

PRODUCT CATALOGUE

LOW DENSITY POLYETHYLENE

BRALEN+
TIPOLEN



CERTIFICATES

MOL PETROCHEMICALS



SLOVNAFT



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WHY TO CHOOSE MOL GROUP?

MOL Group is an oil, gas and petrochemicals company. Its petrochemical assets are INTEGRATED backwards to crude oil, providing RELIABILITY of supply. We can highly lean on the refinery integration benefits: the secured feedstock supply, the robust financial background and strong position in the regional markets, together with the HIGH QUALITY products provided by STATE OF THE ART TECHNOLOGIES.

We aim to become the FIRST CHOICE of our partners in our core region using the advantage of our location and competitive portfolio of high quality polyolefin products. We offer TAILOR MADE SOLUTIONS for our partners helping to build a SUCCESSFUL RELATIONSHIP.

We pay attention to OPERATIONAL EXCELLENCE, maintain our assets regularly in order to ensure reliable operation, considering safety as key value. Optimising operation with refining, the Division runs its production plants on 2 production sites in Tiszaújváros and Bratislava.

We would like to exceed our customers' expectations in SERVICE EXCELLENCE throughout Europe. Supporting the fulfilment of this aim we operate several sales offices throughout Europe: in Hungary, Slovakia, Austria, Germany, Italy, Poland, Romania, Croatia and Ukraine.

BRALEN+ is the registered trademark of SLOVNAFT, a.s.

TIPOLEN is the registered trademark for low density polyethylene produced by MOL Petrochemicals Co. Ltd.

LOW DENSITY POLYETHYLENE

GENERAL INFORMATION

Low density polyethylene LDPE is ductile and flexible material. It is stable in the temperature range from -50 to 85°C , the melting point is from 105 to 115°C . In the oxygen absence LDPE is stable up to 290°C . It decomposes within 290 to 350°C and thermoplastic products of lower molecular weight are formed. Gaseous products are formed in greater quantities above 350°C and these gases contain as main component rather butene than ethylene. In the oxygen presence LDPE is less stable. During high temperature processing of LDPE in the presence of air thermal oxidation occurs.

During outdoor exposure of LDPE the photochemical oxidation caused by UV radiation occurs. Due to the oxidation by thermal or light effects on the surface of the products fine cracks are formed. They may deteriorate the physical and mechanical properties. In order to eliminate these negative phenomena light stabilizers are added to LDPE.

Non-oxidizing acids, bases, salts and their solutions practically have no effect on polyethylene. However, oxidizing chemicals attack polymer. LDPE is insoluble at normal temperature but is soluble at higher temperatures in aliphatic, aromatic and halogenated hydrocarbons. In the case that articles made of LDPE are exposed to the effect of chemical substances along with mechanical stress, on the surface cracks can be formed – this phenomenon is called environmental stress cracking.

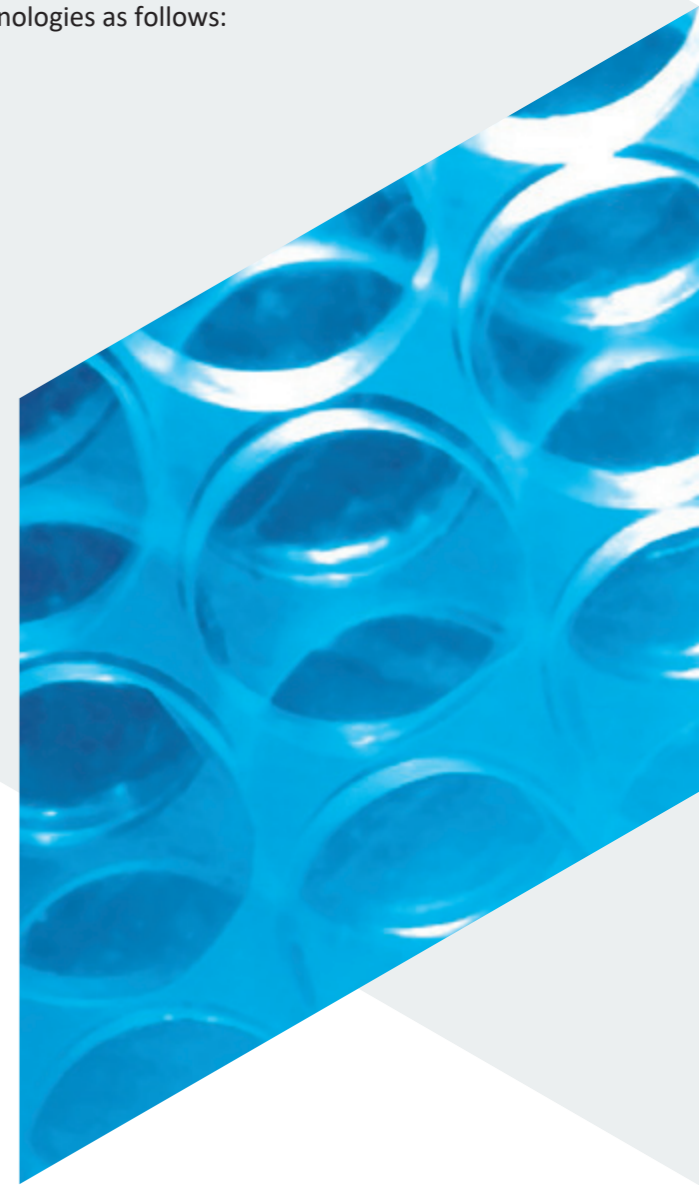
LDPE has advantageous properties in permeability. It practically does not permeate water and steam, but it has a good permeability to carbon dioxide and oxygen. These characteristics are specially used in packaging.

