Table of Contents

Introduction

The National Petrochemical Company(NPC)of Iran is one of the largest companies around the world which is responsible for producing chemicals and polymers.Today NPC is the second largest producer and exporter of petrochemicals in the Middle east.Over the years ,it has not only expanded the range and volume of its products (specially polymers), but it has also taken steps in areas such as research and technology to achieve its goals and produce products with higher quality.

One of NPC's subsidiaries is Iran Petrochemical Commercial Company (IPCC) which is one of the largest companies in the Middle east engaged in sale and marketing of petrochemical products in the Iranian domestic market as well as export to overseas markets,its current goals are to continually improve the presence and profile of IPCC by upgrading quality and increasing quantities of its facilities, product and services.All for the ultimate satisfaction of its customers and business partners To meet its objective , IPCC established worldwide subsidiaries : IPCC U.K.Ltd in England , Intra-Chem Trading in Germany , IPCC Singapore , IPCC Dubai , IPCC Shanghai IPCC Beijing , IPCC India , IPCC South Korea & IPCC Turkey to carry out its marketing and procurement functions.

NPC's production plants which are using the highest technology to produce polymers and chemicals are as follow:

1)Bandar Imam Petrochemical Company (BIPC) which is producer of following polymers with below mentioned capacities :
HDPE(60,000mt/y),LDPE(100,000mt/y),PVC(175,000mt/y), SBR(40,000mt/y)

2)Tabriz Petrochemical company (TPC) which is producer of following polymers with below mentioned capacities : HDPE & LLDPE(100,000mt/y),GPPS(25,000mt/y),HIPS(40,000mt/y),EPS(15,000mt/y) ,ABS(35,000mt/y)

3)Amirkabir Petrochemical company which is producer of following polymers with below mentioned capacity : HDPE(140,000mt/y) , LLDPE & HDPE (300,000mt/y) .

4) Khorasan Petrochemical company which is producer of following polymer with below mentioned capacity : Melamine(20,000mt/y)

5) Khuzestan Petrochemical company which is producer of following polymer with below mentioned capacity : Epoxy resin(10,000mt/y)

6) Shahid Tondgooyan Petrochemical Company (STPC) which is producer of following polymers with below mentioned capacities :
PET (Bottle grade) : (309,000mt/y) ,PET (Textile grade) : (366,000mt/y) ,POY (66,000MT/Y) ,staple(66,000mt/y)

7) Marun Petrochemical company which is producer of following polymers with below mentioned capacity : HDPE(300,000mt/y)

Projects

By the end of the construction operations of new plants, total production capacity of polymers will reach to the following amounts in the year 2008.

1)LLDPE / HDPE(Swing plant) :1, 600,000 mt/y

2)HDPE:1,700,000 mt/y

3)LDPE :1,000,000 mt/y

4)PP: 1,030,000 mt/y

5)PVC:550,000 mt/y

6)PS: 330,000 mt/y

7)PC:25,000 mt/y

8)ABS:70,000 mt/y

Polyethylene (PE)

Polyethylene is the largest tonnage of plastic materials .The characteristics of PE which lead to its widespread use may be summarized as low cost, easy process ability ,excellent electrical insulation, excellent chemical resistance , toughness and flexibility even at low temperature ,reasonable clarity of film ,free from odor and toxicity,a sufficiently low water vapor permeability for many packaging ,building and agriculture applications.

Low Density Polyethylene (LDPE)

Grade	MFI (gr/10min)	Applications
LF0200	2.0	General purpose bags, packaging of carrier bags, co-extruded milk bags, low tension power cables insulation and industrial injection moldings.
LH0075	0.75	Carrier bags, shrink film,industrial film, dust bin liners, small bottles, blow molding of small containers, packaging of pharmaceutical products, packaging of foodstuffs and bottles for storage of chemical products.
LH0050	0.50	Shrink films, industrial film, dust bin liners, blow molding of small containers, packaging of pharmaceutical products, packaging of foodstuffs and bottles for storage of chemical products.
LH0030	0.3	Heavy duty bags,cable,... .
2100TN00	0.3	Shrink hoods, industrial sacks, Heavy duty carrier bags
2101TN47	0.85	Carrier bags, shrink film, industrial film, dust bin liners, small bottles, blow molding of small containers, packaging of pharmaceutical products, packaging of foodstuffs and bottles for storage of chemical products.
2501TN00	0.75	Diaper film, lamination film
2102TX00	1.9	Bags, liner, lamination film
2602TH00	1.9	Diaper film, under blankets and films for medical applications
2004TC37	4.7	Very thin films with good optical properties
2404TC47	4.7	Covering film
1922T	22	Injection molding

Low Density Polyethylene (LDPE)

Producer: Bandar Imam Petrochemical company (BIPC)									
Property	Melt Flow Index (190° C,2.16Kg)	Density	VSP	Elongation @ break	Tensile@ break(MD)	HDT	Dart Impact	Haze	Gloss@ 60
Unit	g/10 min	g/cm3	°C	%	Kg/cm2	°C	gr	%	GU
Method	ASTM D-1238	TSTM 209-B	ASTM D-1525	ASTM D-882	ASTM D-882	ASTM D-648	ASTM D-1709	ASTM D-1003	ASTM D-523
LF0200	2	0.920	94	MD:330 Min TD: 600 Min	160 Min	-	100 Min	15 Max	60 Min
LH0075	0.75	0.921	94	MD:300 Min TD: 450 Min	170 Min	33	120 Min	-	-
LH0050	0.5	0.920	94	MD:280 Min TD: 550 Min	230 Min	58	130 Min	-	-
LH0030	0.3	0.922	95	MD:250 Min TD:500 Min	250 Min	-	-	-	-

