PRODUCT CATALOGUE

HIGH DENSITY POLYETHYLENE

TIPELIN

MOLGROUP CHEMICALS

Published in August 2022

MOLGROUP CHEMICALS | Sustainable Reliability

MOLGROUP CHEMICALS | Working together to win tomorrow's challenges

WHY CHOOSE MOL GROUP?

WE PROVIDE RELIABILITY OF SUPPLY

As an integrated oil, gas and petrochemicals company, **we** can **rely on the e f ciency benef ts of the ref nery integrat on process**:

- Secured feedstock supply
- Robust financial background
- Strong position in the regional markets
- **High-quality** products provided by **state-of-the-art technologies**

WE INTEND TO BE YOUR PARTNER IN CARBON FOOTPRINT REDUCTION

- By offering **sustainable materials**
- By converting 1.8 m tons of fuels to more valuable petrochemical feedstock by 2030
- Through **investments using highly e f cient technologies** that integrate circular economy technologies into our core business
- Through bio and waste-based streams in production and scaling-up recycling

YOU CAN FIND US EVERYWHERE

- Due to our **o f ces located in nine European countries**, including Hungary, Slovakia, Austria, Germany, Italy, Poland, Romania, Croatia and Ukraine

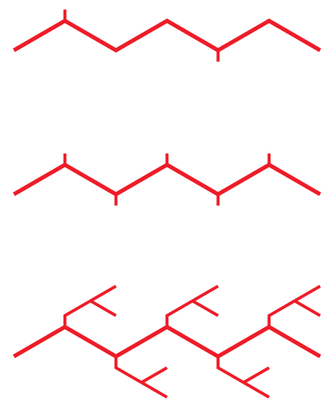
POLYETHYLENE CHARACTERISTICS

MOLECULAR AND CRYSTAL STRUCTURE, DENSITY

Polyethylene macromolecules and their co-polymers build chains consisting of thousands of -CH_2- units. Depending upon polymerisation, this chain develops different branches | **FIG. 1** |.

Owing to its molecular structure with branches of chain length, LDPE is referred to as branched polyethylene. In contrast with this, medium and high density grades have only short branches on their chains and are referred to as linear polyethylene. LDPE has long chain branches, which themselves are branched as well. These products are manufactured in a high pressure process *(>1000 bar)*. Linear polyethylene is produced in a low pressure process *(by Phillips grades about 40 bar and by Mitsui grades about 10 bar)*. Hexene-1 *(Phillips grades)* and butene-1 or propene *(Mitsui grades)* co-monomer built in the chain of these polyethylene grades produces side chains.

| FIG. 1 | **THE SCHEMATIC DIAGRAMS DEMONSTRATE THE STRUCTURE AND NUMBER OF BRANCHES OF VARIOUS POLYETHYLENE GRADES.**



HDPE
Density: 0.94–0.97 g/cm³
Melting point *(DTA)*: 123–128°C

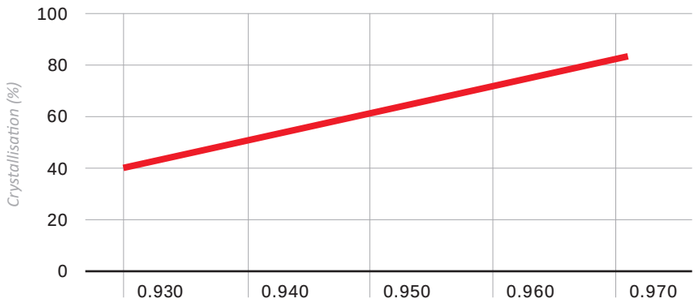
MDPE
Density: 0.93–0.94 g/cm³
Melting point *(DTA)*: 117–123°C

LDPE
Density: 0.91–0.925 g/cm³
Melting point *(DTA)*: 105–115°C

The number of side chains is proportional to the amount of co-monomer built in the chain. As a result of the built-in co-monomer, the density and the degree of crystallinity will decrease. Polyethylene density (0.910–0.970 g/cm³) and molecular weight depend on polymerisation circumstances to some extent. Melt flow rate and density are characteristic indicatives of the polyethylene grade. Higher density is associated with a higher crystallisation and a lower number of branches.

