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The purpose of this Product Selection Guide is intended only as technical support for the use of the products shown.

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- (i) U.S. FDA Class I or II Medical Devices; Health Canada Class I, II or III Medical Devices; European Union Class I or II Medical Devices;
- (ii) film, overwrap and/or product packaging that is considered a part or component of one of the aforementioned medical devices;
- (iii) packaging in direct contact with a pharmaceutical active ingredient and/or dosage form that is intended for inhalation, injection, intravenous, nasal, ophthalmic (eye), digestive, or topical (skin) administration;
- (iv) tobacco related products and applications, electronic cigarettes and similar devices.
- (v) safety components in automotive applications, for example: air bags, air bag unit housings and covers, seat belt mechanisms, brake systems, pedals and pedal supports, steering systems.

The product(s) may not be used in:

- (i) U.S. FDA Class III Medical Devices; Health Canada Class IV Medical Devices; European Class III Medical Devices;
- (ii) applications involving permanent implantation into the body;
- (iii) life-sustaining medical applications.

All references to U.S. FDA, Health Canada, and European Union regulations include another country's equivalent regulatory classification.

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HMC Polymers

An associate of PTTGC & LyondellBasell



About HMC Polymers

HMC Polymers is the leading manufacturer and marketer of polypropylene in Thailand. The company commenced production in 1987 and currently delivers an annual PP production capacity of 810,000 metric tons.

HMC's production facilities, currently comprise two *Spheripol* process plants and one *Spherizone* process plant (300,000 metric tons), as well as one Oleflex propane dehydrogenation plant (PDH).

All plants are located on the Map Ta Phut Industrial Estate of Rayong in Thailand, 200km southeast of Bangkok and produce a broad portfolio of homopolymer, terpolymer, heterophasic and random copolymer resins.

In addition, a 220,000 metric tons world-scale plant also using *Spherizone* polypropylene process technology will be starting operations in 2022, bringing HMC's total PP capacity to over 1 million tons and maintaining the company's position as SE Asia's largest PP producer.

Our goal is to be the preferred partner and leading PP solution provider in Southeast Asia. Today, our joint venture associates include GC and LyondellBasell as major shareholders and a group of leading Thai investors including Bangkok Bank, Hua Kee and Metro Group.

HMC Polymers delivers world-class service and the full spectrum of latest technology PP products for manufacturers in Thailand and the Asia-Pacific region. We constantly strive to improve our environmental impact and use of feedstocks.

Polypropylene Properties

Isotactic polypropylene is well suited for a variety of end uses, ranging from flexible and rigid packaging to fibres and large moulded parts for automotive and consumer products. Polypropylene is recyclable, an important consideration in many packaging and automotive applications, and it can also be incinerated for energy recovery.

PP can be processed using most methods including cast and BOPP film extrusion, extrusion coating, blow moulding and stretch blow moulding, injection moulding and thermoforming. Its physical properties can be easily enhanced by using functional additives. Polypropylene has excellent chemical resistance and electrical insulating properties.

Homopolymers (HOMO)

Homopolymers are characterised by a high isotactic index resulting in a high melting point leading to excellent stiffness, superior scratch resistance and good chemical resistance against most inorganic acids, alkalis and salts.

In addition, homopolymers provide good resistance to environmental stress cracking when in contact with alcohols, esters, detergents or polar hydrocarbons.

Its high melting point also makes HOMO PP resins especially suitable for applications requiring temperature resistance, such as hot filling or steam sterilisation. HOMO PP resins are available in a wide range of melt flow rates (MFR) and therefore can be used in all processing technologies from pipe extrusion to thin wall injection moulding (TWIM).

Terpolymers (TERPO)

Introducing HMC's *Adsyl* and *Clyrell* product ranges, unique product structures from *Spherizone*, the latest generation PP process technology. Terpolymers are polypropylenes modified with two different types of co-monomers.

These products are designed for use as functional layers in flexible packaging including adhesion layers for metallized, printable or barrier films in CPP, BOPP and shrink film.

This exciting addition to HMC's PP product portfolio will enable our customers in the flexible packaging industry to expand the property ranges of their multi-layer films.