Low Density Polyethylene (LDPE)

Producer: Laleh Petrochemical Complex									
Extrusion grades									
Property	Melt Flow Index (190°C,2.16Kg)	Density	Tear strength	Elongation @ break	Tensile strength	C.O.F	Impact strength	Haze	Gloss@ 60
Unit	g/10 min	g/cm3	KN/m	%	MPa		Kj/m	%	%
Method	ISO 1133	ISO 1183	ISO 6383-2	ISO R527-1	ISO R527-1	ASTM D 1894	ASTM D 4272	ASTM D1003	ASTM D 2457
2100TN00	0.3	0.921	MD:20 TD: 25	MD:200Min TD: 500 Min	MD:29 TD:26	0.7	35	15	39±5
2101TN47	0.85	0.921	MD:40 TD: 30	MD:200Min TD: 500 Min	MD:24 TD:21	0.1	30	11	49±5
2501TN00	0.75	0.925	MD:35 TD: 30	MD:200Min TD: 500 Min	MD:28 TD:25	0.7	20	10	50±5
2102TX00	1.9	0.921	MD:60 TD: 25	MD:150 Min TD:500 Min	MD:- TD:20	>1	26	11	50±5
2602TH00	1.9	0.926	MD:90 TD: 40	MD:150 Min TD:500 Min	MD:30 TD:20	>1	15	7.1	61±5
2004TC37	4.7	0.921	MD:80 TD: 30	MD:100 Min TD:450 Min	MD:27 TD:15	0.2	15	9.5	53±5
2404TC47	4.7	0.924	MD:90 TD: 30	MD:100 Min TD:450 Min	MD:27 TD:16	0.2	13	12	50±5
Injection grade									
Property	Melt Flow Index (190° C)	Density	Tensile strength	Elongation @ break	Hardness	Tensile modulus	Izod Impact Notched	VSP	HDT
Unit	Gr/10min	g/cm3	Mpa	%	Shore D	MPa	Kj/m2	^{0}c	^{0}c
Method	ISO 1133	ISO 1183	Iso 527/2	Iso 527/2	Iso 868	Iso 527/2	Iso 180/A	Iso 306	Iso 75
1922T	2.16kg:22 5kg:75	0.919	@yield:8 @break:7	400	45	175	42	82	39

Linear Low Density Polyethylene (LLDPE)

1) LL0410AA and LL0410KJ(contains slip agent) are LLDPE copolymers with butene as comonomer.They are suitable for blending with the conventional LDPE.In lean blends, they offer the following advantages compared to LDPE neat:
-Greater drawdawn
-Improved hot-tack and lower seal shrinkage
-Higher stiffness and toughness
-LL0410KJ offers high slip film with easy opening properties

2) LL0209AA and LL0209KJ(contains slip agent) are LLDPE copolymers with butene as comonomer.They are suitable for blending with the conventional LDPE.Film made of pure LL0209AA has the following advantage over convetional LDPE:
-Better sealing
-High gloss
-Better optical properties (KJ code)

3) LL0220AA and LL0220KJ(contains slip agent) are LLDPE copolymers with butene as comonomer.This grade is suitable for light duty applications and for the production of cast stretch films.

Grade	MFI (gr/10min)	Applications
LL0410	0.9	Shrink &FFS &agriculture film & shrinks of all types
LL0209	0.9	Transparent packaging (kj code) -Lamination film
LL0220	2.2	Light & medium duty film, stretch film

The above data are typical laboratory average. They are intended to serve as guides only.

Linear Low Density Polyethylene (LLDPE)

PRODUCERS: Tabriz Petrochemical Complex (TPC), Amir kabir Petrochemical Complex										
property	Melt index (190°C /2.16kg)	Density 23° c	Elongation @ break	Tensile strength @ break	Tensile strength @ yield	Dart drop Impact	VSP	Haze	GLOSS@45	Tear strength
Method	ASTM D-1238	ASTM D-1505	ASTM D-882	ASTM D-882	ISO 1184	ASTM D-1709	ASTM D-1525	ASTM 1003-A.61	ASTM D2457-70	ASTM D1922
Unit	gr/10min	gr/cm3	%	MPa	MPa	gr	°C	%	%	gr/25µ
LL0410	0.9	0.925	MD:630min TD:800min	MD:35min TD:28min	MD:12min TD:13min	90 min.	105	13	48	MD:80 TD:350
LL0209	0.9	0.920	MD:630min TD:800min	MD:35min TD:28min	MD:10min TD:11min	130 min	-	-	-	MD:80 TD:430
LL0220	2.2	0.920	MD:600min TD:800min	MD:36min TD:28min	MD:10min TD:11min	130 min.	93	-	-	MD:110 TD:300

High Density Polyethylene (HDPE)