Polyethylene is a partially crystalline polymer. The relationship between crystallisation ratio and density of HDPE is shown in | FIG. 2 |. The proportion of crystalline matier part or the density decides the polyethylene's melting characteristic. The melting point rises with the increase in crystallinity and density. The melting point varies between the melting point of LDPE *(ca. 110°C)* and that of HDPE *(ca. 128°C)*.

| FIG. 2 | **DEGREE OF CRYSTALLINITY AS A FUNCTION OF DENSITY**



MOLECULAR WEIGHT, MELT FLOW RATE, MELT VISCOSITY AND FLOW CHARACTERISTICS

Chain length, or the average molecular weight is one of the important characteristics indicative of the degree of linkage. Changes in the molecular weight will definitely change melt viscosity, highly effecting on the processing properties. A high molecular weight polymer has a high melt viscosity. To measure flow properties, a parameter melt flow rate is used according to ISO 1133. High melt flow rate means easy flowing and low molecular weight. Melt flow rate is defined by a one point method, a test that can be performed quite easily under laboratory circumstances. It is important, however, that the molecular weights, melt flow rates and flow characteristics of identical polyethylene grades manufactured in different processes may differ even though they have the same melt flow rate.

MOLECULAR WEIGHT DISTRIBUTION

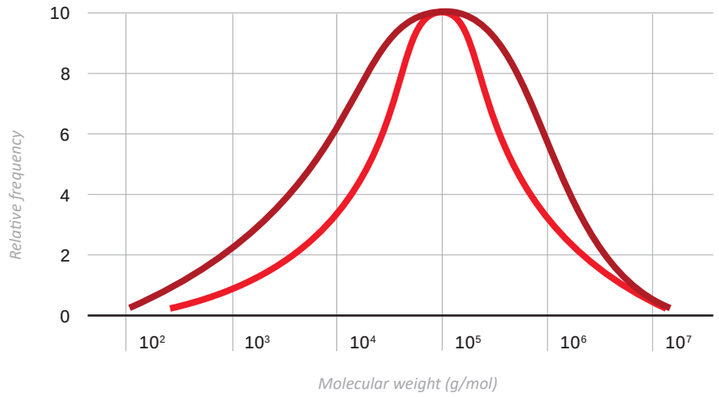
Polyethylene consists of molecules of different chain lengths, giving different molecular weights. This is clearly shown by the diagram demonstrating the frequencies of various molecular weight | FIG. 3 |. Molecular weight distribution influences both processing and end product properties. For example, a narrow molecular weight distribution is needed for the injection moulding of resins if the moulded parts are to be free from all distortion and internal stresses which might compromise their environmental stress cracking resistance *(ESCR)*.

At the same time, a high molecular weight polyethylene with a wider molecular weight distribution is more suitable for the manufacture of blow moulded products, pipes and films. It should be remembered, however, that the low and medium molecular weight fractions account for easy processing. The high molecular weight fraction gives good mechanical properties *(impact strength, creep and warp resistance and ESCR)*.

