



Second generation

Metallocene Polyethylene Film Resins

TOTAL PETROCHEMICALS



TOTAL

Total Petrochemicals

Your Partner for Polyethylene Film Extrusion

Total Petrochemicals manufactures polyethylene at five production sites around the world: Bayport, TX in the United States, Antwerp and Feluy in Belgium, and Gonfreville and Carling in France. Combined production capacities of these sites is more than 4.4 billion pounds.

In the United States, Total Petrochemicals' polyethylene film portfolio includes medium density polyethylene (MDPE), high density polyethylene (HDPE), and second generation metallocene polyethylene resins. These resins are used in a wide range of film applications in the field of consumer, industrial and institutional packaging.

The people at our Research and Technology Center in LaPorte, TX conduct state-of-the-art research and development in catalysts, polymers and processing to offer innovative, practical and cost effective solutions for the film industry. A customer-oriented organization and focused sales force and technical service team make Total Petrochemicals the ideal partner for your film business.

Total Petrochemicals

At a Glance

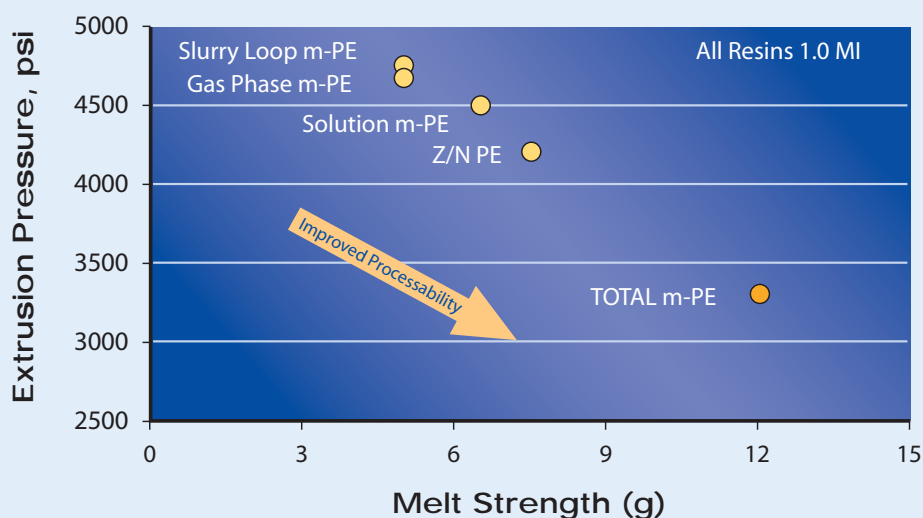
Total Petrochemicals, the petrochemicals business group of Total, encompasses the base petrochemical products produced by steam crackers and selected refinery operations – olefins (ethylene and propylene), C4 fractions and aromatics (benzene, toluene, xylenes and styrene) and the consumer polymers derived from them (polyethylene, polypropylene, polystyrene and elastomers). Total Petrochemicals employs 7500 people in Europe, the United States, the Middle East and Asia. Its products are used in many domestic and industrial markets including packaging, construction and automotive.

Second generation metallocene polyethylenes suitable for a wide range of film applications in consumer, industrial, food and hygiene packaging.

Innovation in blown film technology is creating tremendous flexibility in designing and manufacturing films for packaging applications. This new flexibility has created opportunities for medium density polyethylene (MDPE) and high density polyethylene (HDPE) in flexible packaging. MDPE and HDPE resins offer greater stiffness, tensile strength and heat resistance than LDPE, LLDPE and single-site LLDPE resins. These properties are beneficial because they improve the printing, converting and filling of films. Typically, MDPE and HDPE resins have poor optics (haze, gloss) and poor toughness (impact, tear). Thus, they are not attractive for many consumer packaging applications. Total Petrochemicals has addressed these constraints by designing second generation metallocene MDPE and HDPE resins with outstanding optics, toughness and sealability.

First generation metallocene polyethylene resins were designed to improve mechanical strength, heat sealing and optical properties versus standard LLDPE grades. Total Petrochemicals' second generation metallocene polyethylene resins combine these properties with increased stiffness and excellent processability.

Good Processability in Film Extrusion



Our metallocene polyethylene can be processed at high output rates with low extrusion pressures and good gauge control in comparison with conventional LLDPE and first generation metallocene polyethylene film resins.

This brochure highlights several films made with Total Petrochemicals' second generation mPE resins. The monolayer and co-extruded blown films can be used in a wide range of film applications in the field of consumer, industrial, food or hygiene packaging where very high requirements on optical properties, stiffness, toughness, and sealability are needed.

M 3410 EP



Metalocene MDPE

Density: 0.934

Melt index: 0.9

Applications:

- Clarity shrink bundling
- Tissue and towel overwrap
- Fresh cut produce packaging
- Hygiene film
- Protective packaging
- Sealant webs and laminations

Advantages:

- Outstanding clarity and gloss
- High stiffness
- High output and low extrusion pressure
- Excellent bubble stability and gauge control
- Good heat seal strength
- Good dart impact strength
- Low gel content

Typical Properties:

Monolayer 40 µm thick film made of 100% M 3410 EP.

Dart Impact	Elmendorf Tear		Yield Strength		Elongation @ Break		Haze	45° Gloss
g	g		psi		%		%	
ASTM D1709	ASTM D1922		ASTM D882		ASTM D882		ASTM D1003	ASTM D523
	MD	TD	MD	TD	MD	TD		
100	80	400	2600	2750	660	730	8	65

M 2710 EP

M 2710 EP



Metallocene MDPE

Density: 0.927

Melt index: 0.9

Applications:

- Clarity shrink bundling
- Frozen food packaging
- Fresh cut produce packaging
- Hygiene film
- Shipping sacks
- Bakery film
- Sealant webs and laminations

Advantages:

- Outstanding clarity and gloss
- High stiffness
- High output and low extrusion pressure
- Excellent bubble stability and gauge control
- Good heat seal and hot tack strength
- Excellent dart impact strength
- High tear strength
- Low gel content

Typical Properties:

Monolayer 40 µm thick film made of 100% M 2710 EP.

Dart Impact	Elmendorf Tear		Yield Strength		Elongation @ Break		Haze	45° Gloss
g	g		psi		%		%	
ASTM D1709	ASTM D1922		ASTM D882		ASTM D882		ASTM D1003	ASTM D523
	MD	TD	MD	TD	MD	TD		
200	325	650	2030	2100	710	750	7	70

Total Petrochemicals Film Extrusion Equipment Characteristics

MONOLAYER

- Extruder: 45 mm, 30:1 L/D
- Die diameter = 120 mm
- Cooling system: dual lip air ring with chilled air

CO-EXTRUSION

- 5 extruders / 5 layers
- Die diameter = 60 mm
- Gauge range 5 to 150 mm
- Film width up to 380 mm layflat
- Cooling system: dual lip air ring with chilled air

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