Grade	Melt Flow Index (gr/10min)	Applications
5218	18 (2.16 kg)	Injection moldings grade for House wares, Thin walled food containers, “PET”bottle base cup
5620	20 (2.16kg)	Injection moldings grade for House ware, Toys, Thin walled containers, etc.
6070	7 (2.16kg)	Injection moldings grade for Crates, Boxes , Seats
5740	4 (2.16kg)	Injection moldings grade for Pallet, House ware, Toys
3840	4(2.16kg)	Rotational molded items with good stiffness Septic tanks, Ordinary containers
5813	13(2.16kg)	Injection moldings grade for House ware, Toys, thin walled containers
0035	0.35(2.16kg)	Well suited for wide range of blow molding applications due to its unique properties. These range from bottles for bleach , motor oil , toiletries , mild and distilled water. This grade is also used to make small containers (from 10 cc to 20 lit.).
6040	3.5(2.16kg)	Injection moldings grade
5030	3(2.16kg)	Injection molding grade specially for cap (ESCR ,F50,10% Igepal=40 Hr)
EX3	0.45(5kg)	Pressure pipes, e.g. drinking water pipes, gas pipes, discharge pipes, sewer pipes, for injection molded and other fittings, as well as sheets
EX5	0.28(5kg)	Blown film, paper like film suitable for wrapping, counter bags and carrier bags
I2	10(2.16kg)	Injection molded article such as house hold articles
I3	8(2.16kg)	Transport and stacking crates particularly bottle crates
BL2	1.2(5kg)	Disinfectant bottles up to 2 liters, Containers up to 10 liters, Petrol cans up to 5 liters. (high ESCR)
BL3	1.2(5kg)	Containers up to 10 liters, sheets for thermoforming
BL4	0.35(5kg)	General purpose grade for containers from 1 liter to about 500 liters capacity

High Density Polyethylene (HDPE)

Typical Properties of High Density Polyethylene (HDPE)						
property	Melt index (190 ^{0}C /2.16 kg)	Density 23^0 c	Tensile strength @ yield	Elongation @ break	Charpy Impact	VSP
Method	ASTM D-1238	ASTM D-792	ASTM D-638	ASTM D-638	ASTM D-256	ASTM D-1525
Unit	gr/10min	gr/cm^3	MPa	%	Kj/m^2	^{0}C
Producer of following grades: Tabriz Petrochemical Company (TPC)						
5620	20	0.956	22	900 min.	10 min.	-
5218	18	0.952	20 min	900 min.	3 min.	115 min.
5813	13	0.958	28	800 min.	4 min.	-
6070	7	0.960	26min	900 min.	5 min.	120 min.
6040	4	0.957	26	1000min	11	125
5740	4	0.957	27	1000 min.	10 min. (notched)	-
5030	3	0.952	22	900min	15	125
3840	4	0.938	15	900 min.	18 min.	115 min.
Producer of following grade : Bandar Imam Petrochemical Company (BIPC)						
0035	0.35	0.959	290gr/cm^2 (@break)	900 min.	25kg.cm/cm (Izod impact)	126 min.
Producer of following grades : Amir Kabir and Maroon Petrochemical Company						
EX3	0.45(5 kg),12(21.6 kg)	0.945	22		12	67(50°C/50N)
EX5	0.28(5kg),8(21.6kg)	0.949	MD:18 TD:20	MD:400 TD:405	-	75 (50°C/50N)
I2	10(2.16kg), 28(5kg)	0.950	24	1000 min	3	64 (50°C/50N)
I3	8(2.16kg),23(5kg)	0.957	29	1000 min	3	72 (50°C/50N)
BL2	1.2(5kg) ,23(21.6kg)	0.946	22	600 min	10	70 (50°C/50N)
BL3	1.2(5kg) ,23(21.6kg)	0.954	26	600 min	9	77 (50°C/50N)
BL4	0.35(5kg) ,8.5(21.6kg)	0.952	-	-	25	-

Polypropylene (PP)

Polypropylene is a linear hydrocarbon polymer containing little or no saturation.It is free from most of the environmental stress cracking problems. Polypropylene is one of those rather versatile polymers. It serves double duty, both as plastic and as a raffia. As a plastic it is used to make things like dishwasher-safe food containers ,... . As a raffia, polypropylene is used to make woven sacks ,.....

Random Copolymer

Film		
Grade Name	**MFR**(230°C/2.16Kg)	**Application**
EP2C37F	6	Cast Film
EP1X35AF	8	Cast and Water Quenched Blown Film, Lamination
Extrusion		
Grade Name	**MFR**(230°C/2.16Kg)	**Application**
EP2S12B	1.8	Blow Molding ,Film and Sheet Extrusion
EP2S30B	1.8	Film, Sheet and Blow Molding Small and Medium Sized Items
Injection Molding		
Grade Name	**MFR**(230°C/2.16Kg)	**Application**
EP2X49GA	10	House wares, Thin Walled Packaging ,Caps and Closure, Multilayer Sheet for Thermoforming

Polypropylene (PP)

Heterophasic Copolymers

Injection Molding		
Grade Name	**MFR**(230°C/2.16Kg)	**Application**
EP-T30U	0.4	House wares, Toys ,Furniture ,Boxes, Containers , Pallets ,Crates, Pails
EP-T30R	3.5	Medium Sized Container, Pails, Crates , House ware
EP-C30R	7.0	Household Articles, Toys ,Pails , Closures ,Small Containers , seats ,Automotive Parts
EP-V31RA	21	Thin-walled Injection Molding
EP-N31MA	100	Packaging, House wares ,Toy Boxes ,Video Boxes
Extrusion		
Grade Name	**MFR**(230°C/2.16Kg)	**Application**
EP-D60R	0.4	Extrusion Blow Molding, Tool Boxes, Large Containers ,Profile ,Pipe ,Tough Sheet
EP-YS30RE	1.3	Sheet for Thermoforming ,Corrugated Board ,Blow Molded Bottles ,Container for Foodstuff and Detergent
EP-S31HP	1.3	Conduit Pipe, Corrugated Pipe, Corrugated Board ,Extrusion Blow Molding

Polypropylene (PP)