The narrower the molecular weight distribu t on

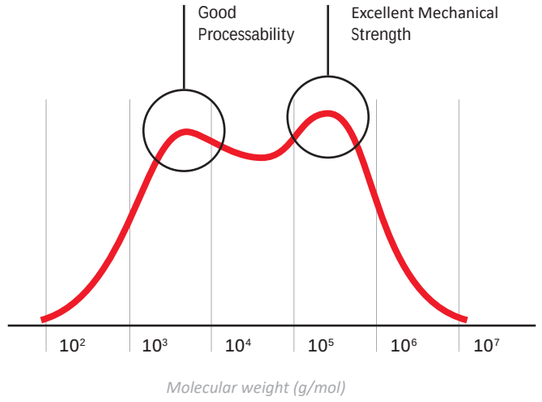
- The lower the internal stresses
- The higher the stretchability

| FIG. 3 | **NARROW MOLECULAR WEIGHT DISTRIBUTION**
BROAD MOLECULAR WEIGHT DISTRIBUTION



The most important property of HDPE is its mechanical strength with easy processing capability, and this can be realized through bimodal high molecular weight HDPE. The low molecular weight component provides good processability, while the high molecular weight component gives excellent mechanical strength.

| FIG. 4 | **MOLECULAR WEIGHT DISTRIBUTION OF BIMODAL TYPE**



OTHER PROPERTIES

SHRINKAGE

The shrinkage of finished products manufactured from HDPE takes place in the crystallisation phase. The extent of crystallisation depends on the processing parameters (temperature, pressure, throughput, thickness, cooling speed, etc.), but molecular structure (molecular weight and weight distribution) is a further factor having an effect on crystallisation. Shrinkage accounts 3–4% in pipe diameters. Shrinkage can be max. 5% in fittings made from pipe grades. Shrinkage can be exactly determined only after 24 hours following injection moulding, because after crystallisation and the compensation of the generated internal stresses will result in further dimensional changes in the finished products. The extent of after shrinkage is time and temperature dependent. After shrinkage time, when shrinkage can reach 1% max., can be reduced by increased storage temperatures.

WEATHER RESISTANCE

HDPE grades have a good resistance to light in the visible spectrum. However, when stored in the open air, they can get damaged by the combined effects of atmospheric oxygen and UV radiation. As a result, their durability and tensile strength lessen, and they may discolour. The useful life of polyethylene can be increased by two or four times with a UV stabiliser added to the blend. The great number of available UV stabilisers allows manufacturers to select the right grade to make a product most suitable for the weather conditions, end product and the environment of application. Special carbon blacks, the best UV stabilisers so far, can extend the useful lives of the products by 10–15 times when added in amounts of 2–3%. Pigments also can improve UV resistance, although, these additives may cause some undesirable side effects, as well.

APPLICATION

The wide range of grades and the careful selection of characteristics of the individual grades allow various applications including:

Blown film grades
for heavy duty bags, industrial bags, shopping bags, garbage bags and packaging films for medicines and foods

Blow moulding grades
to manufacture household plastic products, bottles and cans for foods including oils and large capacity barrels for household or industrial chemicals, corrugated pipes

Pipe grades
for non-pressure corrugated and protective pipes

Sheet extrusion grades
for sheets and thermoformed sheets

Injection moulding grades
for houseware and industrial packaging, consumer goods

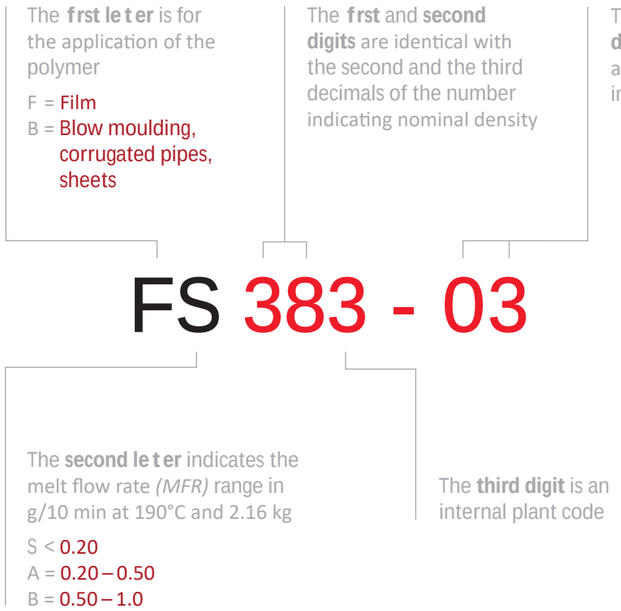
Split film yarn
for agricultural packaging (raschel bag, round bale net)

CODING SYSTEM

TIPELIN IS THE REGISTERED TRADEMARK FOR MEDIUM AND HIGH DENSITY POLYETHYLENE GRADES (MDPE AND HDPE) PRODUCED BY MOL PETROCHEMICALS CO. LTD. ON TISZA SITE.

