



SOLUTION CREATION COMPANY LIMITED
 HEAD OFFICE
 555/1 Energy Complex Building A, 15th Floor, Vibhavadi-Rangsit Road,
 Chatuchak, Chatuchak, Bangkok 10900 THAILAND
 +86 (0) 2-140-8864

GC MARKETING SOLUTIONS COMPANY LIMITED
 555/1 Energy Complex Building A, 9th Fl, Vibhavadi Rangsit Road,
 Chatuchak, Bangkok 10900 THAILAND

+86 (0) 2-140-4488
 +86 (0) 2-140-4333

GC MARKETING SOLUTIONS VIETNAM COMPANY LIMITED
 Ho Chi Minh City, Vietnam Unit 5.02, 5.03 and 5.04, 5th Floor, Deutsches
 Haus Ho Chi Minh-Stadt, No. 33 Le Duan Street, Ben Nghe Ward, District 1,
 Ho Chi Minh City, Vietnam

+8428 38 233611
 +84-28-3823-3722

GC MARKETING SOLUTIONS COMPANY LIMITED
 (GUANGZHOU REPRESENTATIVE OFFICE)
 Guangzhou, China
 China Shine Office Building Unit 3803, Building A,
 No.9 Linhexi Road, Tianhe District, Guangzhou 510620 China

+86-20-8558-9250
 +86-20-8558-9240

GC MARKETING SOLUTIONS COMPANY LIMITED
 (SHANGHAI REPRESENTATIVE OFFICE)
 Shanghai, China
 Room no. 13-012, 13th floor, HangSeng Bank Tower 1000
 Lujiazui Ring Road, Pudong New Area, Shanghai 200120 China

+86-21-2025-2811
 +86-21-2025-2808

GCM POLYMER TRADING DMCC
 Dubai, United Arab Emirate
 Unit 406, Indigo Tower, Plot No. JLT-PH1-D1A,
 Jumeirah Lakes Towers, Dubai, U.A.E.

+971-4-423-0774
 +971-4-423-0773

GC MARKETING SOLUTIONS MYANMAR COMPANY LIMITED
 192 Kaba Aye Pagoda Road
 Unit 05, 14th Floor, Tower 1, Myanmar Centre Tower
 Bahan Township, Yangon, Myanmar

+95 19345411-2

PT GCM MARKETING SOLUTIONS INDONESIA
 Gold Coast Office, Eiffel Tower Lt. 3 Unit A&T, Jl. Pantai
 Indah Boulevard, Pantai Indah Kapuk, RT 6/RW 2,
 Jakarta Utara 14470 Indonesia



www.gcmgrp-techinfo.com



Agricultural Film Solutions

Updated as of June 2021



Company Introduction



PTT Global Chemical Public Company Limited

PTT Global Chemical Public Company Limited, or GC, Thailand's largest integrated petrochemical and refining business and a leading corporation in the Asia-Pacific region, both in size and product variety. GC has a combined olefins and aromatics capacity of 11.28 million tons/year. We committed to creating chemical innovations for a better future. We strongly support technological advances that meet today's lifestyles through products that span several sectors including automobiles, construction, medical products, electric and electronic equipment, agricultural products, environmentally friendly, and safe consumer products that benefit society and improve consumer satisfaction.



GC Styrenics Company Limited

GC Styrenics Company Limited, or GCS, subsidiary of PTT Global Chemical Public Company Limited (GC), is a polystyrene manufacturer with more than 30 years operation experiences capable of supplying 90 KTA of products to customers with two production lines producing High Impact Polystyrene (HIPS) and General Purpose Polystyrene (GPPS). These resources are built to prompt our company to strive towards our vision: "To be preferred polystyrene provider for better living" by enabling us to be able to serve our customers with various applications and needs. Our products are well-known under the brand "DIAREX". They are used as raw materials to produce various types of instant products used in everyday life, mostly to form Packaging products, electronic and electrical appliance industry, consumer products and construction application with special properties and characteristic.