HOMOPOLYMER

Film		
Grade Name	**MFR**(230°C/2.16Kg)	**Application**
S28F	2	BOPP Film
X30S	9	Cast Film, Water Quenched Blown Film
Extrusion		
Grade Name	**MFR**(230°C/2.16Kg)	**Application**
D50S	0.3	Thin Sheet for Thermoforming ,Strapping ,Tubes ,Profile ,Pipe
Q30P	0.7	Nets ,Blow Molding Small and Medium Sized container
S30S	1.8	Sheet, Thermoforming, Film, Yarn and Monofilament
T30S	3.2	Sheet, Thermoforming, Film, Yarn and Monofilament
C30S	6	Sheet, Film, Yarn and Monofilament
V30S	16	Fiber (BCF, Staple)
H39S	35	Fiber (BCF , CF)
H22S	37	Fiber (BCF , CF)
Z69S	25	Fiber (BCF ,CF ,Staple)
Injection Molding		
Grade Name	**MFR**(230°C/2.16Kg)	**Application**
S30G	1.8	General Injection Molding Application, Household Articles
X30G	9	Injection Molding, House wares, Toys, Food Containers

Polypropylene (PP)

FILM									
property	Melt flow rate (230°C,2.16 kg)	Density	Flexural modulus	Elongation at yield	Tensile strength at yield	Izod impact strength (notched) at 20% 23%	Hardness shore D	Haze	Gloss
Method	ISO 1133	ISO 1183	ISO 178	ISO R 527	ISO R 527	ISO 180	ISO 868	MTM 17031	MTM 17021
Unit	dg/min	g/cm3	N/mm2	%	N/mm2	KJ/m2	-	%	%
EP2C37F	6	0.9	900	14	25	6	65	1.8	88
EP1X35AF	8	0.9	1050	14	28	4.5	67	1.8	85
S28F	2	0.9	1450	13	33	6.5	71	-	-
X30S	9	0.9	1500	13	34	4	71	1	85

Injection Molding									
property	Melt flow rate (230 °C,2.16 kg)	Density	Flexural modulus	Elongation at yield	Tensile strength at yield	Izod impact strength (notched) at 20% 23%	Hardness shore D	VSP	H.D.T. (0.46.Mpa)
Method	ISO 1133	ISO 1183	ISO 178	ISO R 527	ISO R 527	ISO 180	ISO 868	ISO 306/A	ISO 75/B
Unit	dg/min	g/cm3	N/mm2	%	N/mm2	KJ/m2	-	°C	°C
EP-2X49GA	10	0.9	1050	14	28	6	66	136	92
EP-T30U	0.4	0.9	950	11	22	60	60	141	85
EP-T30R	3.5	0.9	1150	10	26	14	66	151	88
EP-C30R	7	0.9	1150	10	26	8	68	151	88
EP-V31RA	21	0.9	1500	8	27	6.5	69	151	100
EP-N31MA	100	0.9	1500	7	30	3	72	152	105
S30G	1.8	0.9	1450	13	33	6.5	71	155	105
X30G	9	0.9	1500	13	34	4	71	155	115

Producer :Marun Petrochemical company

Polypropylene (PP)

Extrusion									
property	Melt flow rate (230 ^{0}C,2.16 kg)	Density	Flexural modulus	Elongation at yield	Tensile strength at yield	Izod impact strength (notched) at 20% 23%	Hardness shore D	VSP	H.D.T. (0.46.Mpa)
Method	ISO 1133	ISO 1183	ISO 178	ISO R 527	ISO R 527	ISO 180	ISO 868	ISO 306/A	ISO 75/B
Unit	dg/min	g/cm3	N/mm2	%	N/mm2	KJ/m2	-	^{0}C	^{0}C
D50S	0.3	0.9	1350	14	33	15	70	153	100
Q30P	0.7	0.9	1400	14	33	10	70	154	100
S30S	1.8	0.9	1450	13	33	6.5	71	155	105
T30S	3.2	0.9	1450	13	34	5	71	155	110
C30S	6	0.9	1500	13	34	4	71	155	119
V30S	16	0.9	1550	12	33	-	-	154	95
H39S	35	0.9	1700	10	37	-	97	155	98
H22S	37	0.9	1250	13	35	2.5	72	155	118
Z69S	25	0.9	1050	13	35	3	72	155	118
EP-D60R	0.4	0.9	1050	16	26	60	60	151	88
EP-YS30RE	1.3	0.9	1100	13	27	50	64	151	88
EP2S12B	1.8	0.9	900	14	25	10	65	135	80
EP2S30B	1.8	0.9	900	14	25	10	65	135	80

Producer :Marun Petrochemical company

Polystyrene (PS)

Polystyrene which has desirable characteristic such as good mould ability ,low moisture absorption, good dimensional stability ,good electric insulation properties ,color ability and reasonable chemical resistance, is widely used as an injection molding and vacuum forming material . Polystyrene are classified into three main categories:

1) GPPS (General purpose Polystyrene also called crystal)
2) HIPS (High impact Polystyrene)
3) EPS (Expandable Polystyrene)

