

ELASTOMERS

Dutral[®] BTX 4055

EXCELLENT PROCESSING
CHARACTERISTICS ESPECIALLY
IN LOW VISCOSITY COMPOUNDS

APPLICATION



versalis



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BACKGROUND

The first synthesis ever of an Ethylene Propylene elastomer copolymer was performed in the late '50s by Prof. Natta and his team based in Ferrara. In 1963, the trademarked product Dutral® was scaled-up to a production of 5 KTPY and eventually the capacity increased to 130 KTPY of NPC in order to support market demand.

DUTRAL® BTX 4055: EXCELLENT PROCESSING CHARACTERISTICS ESPECIALLY IN LOW VISCOSITY COMPOUNDS.

Dutral® BTX 4055 is a low molecular weight terpolymer of medium diene content. It is characterized by tailored molecular structure to improve mixing ability, good mechanical properties and good collapse resistance.

Dutral® BTX 4055 based compounds exhibit good injection molding performance, good curing rate and excellent low temperature behaviour.

GRADES	PROPYLENE CONTENT %WT	MOONEY VISCOSITY ML (1+4) 125°C	UNSATURATION LEVEL %WT	OIL CONTENT %WT	PHYSICAL FORM	PACK. N°	MAIN APPLICATIONS
Dutral® BTX 4055	45	45	4.2	-	B	1	Automotive brake parts, mechanical goods

PACK. N°	PACKAGING DESCRIPTION	CRATE DIMENSION (mm)	NOMINAL NET WEIGHT	BALE (BAG) WEIGHT (kg)	BALES (BAGS) TOTAL	BALES (BAGS) X LAYERS
1	Cardboard box	1050x1250x1050	625	25	25	5x5



PRODUCT PORTFOLIO

DUTRAL® TER/BTR - CLASSIFICATION

C3 % WT.	CURING RATE															GREEN STRENGTH	
	MEDIUM ENB					MEDIUM-HIGH ENB					HIGH ENB						
25	4033	4038	4334	4039													VERY HIGH ↓ LOW
30				4437	4535			4436	6537			K9046					
35	4044			4437WO	4548WO												
40			4049	4049					7040	6049				9049	8148WO		
45	4055																
50																	
ML 100°C	30	60	90	120	150	30	60	90	120	150	30	60	90	120	150		

→
Mooney on crude polymer

TER dry grades
TER oil extended grades
BTR/BTX grades
C2 % + C3 % + ENB % = 100 %

1st digit: ENB content in wt%
2nd digit: oil content in wt% (decades)
3rd digit: propylene content in wt% (decades)
4th digit: ML(1+4) 100°C (decades)

PROCESS

The Dutral® EPR is produced by slurry polymerisation process, which allows the production of a wide variety of grades. The process does not require solvent and solvent recovery equipment and, in addition, the low viscosity of the suspension helps temperature control and product handling. Moreover monomers are highly soluble in the reaction bulk, therefore high molecular weight polymers can be produced advantageously.

The polymerisation is carried out by proprietary Ziegler-Natta catalyst and the unreacted monomers are recovered in the stripping section. Eventually, the crumbs are stabilised by means of a proper antioxidant and then washed, dried, baled and packaged.

Dutral®: new Catalyst System benefits

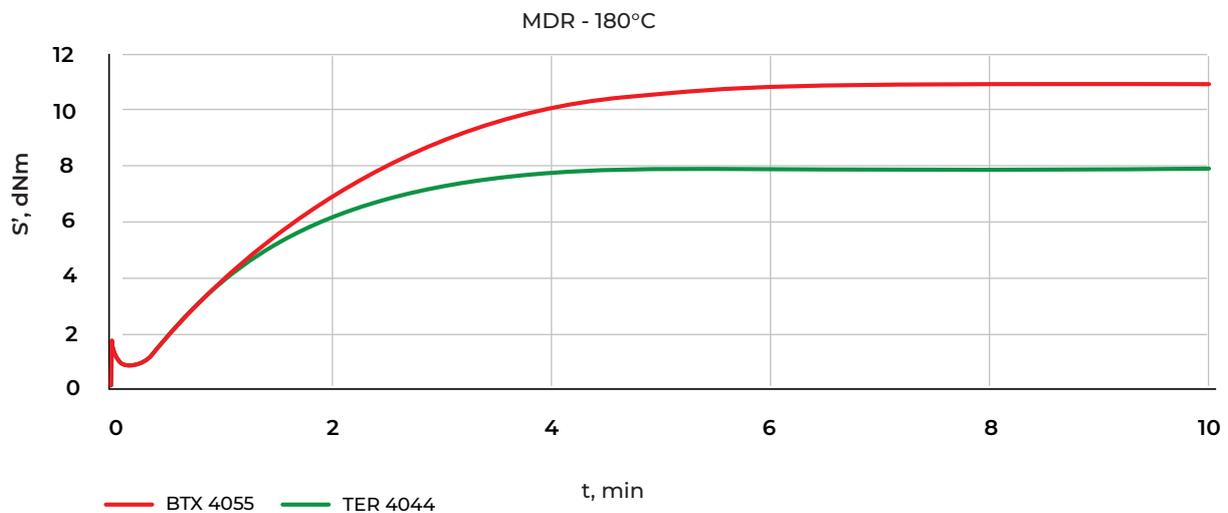
Higher polymerization yield	Cleaner products
Better monomer distribution and side reactions control	Better consistency
	Better curing efficiency
	Gel content: low to none
Widening the polymer design	New polymer structures
	Improved processability