GC Marketing Solutions Company Limited

GC Marketing Solutions Company Limited, or GCM, a subsidiary of PTT Global Chemical Company Limited (GC). GCM is a major polymer sales and marketing company in Thailand. We offer variety of high-quality polymers such as high density polyethylene (HDPE), low density polyethylene (LDPE), linear low density polyethylene (LLDPE), polypropylene (PP), polystyrene (PS) and polyethylene terephthalate (PET). Our products are distributed throughout Thailand as well as being exported to more than 100 countries around the world with the product and services qualities are well accepted by our customers internationally.



www.gcmgrp.com

Solution Creation Company Limited

Solution Creation Company Limited, or SUN, a subsidiary of PTT Global Chemical Public Company Limited (GC), is a distributor of polymer compound which are high density polyethylene (HDPE), linear low density polyethylene (LLDPE), polypropylene (PP) and polystyrene (PS) compound including bioplastics and bioplastics compound.



GC Logistics Solutions Company Limited

GC Logistics Solutions Company Limited, or GCL, a subsidiary of PTT Global Chemical Public Company Limited (GC). GCL is full logistics service for chemical business and other products. The services is including silo, bagging & packing, warehouse management, transportation, freight forwarding, and customs clearance etc. We are committed to strengthen our client's competitive advantage though high quality services, advanced technology and competitive cost.



www.gc-logistic.com



Product Introduction

Business Trends

The market is mainly driven by the rising demand for agricultural films in applications such as greenhouse films, mulch films, and silage. Factors such as global focus on increasing agricultural output and increasing demand from the dairy industry will drive the agricultural films market.

Value Chain



Converter

Benefit to Converter (Production Perspective) :

Our agricultural film resin are well controlled in quality to provide an advantage of Processability, Product stability and Product consistency which essential for high speed & fast cycle time production.

Brand

Benefit to Brand Owner (Marketing Perspective) :

Our agriculture film resin deliver quality advantages of endurance, value added from special function, easy for installation.

Consumer

Benefit to consumer (User Experience Perspective) :

Our agricultural film resin helps consumer to get good products of food.



Solutions

Product Quality

Because the quality and safety are major required for agricultural application, we are strongly committed to producing InnoPlus, PlastMate and DIAREX resin a safe, functional and legal product by obtaining globally recognized certification.



InnoPlus PE, PlastMate HDPE Pipe, DIAREX PS for agricultural application is manufactured under International ISO 9001 / ISO 14001 / OHSAS 18001 standard and strictly control for Good Manufacturing Practices (GMP) and Hazard Analysis and Critical Control Point (HACCP) standard.

InnoPlus PE and PlastMate HDPE Pipe for agricultural application also meet with international standard regulations in contact with food application such a U.S FDA 21 CFR 177.1520 and EC1935/2004, EU10/2011 and its amendments.

DIAREX®

DIAREX PS for agricultural application also meet with international standard regulations in contact with food application such a U.S FDA 21 CFR 177.1640 and EC1935/2004, EU10/2011 and its amendments.

In particular country, InnoPlus PE, PlastMate HDPE Pipe, DIAREX PS for agricultural application comply with HALAL for Muslim country, JCI1 for Japan, GB 9685-16 for China and TIS 816-2556 for Thailand.

Service Quality

We are also strongly committed to handle and deliver agricultural application. We storage the resin in International Distribution Center (IDC) is one of the largest in the Southeast Asian region. It is over 140,000 sq.m. in size and has a capacity to handle the production and delivery of over 1 million tons of polymer per year with most advanced technology under top quality management.

We provide fully logistics with highly effective integrated Transportation Management System (TMS) spanning across transportation network design, routes selection, vehicle scheduling and freight management to ensure the best results.