Grade	Melt Flow Index (gr/10min)	Applications
GPPS1540	11	*Extrusion: Impact* dilution;Gloss layer in Co-extrusion; Anionic butadiene copolymer dilution. *Injection*:Packaging articles;Medical applications ,office equipment;crisper boxes for refrigerator;Pen barrel ;cups.
GPPS1160	2.5	*Extrusion*: Shower cabinet;lighting thin films;Diluted with high impact polystyrene for thermoforming,it shows resistance against high temperatures.In line extrusion/thermoforming of transparent cups. *Direct gassing*:Insulation board;Foamed sheet for thermoforming of fruit trays,meat trays,egg boxes.
HIPS 7240	4.5	*Extrusion*: Dairy sheet coextrusion with EVOH PE ,in dilution with crystal industrial sheet. *Thermoforming*: Cups; Trays; Egg boxes; General packaging .Dilution with crystal for CD inserts, shoe heels.
HIPS 8350	4.5	Extrusion for thermoforming, fridge doors and cabinet liners. It is suitable for fatty foods packaging

General Purpose Polystyrene (GPPS)

Two grades of GPPS which are produced in Iran are as follow :

- GPPS1160 is a high heat resistance, high molecular weight crystalline polystyrene used in the extrusion industry. It is most suitable for production of oriented polystyrene (OPS).It is particularly useful for production of thick sheet by direct gassing, where it gives expanded sheets with high mechanical properties. GPPS1160 can be used in combination with HIPS7240 for the extrusion of sheet for hot-fill thermoforming application .
- GPPS1540 is an easy flowing crystal polystyrene designed for extrusion or injection applications . In extrusion , it improves extruder output and thermoforming cycle times when mixed with a super high impact polystyrene such as HIPS7240. It is particularly suitable for glossy-layer co-extrusion.

Typical Properties of General Purpose Polystyrene(GPPS)

property	Melt flow index (200° C/5Kg)	Styrene Residual Monomer	VSP	Rockwell Hardness	Tensile Strength@ break	Elongation @ break	Flexural modulus	Tensile modulus	Refractive Index	Water Absorption
Unit	gr/10min	ppm	° C	_	MPa	%	MPa	MPa	_	%
Method	ASTM D-1238	GLGLABPSG004	ASTM D-1525	ASTM D-785	ASTM D-638	ASTM D-638	ASTM D-790	ASTM D-638	ISO METHODE	ASTM D-570
GPPS 1160	2.5	<500	Min 101	Scale /L70	48	3	2900	3200	1.591	<0.1
GPPS 1540	11	<500	Min 89.5	Scale /L70	45	2	3000	3100	1.591	<0.1

Density of these grades is approximately : 1.04gr/cm^3
Shrinkage of all grades in mould is approximately : (0.4-0.7%) (ASTM D 955)
All tests are carried out at $23^{O}C$ unless otherwise stated.
Producer: Tabriz Petrochemical Company(TPC)

The above data are typical laboratory average. They are intended to serve as guides only.

High Impact Polystyrene (HIPS)

Two grades of HIPS which are produced in Iran are as follow :

- HIPS7240 is a very high impact polystyrene used in the extrusion industry .This grade is designated to be diluted with crystal polystyrene. The good melt strength of this grade makes it particularly suitable for deep-draw thermoforming. It is available in white color.

- HIPS 8350 is a very high impact polystyrene used in the extrusion industry .This grade has an improved environmental stress crack resistance (ESCR) in comparison with standard high impact polystyrene grades.It is recommended for the production of packaging intended for products likely to cause stress cracking (e.g fats and oils).HIPS8350 retains good mechanical properties at low temperatures making this grade suitable for frozen food packaging and for the production of fridge liners in contact with HCFC expanded foam insulation.

Typical Properties of High Impact Polystyrene HIPS)

property	Melt flow index (200° C/5kg)	VSP	Rockwell Hardness	Tensile strength at yield	Tensile Strength at break	Elongation at break	Flexural modulus	Tensile modulus	Styrene residual monomer	Water Absorption	Izod impact
unit	g/10min	° C	_	MPa	MPa	%	MPa	MPa	ppm	%	Kj/m²
Method	ASTM D-1238	ASTM D-1525	ASTM D-1525	ASTM D- 638	ASTM D-638	ASTM D-638	ASTM D-790	ASTM D-638	GLGLABPSG004	ASTM D-570	ISO 180/1A
HIPS 7240	4.5	Min 94	Scale L65	21	20	55	1750	1800	<500	<0.1	Min 8.5
HIPS 8350	4.5	Min 92	Scale R54	18	20	60	1600	1600	<500	<0.1	Min 9

Density of this grade is approximately : 1.04gr/cm^3
Shrinkage of this grade in mould is approximately : (0.4-0.7%) (ASTM D 955)
All tests are carried out at 23^{O}C unless otherwise stated.
Producer: Tabriz Petrochemical Company

The above data are typical laboratory average. They are intended to serve as guides only.

Expandable Polystyrene (EPS)

Standard expandable polystyrene (EPS) is manufactured by the suspension polymerization method .

The polymerization is generally carried out in a batch process. Various grades of EPS supplied in free flowing beads contain pentane (CFC free) as a foaming agent . It is used for fast cycle low destiny block mold application with good surface finish.

EPS produced in two classes :

1)Standard grades

2)Flame retardant grades (FR)

All grades can be produced in both of classes.

Available grades are as follow:

TYPES	HIGH STENGTH (HS)	FAST CYCLE (FC)	WATER PROOF(WP)	SPECIAL EXTRUSION (EX)
GRADE	121,221,321	323,422,522	326,426,526	600

All grades have specifications as follows:	
Residual monomer content	<1000mm,(average value:500ppm)
K.Value	52-57
Molecular weight	150000-178000(based on the K.Value)
Polymer moisture	1.0 wt% max.
Blowing agent content	5.2% min.at shelf life end (about 6 month)
Shelf life	Depending on storage conditions which affect blowing agent loss rate (normally 6 month)
Producer :Tabriz Petrochemical Company (TPC)	

The above data are typical laboratory average. They are intended to serve as guides only.

