		D638	
Units		g/10'	psi	MPA	ft-lb/in	J/m	psi	MPA
High Crystalline HECO	TI2150C	15.0	230,000	1,586	1.5	80	4,600	32
		Highly crystalline homopolymer phase, very high molecular weight EPR phase, very high flexural modulus, reduced emissions, reduced gels						
	TI2350C	40.0	230,000	1,586	1.0	53	4,600	32
		Highly crystalline homopolymer phase, very high molecular weight EPR phase, very high flexural modulus, reduced emissions, reduced gels, high melt flow						
	TI2600C	66.0	240,000	1,655	0.9	48	4,900	34
		Highly crystalline homopolymer phase, very high molecular weight EPR phase, very high flexural modulus, reduced emissions, reduced gels, high melt flow						
	TI2900C	110.0	230,000	1,586	0.7	37	4,900	34
		Highly crystalline homopolymer phase, very high molecular weight EPR phase, very high flexural modulus, reduced emissions, reduced gels, high melt flow						
	TI71000M	120.0	245,000	1,690	0.7	37	4,900	34
		Highly crystalline homopolymer phase, very high molecular weight EPR phase, very high flexural modulus, reduced emissions, reduced gels, high melt flow						
HCHP	F020HC	2.0	300,000	2,069	0.5	27	5,700	39
		Very high flexural modulus, high clarity						
	F350HC2	35.0	300,000	2,069	0.4	21	6,000	41
		Very high flexural modulus, high melt flow						
	F1000HC	115.0	300,000	2,069	0.3	16	5,950	41
		Very high flexural modulus, high melt flow						



Compounding

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ASTM Method		D1238	D790A		D256A		D638	
Units		g/10'	psi	MPA	ft-lb/in	J/m	psi	MPA
HECO	TI4005P2	0.5	210,000	1,448	NB	NB	4,200	29
		Extra high Izod impact, very high flexural modulus, good low temperature drop impact, nucleated						
	TI4007G	0.7	175,000	1,207	NB	NB	4,200	29
		Extra high izod impact, superior low temperature drop impact						
	TI6035NB	3.8	140,000	966	NB	NB	3,100	21
		Extra high izod impact, superior low temperature drop impact						
	TI4040WT	4.0	205,000	1,414	3.5	187	4,400	30
		Superior drop impact at refrigeration temperature, very high flexural modulus, nucleated, good mold release						
	KN-501	8.0	170,000	1,172	2.5	133	3,700	26
		Excellent color and processing stability, excellent long term heat aging properties, wet/dry environment resistance						
	TI6120Q4	12.0	115,000	793	NB	NB	2,750	19
		Extra high izod impact, superior low temperature drop impact, good paint adhesion						
	C702-20	18.0	150,000	1,034	3.5	187	3,000	21
		High Impact						
	TI6200Q4	20.0	115,000	793	NB	NB	2,850	20
		Extra high izod impact, superior low temperature drop impact, good paint adhesion						
	C7079-25RNA	25.0	154,000	1,062	NB	NB	3,200	22
		Consistent processability, excellent toughness, good surface gloss						
	TI6350WV	35.0	135,000	931	4.2	224	2,800	19
		Superior low temperature impact, nucleated, antistatic						
	TI4350P	35.0	200,000	1,379	1.4	75	4,000	28
		Good balance of stiffness and impact strength, excellent organoleptic properties, high melt flow						
	C705-44NA	44.0	198,000	1,366	1.0	53	3,180	22
		High stiffness, nucleated for fast set-up, good impact resistance, contains antistat for mold release						
	TI4700P2	70.0	180,000	1,241	1.2	64	3,900	27
		High stiffness, nucleated						
	TI4900M	115.0	210,000	1,448	0.7	37	4,300	30
		Very high flexural modulus, high melt flow						

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