How to Handling and Storage

Handling

- Use good housekeeping for safe handling of the product
- No smoking, open flames or source of ignition drinking or eating in handling and store area
- Avoid spilling the product, as this might cause falls
- Potential toxic/irritating fumes may be evolved from heated material. Provide appropriate ventilation for such processing conditions
- Take precautionary measures against explosion risks, as all types of polymers may develop dust during transporting or grinding of granules

Storage

- Store away from heat, ultraviolet and direct sunlight in a dry, cool and well-ventilated area
- Take precautionary measures to prevent the formation of static electricity
- Do not store together with oxidizing and self-igniting products



GRADE Selection : LLDPE

Properties	Test Method (ASTM)	Unit	LL7810A	LL7810D	LL7910A
MFR at 190 °C, 2.16 kg	D1238	g/10min	1	1	1
Density	D792	g/cm ³	0.918	0.920	0.918
Film Properties					
Tensile Strength at Break (MD)	D882	MPa	50	54	60
Tensile Strength at Break (TD)	D882	MPa	50	54	53
Elongation at Break (MD)	D882	%	700	600	490
Elongation at Break (TD)	D882	%	800	710	675
1% Secant Modulus (MD)	D882	MPa	200	230	191
1% Secant Modulus (TD)	D882	MPa	230	290	224
Dart Impact Strength	D1709	g	>423	>423	206
Tear Strength (MD)	D1922	g	300	300	250
Tear Strength (TD)	D1922	g	400	400	450
Vicat Softening Point	D1525	oC	106	107	106
Gloss (45o)	D2457	-	35	49	62
Haze	D1003	%	13	15	8
Special Feature			-	Medium Slip & Antiblock	-

For more information : www.gcmgrp-techinfo.com



GRADE Selection : LLDPE

Properties	Test Method (ASTM)	Unit	LL7410A	LL7410D	LL7410D1	LL7410D2	LL7610A	LL7610D1
MFR at 190 °C, 2.16 kg	D1238	g/10min	1	1	1	1	1	1
Density	D792	g/cm ³	0.918	0.921	0.920	0.921	0.918	0.920
Film Properties								
Tensile Strength at Break (MD)	D882	MPa	34	34	34	34	40	40
Tensile Strength at Break (TD)	D882	MPa	26	26	26	26	30	30
Elongation at Break (MD)	D882	%	600	600	600	600	650	650
Elongation at Break (TD)	D882	%	800	800	800	800	750	750
1% Secant Modulus (MD)	D882	MPa	190	190	190	190	250	250
1% Secant Modulus (TD)	D882	MPa	230	230	230	230	300	300
Dart Impact Strength	D1709	g	100	100	90	90	180	180
Tear Strength (MD)	D1922	g	100	100	100	100	350	350
Tear Strength (TD)	D1922	g	300	300	300	300	500	500
Vicat Softening Point	D1525	C	100	100	101	100	100	100
Gloss (45o)	D2457	-	55	50	50	50	35	30
Haze	D1003	%	10	17	13	20	13	13
Special Feature			-	High Slip & Antiblock	Low Slip & Antiblock	Very high Slip & Antiblock	-	Low Slip & Antiblock

For more information : www.gcmgrp-techinfo.com



GRADE Selection : LDPE

Properties	Test Method (ASTM)	Unit	LD2420D	LD2420F	LD2420H	LD2426H	LD2420K	LD2426K
MFR at 190 °C, 2.16 kg	ISO 1133	g/10min	0.27	0.75	1.9	1.9	4	4
Density	ISO 1183	g/cm ³	0.922	0.922	0.924	0.924	0.924	0.924
Melting Temperature	ISO 11357	°C	112	112	110	110	110	110
Vicat Softening Point	ASTM D1525	°C	96	94	93	93	93	93
Film Properties								
Haze	ASTM D1003	%	8	6	6	7	7	8
Gloss (20°)	ASTM D2457	-	50	60	80	80	90	80
Dart Drop Strength	ASTM D1709	g	220	170	140	150	130	120
Max Tensile Strength (MD)	ISO 527	MPa	28	25	23	23	20	20
Max Tensile Strength (TD)	ISO 527	MPa	27	23	20	20	18	18
Ultimate Elongation (MD)	ISO 527		450	400	500	500	560	500
Ultimate Elongation (TD)	ISO 527	%	700	700	700	700	700	630
Special Feature		%	-	-	-	Slip & Antiblock	-	Slip & Antiblock