Expandable Polystyrene (EPS)

Type &Grade	Bead size (mm)	Typical end product Density (Kg/m3)	Typical Applications
121 HS	1.8-2.5	13-25	Low density blocks.
221 HS	1.0-1.8	14-30	Low-medium density blocks.
321HS	0.7-1.0	18-30	Shape molding with wall thickness>10mm ,and medium –high density blocks.
323FC	0.7-1.0	18-30	Faster cycling shape molding with wall thickness >10 mm &medium-high density blocks.
422FC	0.5-0.7	20-35	Faster cycling shape molding of 6-10 mm wall thickness suitable for high quality products demanding improved surface finish and high strength.
522FC	0.3-0.5	22-50	Very thin wall shape molding with wall thickness<6 mm suitable for high quality products demanding improved surface finish and high strength.
TPC600EX	UP TO 0.3	…….	Special for extrusion.
326WP	0.7-1.0	18-30	Low water absorption ,longer cycling shape molding with wall thickness > 10 mm.
426WP	0.5-0.7	20-35	Very low water absorption ,cycling shape molding of 6-10 mm wall thickness.
526WP	0.3-0.5	22-50	Very thin-wall water proof shape molding products with wall thickness < 6 mm such as drinking cups.
Lower densities can be achieved by double pre expansion. All grades also can be produced as FR grade.			

Polyvinyl Chloride (PVC)

PVC is one of the two most important plastic materials available today. It is produced at NPC (BIPC site) by suspension polymerization process. PVC compounds of large extent of stabilizers and other additives are able to meet the requirements of many applications.

PVC grades produced by NPC with their general information ,applications , and specifications are as follow:

PVC- 6058	Extrusion of flexible section and hoses: This grade processed with plasticizer is particularly suitable for the manufacture of flexible section & hoses. The most varied field of applications satisfied by this product are transparent sheets and hollow wares etc. Calendering :This grade processed without plasticizer is used for calendering ,for example HT-film can be produced by this grade. It processed with plasticizer is used as additive polymer in compounds for calendering ,for example film and floor covering can be produced. Injection molding :Grade S6058 processed without plasticizer is used for the injection molding. S-PVC in compounds permits a trouble free processing on conventional PVC injection molding machines for sanitary ware ,building parts ,water fittings ,WC flush tanks, electrical switch cabinets etc.
PVC- 6558	Extrusion of flexible sections and hoses: This grade processed with plasticizer is particularly suitable for manufacture of rigid sections & hoses. The most varied field of applications satisfied by this product are transparent and solid colored hoses and section etc. Injection molding :This grade in compounds permits a trouble free processing on conventional PVC injection molding machines for sanitary ware ,building parts ,water fitting ,WC flush tanks etc .Grade S6558 processed without plasticizer is used for the injection molding.
PVC- 7054	Extrusion of flexible sections and hoses: This grade processed with plasticizer is particularly suitable for the manufacture of flexible sections & hoses. The most varied field of applications are satisfied by this product like ,transparent and solid colored hoses and sections, refrigerator seals , sealing for window & doors , film &sheets. Grade S7054 processed with plasticizer is suitable for wide range of thickness like film and floor covering. Injection molding : This grade in compounds permits a trouble free processing on conventional PVC injection molding machines for camping / leisure equipment ,packaging ,roof lights ,electronic /phone equipment etc. Grade7054 processed with plasticizer is used for the injection molding. Cable industry: Grade S7054 processed with plasticizer is widely used for the manufacture of cable insulation and sheathing for voltages up to 20KV.It is most suitable for the manufacture of high quality cable insulation.

Polyvinyl Chloride (PVC)

General Information:

PVC-S 6058:This grade has low porosity & very high bulk density .Therefore it is most suitable for rigid applications, high machine throughput &specific application as additive polymer.

PVC-S 6558:This grade has low porosity &high bulk density. Therefore it is most suitable for flexible applications.

PVC-S 7054:This grade has high porosity. Therefore it is most suitable for flexible applications. The electrical, mechanical &thermal properties expected of the various applications can be achieved with this grade.

Typical Properties of Poly vinyl chloride

Property	K-value	Sulphate ash	Volatiles	Bulk density	Screen analysis (residue on sieve) 63 micron 250 micron	Dark resin (particles in 250gr PVC)	Plasticizer acceptance	Fish eyes	Flow ability (dia. Of funnel outlet)	Viscosity number	Residual VCM
Unit		wt % max.	wt % max	gr/lit	wt % min. wt % max.	No. max.	gr (DOP/100gr PVC) min	Number (per 25 cm²) Max	mm max	cm3/g	ppm
Method	DIN-53726	DIN-53568/2	ISO R-1269	DIN-53466	DIN-53734 DIN-53734	HULS-6.7	DIN 53417/1	HULS-6.9	HULS-6.10	DIN-53762	HULS-6.11
PVC-6058	60	0.05	0.2	580	90 5	30	10	5	4	88	≤1
PVC-6558	65	0.05	0.2	600	90 5	30	10	5	4	105	≤1
PVC-7054	70	0.05	0.2	475	85 0.5	30	30	5	4	125	≤1

Producer :Bandar Imam Petrochemical Company (BIPC)

The above data are typical laboratory average. They are intended to serve as guides only.

Melamine

Applications:

Paints,Adhesives,Decorative laminates,Water-resistant board & plywood, wood finishing,and covering,Office desks,Home appliance.