LDPE is an excellent insulator with good dielectrical properties and a high volume resistance. The low dissipation factor predetermines LDPE for the use at high frequencies particularly where very low dielectric loss is required.

APPLICATION

The excellent physical and mechanical properties provide the wide range of applications of this polymer. BRALEN+ and TIPOLEN are available in number of grades for all processing technologies as follows:

- ▶ films
- ▶ injection moulding
- ▶ extrusion
- ▶ tubes and pipes
- ▶ blow moulding



CODING SYSTEM

BRALEN+

BRALEN+ COMMERCIAL GRADES PRODUCED BY LYONDELLBASELL TUBULAR REACTOR PROCESS ARE DESIGNATED BY TWO LETTERS AND TWO GROUPS OF DIGITS. THE SIGNIFICATION IS AS FOLLOWS:

The first letter in the code of BRALEN+ grade indicates the main application area:

F = Film
M = Injection moulding

The second letter in the code of BRALEN+ grade indicates the range of density in kg/m³ at 23°C:

A = 918–921
B = 922–925
C = 926–929
D = 930 and more

FB 2 - 16

The first group of digits indicates MFR in g/10 min at 190°C and 2.16 kg:

– if MFR is below 1, the code is in shape like 02
– if MFR is over 1, then the figure in the code is according to mathematical rounding (e.g. MFR 1.7 = code 2)

The second group of digits represents internal code:

01–39 non-additivated grades
40–99 additivated grades

TIPOLEN

TO IDENTIFY **TIPOLEN** PRODUCTS MANUFACTURED BY LYONDELLBASELL TUBULAR REACTOR PROCESS A CODE OF TWO LETTERS AND FIVE DIGITS IS APPLIED.

The first letter in the code of TIPOLEN grade indicates the main application area:

F = Film

The second letter shows MFR range in g/10 min at 190 °C and 2.16 kg:

A = 0.20–0.35
B = 0.6–0.90
C = 1.7–2.2
D = 3.4–4.6

FB 243 - 55

The first, second and third digits are internal plant codes

The fourth and fifth digits are indicating the presence of additives

Grade/ Parameter	Melt Mass – Flow Rate (MFR) 190 °C/ 2.16 kg	Density (23 °C) **	Tensile Strength (MD/TD) *	Tensile Strain at Break (MD/TD) *	Dart Drop *	Haze *	Vicat Softening Tempera- ture **	Additives	Recommended Film Thickness	Recommended Processing Conditions	Application
Units	g/10 min	kg/m ³	MPa	%	g	%	°C	ppm	mm	°C	–
Test methods	ISO 1133-1	ISO 1183-1	ISO 527-1,3	ISO 527-1,3	ISO 7765-1 method A	ISO 14782	ISO 306/A 50	–	–	–	–
FA 03-01	0.25	920	25/26	450/500	280	11	92	–	0.070–0.220	170–220	Heavy duty packaging, shrink hoods, agricultural films
FB 03-02	0.30	923	27/27	450/550	250	9	96	–	0.070–0.220	170–220	Heavy duty packaging, shrink hoods, agricultural films
FC 03-03	0.30	927	29/27	450/550	150	7	100	–	0.060–0.220	170–220	Heavy duty packaging, blown films, shrink films
FB 08-12	0.80	924	24/24	450/550	200	8	95	–	0.025–0.100	170–220	Shopper bags, surface protection films
FB 08-50	0.80	924	20/21	350/500	200	9	95	SA(E) 500 AB 900	0.025–0.080	170–220	Freezer films, laminating films, shopper bags
FC 08-13	0.80	928	27/25	500/600	120	5.5	103	–	0.025–0.080	170–220	Blown films, shrink films, bags and pouches
FB 2-16	2	922	22/22	540/600	140	5.5	93	–	0.020–0.100	160–200	General purpose films, fine shrink films, high clarity films
FB 2-51	2	923	19/20	450/560	150	6	93	SA(E) 500 AB 1000	0.020–0.060	160–200	General purpose films, freezer films, FFS films
FB 4-31	4	922	20/19	540/600	110	5.5	92	–	0.015–0.040	150–190	Cast films, surface protection films, extrusion coating and injection moulding applications
FB 4-52	4	923	19/17	450/550	100	6	92	SA(E) 600 AB 1800	0.015–0.040	150–190	Cast films, high clarity films, clothes protection films, very thin gauge films, thin gauge and laminating films, cling films

FILM APPLICATIONS

| NOTES |

Typical properties, not be used as specification.