For more information : www.gcmgrp-techinfo.com



GRADE Selection : HDPE

Properties	Test Method (ASTM)	Unit	HD7000F	HD5000S	HD5050S	HD2208J	HD2228J	HD2308J	HD2418J
MFR at 190 °C, 2.16 kg	D1238	g/10min	0.05	0.8	1.0	3.7	4	6	7
Destiny	D792	g/cm ³	0.956	0.954	0.956	0.961	0.960	0.962	0.964
Melting Temperature	D3418	°C	135	134	136	134	136	136	137
Tensile Strength at Yield	D638	kg/cm ²	300	290	290	310	300	300	310
Tensile Strength at Break	D638	kg/cm ²	390	390	420	220	300	170	175
Elongation at break	D638	%	820	>1000	>1000	>1000	>1000	>1000	>1000
Flexural Modulus	D790	kg/cm ²	12000	12000	12000	12000	12000	15000	14800
Notched Izod Impact Strength	D256	kg.cm/cm	30	17 (Partial Break)	55 (Partial Break)	5 (Complete Break)	6 (Complete Break)	5 (Complete Break)	4 (Complete Break)
Durometer Hardness	D2240	Shore D	64	125	-	65	65	65	65
Vicat Softening Point	D1525	°C	125	-	128	122	127	125	127.5
ESCR; 25% Igepal, F50	D1693	Hours	>2000	-	-	6	6	5	4
Special Feature			-	-	-	UV added	UV added	UV added	UV added

For more information : www.gcmgrp-techinfo.com



GRADE Selection : HDPE Compound

Properties	Test Method (ASTM)	Unit	HD8100MB
MFR at 190 °C, 5 kg	ISO 1133	g/10min	0.25
Density	ISO 1133	g/cm ³	0.960
Tensile Strength at Yield	ISO 527	MPa	23
Tensile Strength at Break	ISO 527	MPa	> 30
Elongation at break	ISO 527	%	> 600
Flexural Modulus	ASTM D790	kg/cm ²	11500
Notched Izod Impact Strength	ASTM D256	kg.cm/cm	50 (Non Break)
Durometer Hardness	ASTM D2240	Shore D	64
ESCR; 25% Igepal, F50	ASTM D1693	Hours	>2000
Carbon Black Content	ISO 6964	%	2.25
Oxidative Induction Time (OIT, 210oC)	ISO 11357-6	Min	>40
Classification	ISO 12162	-	PE100

For more information : www.gcmgrp-techno.com

DIAREX® GRADE Selection : PS

Properties	Test Method (ASTM)	Unit	H350E
MFR at 200 °C, 5 kg	D1238	g/10min	2.6
Tensile Strength at Yield	D638	kg/cm ² lb/in ²	281 4000
Tensile Elongation*	D638	%	53
Flexural Strength	D790	kg/cm ² lb/in ²	386 5500
Flexural Modulus* (x10000)	D790	kg/cm ² lb/in ²	1.8 26
Izod Impact strength*	D256	kg/cm ft.lb/in	11 2
Rockwell Hardness*	D785	Scale	R112
Vicat Softening Point (1 kg)*	D1525	°C °F	101 213
Deflection Temperature* (18.56 kg/cm)	D648	°C °F	76 169
Underwriter Laboratory*	-	-	UL-94HB

HIPS High Impact

*Data based on injection molding test pieces