General information:
Melamine is a white crystalline non-toxid powder produced from Urea with the following characteristics:

Molecular weight	Melting point	Vapor pressure
126.13	250°c	50mm at 315 °c

Typical Properties of MELAMINE			
Property	Unit	Test method	Value
State			White crystals
Melamine purity	wt %	Eurotecnica method No.251	Min 99.9
moisture	wt %	Eurotecnica method No.204	Max 0.1
Ash content	wt %	Eurotecnica method No.203	Max 0.03
Resin color	APHA	Eurotecnica method No.253	MAX 5
Producer :Khorasan Petrochemical Company			

The above data are typical laboratory average. They are intended to serve as guides only.

Epoxy Resin

General information:

Epiran resins (Epiran 1& Epiran 6 & Epiran10 & Epiran5 &Epiran5s) are standard unmodified Epoxy resins .Epiran 6 is a low molecular weight resin and Epiran 1 is a high molecular weight made from Bisphenol A and Epichlorohydrin. Epiran 10 is a high molecular weight resin which does not contain any diluent made from Bisphenol A and low molecular Epoxy resin using alloying method.

Applications:

Epiran 6 is mainly used for compositions cold cured with polyamines and polyamids for manufacturing of adhesives and laminates used in electronics,radio engineering and compositions filled with metal powders,silica flour,graphite , etc.

Epiran 1 is mainly used as a base resin for manufacturing of varnishes cold cure with Aliphatic polyamines and polyaminoamides and adhesives hot- cured with acid anhydrides.

Epiran 10 is mainly used for powder paints cured with Aliphatic polyamines and polyaminoamides.

Epiran 5 mainly used cold cure adhesive,varnishes and lutes ,as a binder in epoxy-glass laminate manufacturing and as encapsulating in electronics.

Epiran 5S mainly used cold cure adhesive,varnishes and lutes ,as a binder in epoxy-glass laminate manufacturing and as encapsulating in electronics.

property	Appearance	Epoxide value	Epoxide equivalent	Viscosity at 25°c	Total chlorin content	Color	Softening point	Non- volatiles content
Test method	-	Internal method	Internal method	DIN-53015	ASTM D-1726/87	ISO 4630	ASTM D-3638	DIN EN ISO 3251
unit	-	Val/100 gr	-	M pa . s	%wt	Gardner scale	°c	%wt
Epiran 6	Clear light yellow liquid	0.51-0.54	185-196	15000 max.	0.2 max.	<1*	--	99 min.
Epiran 1	Clear light yellow flake	0.18-0.23	434-555	-	0.2 max.	<1*	63-75	-
Epiran 10	Clear light irregvlar yellow flake	0.14-0.17	588-714	-	0.2 max.	<1*	75-90	-
Epiran 5	Clear light yellow liquid	0.48-0.51	196-208	20000-30000	0.2 max.	<1	-	>99%
Epiran 5s	Clear light yellow liquid	0.49-0.521	192-204	15000-20000	-	<1	-	>99%

Acrylonitrile_Butadiene_Styrene (ABS)

Because of the range of ABS polymers that may be produced ,a wide range of properties is exhibited by these materials.Properties of particular importance are toughness and impact resistance,dimensional stability ,good heat distortion resistance and good low-temperature properties.

ABS is a grafted terpolymer that consists of acrylonitrile – butadiene- styrene dispersed in glassy matrix of styrene-acrylonitrile (SAN) copolymer. ABS has been known as a thermoplastic, but it also satisfies functioning as an alloy or modifier of other thermoplastics. There are to 41 different grades available for production as per license.

MAIN FUNCTION	GRADE NAME	Typical Applications
GENERAL PURPOSE	SD – 0150	Type writers, Monitor stand, Electrical parts, Fitting, Etc.
EXTRUSION	SH –0150	Refrigerator liner sheet , General sheet
	SV -0157	Refrigerator liner.
HIGH MODULUS	HM-0560	VCRs, Watches, Toys, OA equipments; Cassette recorders, etc.
HIGH GLOSS	HG-0760H	Phone receivers, General home appliances, Cosmetic containers,Fridge door handle.
HEAT RESISTANT	HR-0370F	Rice cookers, Microwave oven components and heater housing which require moderate levels of heat resistance
Flame Retardant	VH-0800D	Computer monitors , printers , automotive facsimile machines , photocopy machines

Typical Properties of Acrylonitrile -Butadiene-Styrene

Property	Melt Flow Index (200 o C ,5kg)	Izod Impact Strength	Vicat Softening Point (5kg)	Tensile Strength at yield (Min)	Flexural Strength at yield (Min)	Flexural modulus (Min)	Rockwell Hardness (23o C)
Unit	gr /10 min	Kgf.cm/cm	o C	Kgf/cm2	Kgf/cm2	Kgf/cm2	R.Scale
Test	ASTM D-256	ASTM D-256	ASTM D-1525	ASTM D-638	ASTM D-790	ASTM D-790	ASTM D-785
SD-0150	1.4 – 2.2	19 – 25	96 – 100	430	570	19000	101 – 106
SH-0150	0.9 – 1.3	18 – 26	97 – 102	420	570	19000	104 – 110
SV-0157	0.3 – 0.9	27 – 35	97 – 103	400	580	19000	101 – 107
HM-0560	2.0 – 3.0	10 – 16	105 – 109	520	650	20000	109 – 115
HG-0760	2.5 – 3.5	18 – 24	93 – 99	410	600	20000	101 – 107
HR-0370F	0.4 – 1.0	10 - 16	103 - 109	420	_	_	105 – 111
VH0800D	4.7-7	12-19	83-87	400	580	26500	96-100

Producer: Tabriz Petrochemical Company (TPC)

The above data are typical laboratory average. They are intended to serve as guides only.