* Typical properties tested using 0.050 mm thick blown film extruded at melt temperature of 180 °C (for MFR 0.3–2 g/10 min), or at 170 °C (for MFR 4 g/10 min), and at blow up ratio 2.5:1.

** Typical properties measured on standard injection moulded test specimen according to ISO 294-1

| ADDITIVES |

SA (E) Slip agent Erucamide

AB Antiblocking agent

For the latest product portfolio please check www.molgroupchemicals.com

Grade/ Parameter	Melt Mass – Flow Rate (MFR) 190 °C/2.16 kg	Density (23 °C) **	Tensile Strength (MD/TD) *	Tensile Strain at Break (MD/TD) *	Vicat Softening Tempera- ture **	Dart Drop *	Shore D Hardness **	Haze *	Additives	Recommended Film Thickness	Application
Units	g/10 min	kg/m ³	MPa	%	°C	g	–	%	ppm	mm	–
Test methods	ISO 1133-1	ISO 1183-2	ISO 527	ISO 527	ISO 306 /A120	ISO 7765-1 method A	ISO 868	ISO 14 782	–	–	–
FA 244-51	0.30	920	21/22	300/550	92	300	49	12	–	0.07–0.16	Heavy duty bags, shrink films, carrier bags, packaging films, household films, films for laminating, agricultural films, silage films, blow moulded products, bottles
FB 243-51	0.80	921	26/22	300/600	96	115	48	12	–	0.04–0.10	Carrier bags, household films, packaging films, films for laminating, small blow moulded products, bottles
FB 243-55	0.80	922	25/20	230/550	96	115	48	11	SA(E) 400 AB 800	0.04–0.10	Carrier bags, household films, packaging films
FC 243-51	2.0	922	24/19	300/560	94	80	48	9	–	0.04–0.08	General purpose films, bubble films, foamed sheets
FC 243-55	2.0	922	24/19	240/560	94	80	48	9	SA(E) 400 AB 800	0.04–0.08	General purpose films
FD 243-51	4.0	922	22/18	340/520	92	75	48	8	–	0.04–0.08	High clarity fine films, caps
FD 243-55	4.0	923	20/16	270/560	92	75	48	8	SA(E) 700 AB 1400	0.04–0.08	High clarity fine films, caps

| NOTES |

- * Haze, Dart Drop, Tensile Strength and Tensile Strain at Break have been measured on film – thickness of 0.07 mm (MFR = 0.30 g/10 min), and 0.04 mm (MFR more than 0.30 g/10 min), blow up ratio 2:1
- ** Density, Vicat Softening Temperature and Shore D Hardness have been measured on standard pressed specimens (ISO 293) conditioned at room temperature (ISO 291)

| ADDITIVES |

- SA (E) Slip agent Erucamide
AB Antiblocking agent

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STORAGE & HANDLING

Pellets are packed in 25 kg PE-LD bags and transported on shrink-wrapped or stretch-wrapped pallets at eligible load of polymer 1375 kg. We use adhesive between the bags in order to avoid their slipping. Pay attention to this fact during the removing of the bags from the pallets. The preferred method is to lift the bag at first without rotation. Heat treated pallets are available as well. Transportation in a road silo or rail silo is also available. For more detailed information please contact SLOVNAFT and MOL Petrochemicals sales representative.

Since polyethylene is a combustible substance, the fire safety rules applicable for combustible materials in warehouses and store rooms should be observed.



If polymer is stored in conditions of high humidity and fluctuating temperatures, then atmospheric moisture can condense inside the packing. If it happened, it is recommended the pellets to be dried before use. During the storage polyethylene should not be exposed to UV radiation and temperatures above 40 °C. Producer does not take responsibility for any damages caused by adverse storage.

REACH STATEMENT

Polymers are exempt of REACH registration. However, their raw materials which mean monomers and relevant additives have been registered. SLOVNAFT, a.s./MOL Petrochemicals Co. Ltd. is committed to fully respect this legislation and will only use REACH compliant raw materials. At this point in time LDPE BRALEN+/TIPOLEN does not contain any substances specifically identified as SVHC at levels greater than 0.1%.

APPLICATION FOR FOODS

Most TIPOLEN and BRALEN+ grades satisfy the regulations applied by the European countries (EEC). Because several European countries apply restrictive regulations for the allowed migration values of additives in packaging material in contact with food, it is recommended that customers contact MOL Petrochemicals and SLOVNAFT for some special information or product licenses for food industry.



SAFETY

Under normal circumstances, polyethylene is not regarded as hazardous material when in contact with the skin or when inhaled. However, any contact with the molten polymer or the inhalation of the released gases should be avoided in processing. It is recommended to install exhaust units over processing machines and to secure good ventilation of the place. For further information see Material Safety Data Sheet.



RECYCLING

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



DISCLAIMER

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