Random Copolymers (RACO)

Random copolymers are derived by modification of the polypropylene chain by the addition of small amounts of comonomer resulting in modified properties when compared with HOMO PP.

Random copolymers provide significantly improved optical properties (haze and gloss), enhanced hot sealing characteristics as well as improved impact performance.

RACO PP resins show good chemical resistance against most inorganic acids, alkalis and salts as well as good resistance to environmental stress cracking.

RACO PP resins are widely used as a skin layer in extrusion applications for flexible packaging as well as in injection moulded consumer goods due to their excellent optical properties.

Heterophasic Copolymers (HECO)

Heterophasic copolymers are achieved by polymerising a rubber component within the polypropylene matrix polymer. The resulting polymers exhibit a good level of stiffness due to the matrix polymer combined with excellent low temperature impact performance thanks to the rubber component.

Heterophasic copolymers can serve applications in operating environments from deep freeze to microwave ovens.

Due to high impact performance, HECO resins are used in demanding applications such as automotive bumpers, pails and crates or sewage pipe systems. Heterophasic copolymers are available in a broad range of melt flow rates (MFR) and can be converted with all major technologies ranging from pipe extrusion, blown film to injection moulding or TWIM.

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HMC Product Quick Reference Guide

Name	Product Type	MFR @216kg/230°C, g/10min	T.S. MPa	Flex. Mod. MPa	Notched Izod at 23°C, J/m	HDT °C	Applications
CAST FILM AND BLOWN FILM							
HP520M	HOMO	8	35	1,550	28	105	Core layer for CPP film
EP310D	HECO	0.7	26	1,100	No break	90	Non-pressure pipe, sheet extrusion, retort film and blown film
Adsyl 6093	TERPO	6.5	26	835	52	79	Terpolymers very low SIT with AB for skin layer of CPP film
RC221M	TERPO	7	25	820	45	79	Terpolymers low SIT for skin layer of CPP film
RC6049A	TERPO	7	25	860	45	78	Terpolymers low SIT with AB for skin layer of CPP film
RC213M	RACO	10	30	1,100	31	87	Medium SIT with AB for skin layer of metallized CPP film
RP225N	RACO	11	26	880	40	84	Medium SIT with AB and slip agent for skin layer of laminated CPP film
POLYOLEFIN SHRINK FILM							
Adsyl 6089	TERPO	5.5	24	795	49	75	Terpolymer very low SIT with AB and slip agent for skin layer of POF film
THERMOFORMING AND SHEET EXTRUSION							
HP500D	HOMO	0.5	35	1,560	104	103	Low sagging resin for vacuum TF, sheet for food and electronic trays
HP748H	HOMO	2	38	1,800	47	115	Clear and highly stretchable resin for deep-drawn beverage TF cups, sheet
HA849K	Hc-HOMO	3.5	40	2,150	30	128	Very high stiffness, heat resistance and high clarity for multilayer TF
EA6052	Hc-HECO	1.2	30	1,750	277	117	High heat and cold impact resistance for freezer to microwave TF trays, sheet
EP300H	HECO	1.8	25	1,150	No break	88	TF trays, sheets, corrugated board, extrusion profiles, EBM bottles
BOPP							
HP525J	HOMO	2.8	33	1,500	34	97	Metallizable high stiffness BOPP resin
HP6047	HOMO	3	36	1,700	31	103	High purity dielectric BOPP film
Adsyl 6064	TERPO	5.5	24	770	50	74	Terpolymer - very low SIT for skin layer of BOPP film
RC6081	TERPO	6	24	800	43	77	Terpolymer - low SIT for skin layer of BOPP film
RC2472	RACO	7	20	580	76	76	High clarity printing and sealing layer for BOPP film
MEDICAL							
Soft Medical	RACO	1.5	22	650	100	76	Soft resin for EBM, 1-stage ISBM, BFS-IV bottles and IV bags
RP271G	RACO	1.7	26	900	80	88	EBM, 1-stage ISBM IV bottles
RP271M	RACO	8	27	1,030	50	90	2-stage ISBM, injection moulding