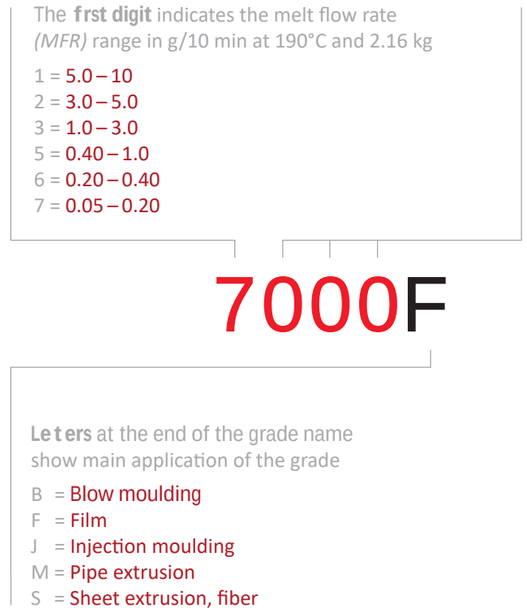
GRADES PRODUCED BY PHILLIPS TECHNOLOGY:

TIPELIN GRADES PRODUCED BY PHILLIPS TECHNOLOGY ARE IDENTIFIED BY A CODE SYSTEM CONSISTING OF TWO LETTERS AND FIVE DIGITS.



GRADES PRODUCED BY MITSUI TECHNOLOGY:

TIPELIN HIGH DENSITY POLYETHYLENE GRADES PRODUCED BY MITSUI TECHNOLOGY ARE IDENTIFIED BY A CODE SYSTEM CONSISTING OF FOUR DIGITS AND ONE LETTER.