Styrene Butadiene Rubber (SBR)

Typical type general purpose rubber with the properties of well-balanced tensile strength, tear strength, aging resistance and abrasion resistance, used for tires, belts, footwear and some other industrial rubber goods.

Typical Properties of SBR:

property	Volatile matter	Ash	Organic acid	Soap	Bound Styrene	Oil Content	Raw Viscosity (ML 1+4 @100 °C)	Compound Viscosity (ML 1+4 @ 100 °C)	Tensile strength (35 min cured)	Ultimate Elongation (35 min cured)	300% modulus (35 min cured)
Unit	Wt%	Wt%	Wt%	Wt%	Wt%	Wt%	-	-	Kg/cm2	%	Kg/cm2
Method	ASTM D-1416	ASTM D-1416	ASTM D-1416	ASTM D-1416	ASTM D-1416	ASTM D-1416	ASTM D-1646	ASTM D-1646	ASTM D-412	ASTM D-412	ASTM D-412
SBR-1500	0.75 Max	1.5 Max	6.125	0.5 Max	23.5	-	52	84 Max	250 Min	470 Min	139
SBR-1502	0.75 Max	1.5 Max	5.875	0.5 Max	23	-	52	84 Max	250 Min	350 Min	187
SBR-1712	0.75 Max	1.5 Max	4.8	0.5 Max	23.5	27	47	62 Max	200 Min	530 Min	94

The above data are typical laboratory average. They are intended to serve as guides only.

Styrene Butadiene Rubber (SBR)

1) SBR-1500 is a high molecular weight Styrene butadiene rubber combining good extrusion behavior and superior compound properties.It has relatively wide molecular weight distribution and the butadiene component has an average about 9% Cis-1,4 , 54.5% trans and 13% 1,2 vinyle structure.
SBR 1500 contains antioxidant to avoid product degradation.The high strength and great toughness of rubber permit the use of its elastic qualities.The properties of rubber show excellent resistance to cutting,tearing and abrasion.It has a relatively long,useful life under a wide variety of conduction.

2) SBR-1502 is a cold, 23.5% styrene SBR polymer made with a mixed-acid emulsifier, a non-staining stabilizer and a salt-acid coagulation. Provided that the compounds are formulated and processed correctly, the cured have very good abrasion , good heat and aging resistance, good mechanical properties , good electrical properties and good resistance to polar solvents and dilute acids.

3) SBR-1712 is staining type cold SBR ,extended with 27.5 part of highly aromatic oil. Provided that the compounds are formulated and processed correctly ,the vulcanized SBR-1712 has very good abrasion ,good electrical properties and good resistance to polar solvents and dilute acids .

Grade name	Main Applications:
SBR-1500	It is well suited for wide range of applications due to its unique properties.Some examples are :Tires,tread rubber and molded and extruded mechanical goods.
SBR-1502	End uses include white sidewall tires, foot wear, light and dark colored mechanical goods and miscellaneous items where excellent physical properties and minimum discoloration and staining are required.
SBR-1712	It is used for the production of tires, high quality technical rubber goods, molded and extruded mechanical rubber goods and other industrial products where color and staining are not decisive factors.

Polyethylene Terephthalate (Bottle Grade)

Polyethylene Terephthalate (PET) is a thermoplastic polyester. It is used for the production of bottles , sheet , strapping and injection molded parts. PET bottles are used in wide range of applications such as carbonated soft drink (CSD), Water (still/carbonated) ,edible oil,....

Three grades of PET which are produced in Iran are as follow :

Property	IV	DEG Content	Melting Point	Color (l)	Color (b)	Acetaldehyde content	Water Content	COOH End Group	Major Application
Unit	dl/gr	%wt	°C	L-Value	b-Value	ppm	Wt%	mmol/kg	-
Method	Ubbelhode	GC	DSC	Spectroscopy	Spectroscopy	GC	Karl-Fisher	Titration	
BG-781	0.78±0.02	Max 1.5	248±2	>90	<2	<1.0	Max 0.3	Max 32	Edible oil, Water, non carbonated soft drink
BG-800	0.80±0.02	Max 1.5	248±2	>90	<2	<1.0	Max 0.3	Max 32	CSD, Edible oil APET sheet, Pharmaceuticals
BG-821	0.82±0.02	Max 1.5	248±2	>90	<2	<1.0	Max 0.3	Max 32	CSD, sheet. Strapping
Producer : Shahid Tondgooyan Petrochemical Company (STPC)									

Polyethylene Terephthalate (Textile Grade)

· Polyethylene Terephthalate (PET) from pure terephthalic acid (PTA) and Ethylene Glycol (EG). Textile chips are mainly used in the production of polyester fibers and filaments.

grade of PET (Textile Grade) which are produced in Iran are as follow :

Property	IV	DEG Content	Color (l)	Color (b)	COOH End Group	Water Content	Melting Point	Titanium Dioxide	Chip Weight
Unit	dl/gr	%wt	L-Value	b-Value	mmol/kg	Wt%	°C	%wt	Gr/100Ea
Method	Ubbelhode	GC	Spectroscopy	Spectroscopy	Titration	Karl-Fisher	DSC	Spectroscopy	-
TG-641	0.64±0.01	0.9-1.3	>90	<4.2	<32	<0.25	255±2	0.34±0.06	<2.5
Producer : Shahid Tondgooyan Petrochemical Company (STPC)									

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