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RAFFIA AND RAFFIA COATING							
HP400H	HOMO	2.1	33	1,450	40	95	Slit tape, straws, rope, sheet
HP400K	HOMO	4	33	1,400	32	93	Slit tape, straws, housewares, furniture
HP500L	HOMO	6	34	1,550	34	102	High tenacity for high speed slit tape machines
EP120P	HECO	18	19	600	32	77	Soft high speed coating and lamination for woven bags
EP229R	HECO	22	25	960	18	83	High speed coating and lamination for woven bags
EP229S	HECO	32	26	1,000	16	83	High speed coating and lamination for woven bags
TEXTILES AND SPUNBOND							
HP553R	HOMO	22	34	1,500	20	98	Anti-gasfading for staple, multifilament, injection moulding, caps
HP561R	HOMO	25	32	1,240	24	94	Low MFR, anti-gasfading for spunbond, nonwoven fabrics
HP563T	HOMO	55	34	1,450	20	105	High MFR, fast crystallization spunbond, nonwoven fabrics
HP562T	HOMO	60	34	1,390	14	107	High MFR, anti-gasfading for spunbond, nonwoven fabrics
WATER QUENCHED BLOWN FILM							
HP527NA	HOMO	1.1	34	1,450	27	100	High clarity water quenched blown film
THIN WALL INJECTION MOULDING							
HP544T	HOMO	60	37	1,700	26	119	High flow with good transparency for thin-wall packaging
HP640U	HOMO	75	37	1,750	26	117	High flow with transparency improvement for thin-wall packaging
HP649U	HOMO	75	38	1,800	23	115	High flow with excellent transparency for thin-wall packaging
EP548S	HECO	44	27	1,500	46	116	Good stiffness/impact balance, anti-static performance
EP546T	HECO	60	26	1,550	40	115	High flow resin for yogurt cups, freezer to microwave thin-wall packaging
RP348S	RACO	35	29	1,030	47	86	High clarity and high gloss resin for thin-wall packaging
BATTERY CASES							
EP549N	HECO	1.2	26	1,350	100	100	Battery cases, appliance and automotive parts, UV stabilized

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INJECTION MOULDING							
HP500N	HOMO	1 2	34	1,480	25	97	Containers, housewares, toys, caps
EP400L	HECO	5	25	1,220	132	88	Pails, crates, appliances, toys
EP344N	HECO	10	23	1,250	170	99	Very high impact resistance for IML pails and crates
EP540N	HECO	1 2	27	1,540	80	110	High stiffness, medium impact for pails and crates
EP341R	HECO	24	24	1,150	60	96	Medium flow resin for appliances
EP380T	HECO	44	24	1,150	64	90	Good flow with good impact resistance for appliances
EP549T	HECO	60	26	1,500	40	115	High flow with fast cycle times for appliances, containers
RP348N	RACO	1 1	29	1,050	70	86	Excellent transparency for containers, housewares, caps, ISBM bottles
RP6112	RACO	1 1	29	1,100	60	86	Non-Phthalate with excellent transparency for containers, housewares, caps, ISBM bottles
RP346R	RACO	25	29	1,050	50	85	Excellent bluish transparency for housewares, large size containers
RP6110	RACO	25	31	1,200	50	90	Non-Phthalate with excellent transparency for housewares, large containers
RP6111	RACO	25	31	1,200	50	90	Non-Phthalate with bluish transparency for housewares, large containers
PIPES AND FITTINGS							
H2483	HECO	0.3	32	1,800	560	108	PP High Modulus (PP-HM) for drainage and sewage pipe systems
H5416T	RACO	0.3	26	850	580	84	PP-R grade for pressure pipes, hot and cold water distribution
CAPS & CLOSURES AND EXTRUSION BLOW MOULDING							
HP400M	HOMO	7.5	34	1,450	27	96	Caps, housewares, toys, containers
HP648N	HOMO	12	38	1,870	32	122	High stiffness resin for caps, closures, housewares, toys
EP545L	HECO	6	31	1,480	77	115	CSD and hot fill closures
RP6068	RACO	1	21	620	No break	72	Excellent clarity and impact resistance for large size EBM/bottles
RP242G	RACO	1.5	27	920	No break	82	High clarity for EBM bottles, sheet, caps and closures