BLOW MOULDING, PIPE AND SHEET GRADES

TYPICAL PROPERTIES, CANNOT BE CONSIDERED AS SPECIFICATION

		Grade/ Parameter	Melt Mass – Flow Rate (MFR)	Density 23°C[4]	Tensile Stress at Yield[4]	Tensile Strain at Yield[4]	Tensile Stress at Break[4]	Tensile Strain at Break[4]	Flexural Modulus[4]	Notched Izod Impact Strength[4]	Vicat Softening Tempera-ture[4]	Hardness Shore D[4]	ESCR F50 B method	OIT 200°C	Application
		Unit	g/10 min	kg/m³	MPa	%	MPa	%	MPa	kJ/m²	°C	–	h	min	–
		Test method	ISO 1133-1	ISO 1183-2	ISO 527-3	ISO 527-3	ISO 527-3	ISO 527-3	ISO 178	ISO 180/A	ISO 306/A 120	ISO 868	ASTM D 1693	EN 728	–
BLOW MOULDING GRADES	UNIMODAL	TIPELIN BS 501-17	0.18[1] 0.94[2] 22[3]	950	27	12	27	1100	1350	15	129	64	100[5]	8	Bottles and cans of max. 10 litre capacity for aggressive, household chemicals and detergents, corrugated pipes
		TIPELIN BS 520-14	0.10[1] 0.45[2] 10[3]	952	28	12	34	1500	1400	24	130	65	260[5]	40	Balloons and drums up to 220 l for aggressive industrial chemicals, thermoforming
		TIPELIN BS 502-43	0.20[1] 0.76[2] 19[3]	950	26	12	25	1300	1250	14	129	62	100[5]	90	Bottles and cans of max. 10 litre capacity for non-aggressive household chemicals and detergents, corrugated pipes
		TIPELIN BA 550-13	0.35[1] 1.5[2] 28[3]	954	29	11	–	1180	1500	14	130	65	40[5]	8	Bottles and cans of max. 30 litre capacity for non-aggressive household chemicals, cosmetics and oils, corrugated pipes
		TIPELIN BB 620-17	0.65[1] 2.9[2] 50[3]	962	31	10	–	1200	1800	14	131	67	18[5]	7	Small bottles, corrugated pipes
	BIMODAL	TIPELIN 6000B	0.30[1] 1.3[2] 30[3]	958	31	10	31	1200	1650	9	129	65	150[6]	30	Thin walled bottles of max. 5 litre capacity for consumer goods (cosmetics, daily care), corrugated pipes
		TIPELIN 6010B	0.30[1] 1.3[2] 30[3]	958	30	10	30	1080	1750	8	126	66	150[6]	90	Thin walled bottles of max. 5 litre capacity with long colour stability, consumer goods (cosmetics, daily care)
		TIPELIN 6300B	0.30[1] 1.3[2] 30[3]	954	28	11	28	1100	1500	9	128	64	350[6]	30	Bottles and containers of max. 10 litre capacity for detergents and household chemicals, corrugated pipes
		TIPELIN 6301B	0.30[1] 1.3[2] 30[3]	954	29	10	29	1010	1500	8	128	65	300[6]	105	Bottles and containers up to 10 litre capacity for detergents and household chemicals, corrugated pipes
		TIPELIN 7300B	0.10[1] 0.40[2] 11[3]	954	28	11	30	1200	1500	15	129	65	>800[6]	50	Jerry can for aggressive industrial chemicals, sheet extrusion
PIPE AND SHEET GRADES		TIPELIN 7700M	0.06[1] 0.26[2] 8[3]	948	24	12	33	1550	1100	22	127	63	>10000[6]	>100	Non-pressure pipes and sheet manufacturing
		TIPELIN 7100S	0.12[1] 0.50[2] 13[3]	949	24	12	33	1500	1200	15	126	63	>10000[6]	120	Extrusion of sheets for industrial parts and for non-pressure pipe extrusion
		TIPELIN 7111S	0.12[1] 0.50[2] 13[3]	949	25	11	30	1490	1250	16	127	63	>10000[6]	>120	Non-pressure pipes and sheet manufacturing

| NOTES |

[1] MFR at 190°C and 2.16 kg
[2] MFR at 190°C and 5 kg
[3] MFR at 190°C and 21.6 kg
[4] Values have been measured on standard pressed specimens *(ISO 293)* conditioned at room temperature *(ISO 291)*
[5] Values have been measured in 100% Igepal CO-630 on standard pressed specimens (ISO 293) conditioned at room temperature (ISO 291)
[6] Values have been measured in 10% Igepal CO-630 on standard pressed specimens (ISO 293) conditioned at room temperature (ISO 291)

For the actual values and product por t olio please check www.molgroupchemicals.com

INJECTION MOULDING, FIBER AND FILM GRADES

TYPICAL PROPERTIES, CANNOT BE CONSIDERED AS SPECIFICATION

		Grade/ Parameter	Melt Mass – Flow Rate (MFR)	Density 23°C [4]	Tensile Stress at Yield	Tensile Strain at Yield	Tensile Stress at Break	Tensile Strain at Break	Elmendorf Tear Resistance	Dart Drop (F50)	Flexural Modulus	Notched Izod Impact Strength	Spencer Impact Strength	Vicat Softening Tempera-ture	Hardness Shore D	ESCR F50 B method [7]	OIT 200°C	Recom-mended film thickness	Application
		Unit	g/10 min	kg/m³	MPa	%	MPa	%	cN	g	MPa	kJ/m²	MPa	°C	–	h	min	mm	–
		Test method	ISO 1133-1	ISO 1183-2	ISO 527	ISO 527	ISO 527	ISO 527	ISO 6383-2	ISO 7765-1 method A	ISO 178	ISO 180/A	ASTM D 3420	ISO 306/A 120	ISO 868	ASTM D 1693	EN 728	–	–
INJECTION MOULDING GRADES	UNIMODAL	TIPELIN 3100J	2.0 [1]	952	25 [9]	12 [9]	25 [9]	1100 [9]	–	–	1000 [9]	10 [9]	–	127 [9]	62 [9]	20	60	–	Injection moulding and compression moulding, caps and closures for carbonated soft drinks, engineering and technical parts
		TIPELIN 1100J	8.0 [1]	961	28 [9]	11 [9]	10 [9]	750 [9]	–	–	1400 [9]	4.5 [9]	–	128 [9]	63 [9]	>3	35	–	Recommended for manufacturing daily necessaries, kitchen housewares, boxes, crates, trays, toys, caps, cartridges
		TIPELIN 1108J	8.0 [1]	961	29 [9]	11 [9]	11 [9]	750 [9]	–	–	1400 [9]	4.5 [9]	–	127 [9]	62 [9]	>3	120	–	Recommended for manufacturing daily necessaries, kitchen housewares, boxes, crates, trays, toys, caps, cartridges, contains UV stabilizer package
FIBER GRADE		TIPELIN 5700S	0.50 [1] 1.7 [2] 25 [3]	947	23/20 [6]	15 [6]	46/45 [6]	750/900 [6]	17/150 [6]	47 [6]	1200 [4]	10 [4]	34 [6]	126 [4]	62 [4]	–	100	Primer film: 0.06–0.12 Fibre: 0.018–0.025	Split yarn fibres for agricultural applications, films, bags
BLOWN FILM GRADES		TIPELIN FS 340-03	0.17 [1] 0.78 [2] 14 [3]	935	22/18 [5]	–	51/43 [5]	700/800 [5]	50/336 [5]	86 [5]	800 [4]	–	37 [5]	118 [4]	60 [4]	–	25	0.015–0.06	Heavy duty bags, industrial films, multilayer films, blend component for LDPE
		TIPELIN FA 381-10	0.28 [1] 1.2 [2] 21 [3]	938	22/16 [5]	–	45/40 [5]	750/870 [5]	50/360 [5]	85 [5]	840 [4]	–	34 [5]	120 [4]	60 [4]	–	26	0.015–0.06	Bags, shopping bags, multilayer films, blend component for LDPE
		TIPELIN FS 383-03	0.18 [1] 0.80 [2] 15 [3]	938	23/18 [5]	–	51/41 [5]	730/820 [5]	47/280 [5]	90 [5]	850 [4]	–	32 [5]	120 [4]	60 [4]	–	30	0.015–0.06	Bags, shopping bags, multilayer films, blend component for LDPE
		TIPELIN FS 471-02	0.18 [1] 0.80 [2] 15 [3]	946	23/20 [5]	–	50/40 [5]	710/860 [5]	25/300 [5]	80 [5]	1180 [4]	–	34 [5]	127 [4]	63 [4]	–	30	0.008–0.06	Extra thin packaging films, bags, shopping bags, garbage bags
		TIPELIN FB 472-02	0.69 [1] 2.7 [2] 40 [3]	947	23/19 [5]	–	46/37 [5]	810/980 [5]	25/230 [5]	47 [5]	1200 [4]	–	26 [5]	125 [4]	63 [4]	–	30	0.015–0.06	Bags, shopping bags, garbage bags, blend component for LDPE primarily for shrink film
		TIPELIN BB 620-17	0.65 [1] 2.9 [2] 50 [3]	962	27/24 [5]	–	39/25 [5]	715/550 [5]	12/91 [5]	20 [5]	1800 [4]	–	9 [5]	131 [4]	67 [4]	–	7	–	Multilayer shrink films and packaging films, blend component for LDPE in core layer.
	BIMODAL	TIPELIN 7000F	0.08 [1] 0.30 [2] 9.0 [3]	955	27/24 [6]	–	55/45 [6]	500/550 [6]	15/175 [6]	200 [6]	1500 [4]	16 [4]	85 [6]	129 [4]	64 [4]	–	50	0.006–0.06	Ultra-thin film, merchandise bags, disposal waste bags
		TIPELIN 7500F	0.095 [1] 0.30 [2] 10 [3]	952	26/21 [6]	–	60/44 [6]	520/570 [6]	14/135 [6]	180 [6]	1400 [4]	16 [4]	80 [6]	128 [4]	64 [4]	–	55	0.006–0.06	Ultra-thin film, merchandise bags, disposal waste bags

| NOTES |

[1] MFR at 190°C and 2.16 kg
[2] MFR at 190°C and 5 kg
[3] MFR at 190°C and 21.6 kg
[4] Values have been measured on standard pressed specimens *(ISO 293)* conditioned at room temperature *(ISO 291)*
[5] The thickness of the film: 0.025 mm for the mechanical measurement *(MD/TD: MD = machine direction, TD = trans direction)*, blow up ratio 4:1
[6] The thickness of the film: 0.015 mm for the mechanical measurement *(MD/TD: MD = machine direction, TD = trans direction)*, blow up ratio 4:1
[7] Values have been measured in 100% Igepal CO-630 on standard pressed specimens *(ISO 293)* conditioned at room temperature *(ISO 291)*
[8] Values have been measured in 10% Igepal CO-630 on standard pressed specimens *(ISO 293)* conditioned at room temperature *(ISO 291)*
[9] Values have been measured on standard injection moulded specimens *(ISO 294-1)* conditioned at room temperature *(ISO 291)*

For the actual values and product por t olio please check www.molgroupchemicals.com

PROCESSING CONDITIONS OF TIPELIN MDPE AND HDPE GRADES

FILM MANUFACTURING

Considering their characteristics, TIPELIN film grades are medium and high density polyethylenes with a typically wide molecular weight distribution. To manufacture these grades a HDPE processing unit with a 0.7–1.2 mm die gap and melt temperatures of 200–220°C are recommended. To reach optimum mechanical properties a high blow up ratio *(minimum 4:1)* should be applied.

Generally, the frost line height is 5–8 times of the die diameter. TIPELIN FS 340-03, FS 383-03, FA 381-10 and FB 472-02 may be processed on machines designed for LDPE as LDPE, LLDPE or other blends containing HDPE. Depending on the extruder design and processing conditions, the film thickness range can be 0.007–0.200 mm.

PIPE AND SHEET EXTRUSION

Pipes and sheets can be manufactured from TIPELIN grades in a profile extrusion process. For the extrusion of TIPELIN profiles, screw of at least 20 D, shorter compression zone *(1-3 D)* and a 2–2.5 compression ratio should be applied. The constant pitch of the screw should be equal with or less than the diameter. Recommended processing temperatures are 170–220°C for extrusion.

BLOW MOULDING

TIPELIN blow moulding grades are high density polyethylenes with typically low MFR and a wide molecular weight distribution. TIPELIN blow moulding grades process well on extruders whose screw is not less than 20 D, constant pitch is equivalent with or less than diameter, compression zone is shorter *(1-2 D)* and where compression ratio is 2.5–3. Recommended melt temperatures are 180–220°C.

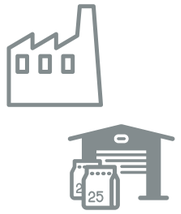
PHYSICAL PROPERTIES*

Quantity	Method	Value	Unit
Thermal expansion (20°C)	ASTM D696	12.6×10^{-5}	$°C^{-1}$
Thermal conductivity (20°C)	ISO 8302	0.48	W/(m·K)
Thermal conductivity (150°C)	ISO 8302	0.2	W/(m·K)
Electric resistivity	DIN IEC 93	10^{13}–10^{16}	Ohm·m
Dielectric constant (1 MHz)	ASTM D150	2.4	–
Specific heat	ASTM C351	1800–2700	J/kg·K
Melting temperature	Internal method (DSC)	125–135	°C
Glass transitional temperature	ASTM E1356	–80	°C
Breakdown potential	IEC 243-1	17.7–19.7	kV/mm
Dielectric loss factor	ASTM D150	0.0005–0.0008	
Friction coefficient	ASTM D1894	0.25–0.3	
Refraction index	ISO 489	1.52–1.53	
Shrinkage	ISO 294-4	2.4–4.0	%
Water absorption	ASTM D570	0.01–0.015	%
Fatigue	ASTM D671	18–20	MPa

* These physical values are based on literature data. The values can change with different types, these values are not specified and not guaranteed

STORAGE & HANDLING

PACKAGING



- 25 kg polyethylene bags
- Transported on shrink-wrapped or stretch-wrapped pallets
  - eligible load of polymer 1375 kg
- Adhesive is used between the bags in case of TIPELIN to avoid their slipping
  - pay attention during the removal of the bags from the pallets
  - lift the bag at first without rotation
- Heat-treated pallets from PRS
  - a member of the Faber Halbertma Group, operating a pooling system that collects the pallets after use and organises reuse as part of a sustainable, circular system
  - PRS pallets remain the property of PRS at all times

TRANSPORTATION

- By truck
- Road silo
- Rail silo
- For details please see Services on www.molgroupchemicals.com

STORAGE

- Polyethylene is a combustible substance
  - adhere to the fire safety rules
- Do not store polyethylene in conditions of high humidity and fluctuating temperatures
  - atmospheric moisture can condense inside the packing
  - if it happens, dry the pellets before use
- Do not expose to UV radiation and temperatures above 40°C
- The producer does not take responsibility for any damages caused by adverse storage

STATEMENTS

REACH COMPLIANCE

- Polymers are exempt from registration
- SLOVNAFT, a.s. and MOL Petrochemicals Co. Ltd. use REACH-compliant raw materials (monomers and relevant additives)
- TIPELIN grades do not contain any substances specifically identified as SVHC at levels greater than 0.1%
- For more detailed information see REACH/SVHC statement on www.molgroupchemicals.com

APPLICATION FOR FOODS

- Most TIPELIN grades satisfy the regulations applied by European countries (EEC)
- In case of country-specific regulations or food industrial product licenses, contact MOL Petrochemicals Co. Ltd. and SLOVNAFT, a.s. for special information
- For more detailed information related to product safety, see Declaration data sheets on www.molgroupchemicals.com

SAFETY

- Polyethylene is not regarded as hazardous material when in contact with the skin or inhaled
- Any contact with the molten polymer or the inhalation of the released gases should be avoided during processing
- Install exhaust unit over processing machine and secure good ventilation of the area.
- For further information see Material Safety Data Sheets on www.molgroupchemicals.com.

RECYCLING

- Polyethylene resins are suitable for recycling using modern recycling methods.
- In-house production waste should be kept clean to facilitate direct recycling.

DISCLAIMER

CERTIFICATES

MOL PETROCHEMICALS

SYSTEM CERTIFICATION ISO 50001 SGS
SYSTEM CERTIFICATION ISO 14001 SGS
SYSTEM CERTIFICATION ISO 9001 SGS
SYSTEM CERTIFICATION ISO 45001 SGS

SLOVNAFT

SYSTEM CERTIFICATION ISO 14001 SGS
SYSTEM CERTIFICATION ISO 9001 SGS
SYSTEM CERTIFICATION ISO 45001 SGS

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