Case study: Dutral® BTX 4055 in NAF compounds for injection moulding

Formulation

Dutral® BTX 4055	phr	100	
Dutral® TER 4044	phr		100
Zinc Oxide	phr		5
Stearic Acid	phr		1
FEF N 550	phr		70
Ultrasil VN3	phr		35
White paraffinic process oil	phr		70
Struktol WB 16	phr		2
PEG 4000	phr		5
Dynasilan VTEO	phr		1
Rhenogran MBT-80	phr		1.5
Rhenocure TP/S (ZDBP)	phr		3.5
Sulphur	phr		1
Total	phr		295

MOONEY VISCOSITY	BTX 4055	TER 4044
Mooney viscosity compound (1+4) @100°C	29	29

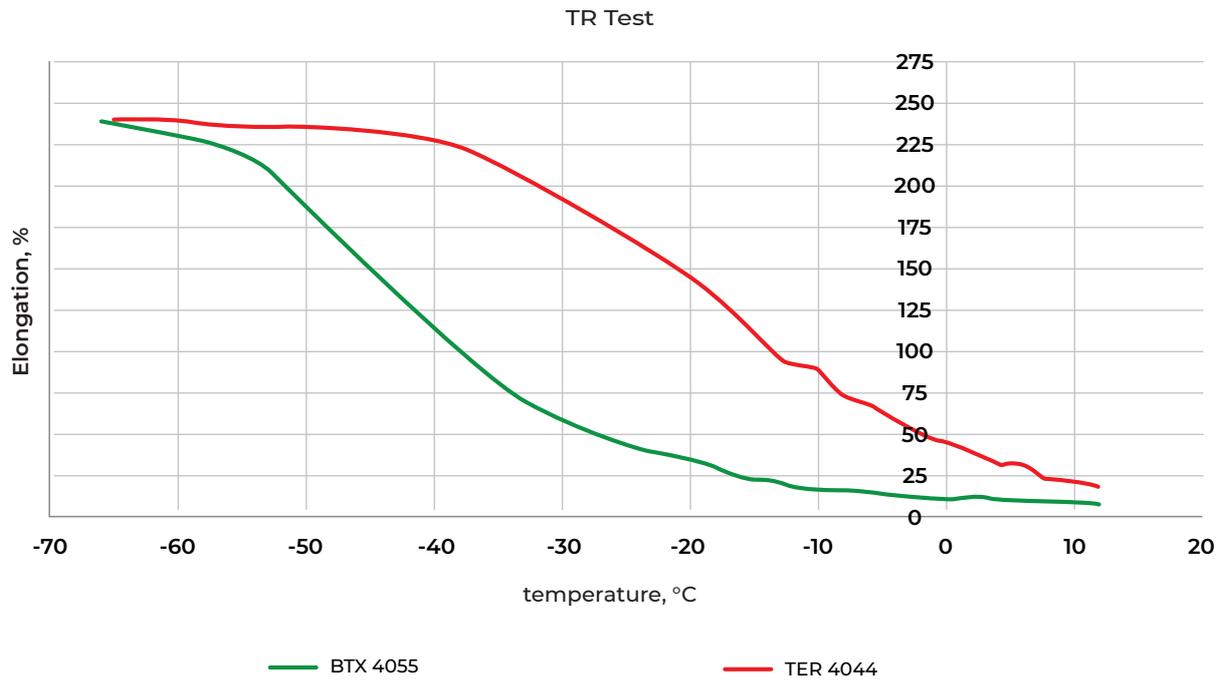


Crosslink density of Dutral®BTX 4055 based compound is higher than that of Dutral®TER 4044, due to the absence of low molecular weight fractions typical of broad MWD grades.

MECHANICAL PROPERTIES		BTX 4055	TER 4044
Modulus 300%	MPa	3.5	3.4
Tensile Strength	MPa	8.4	8.8
Elongation at Break	%	681	672
Hardness	Sh A	54	52

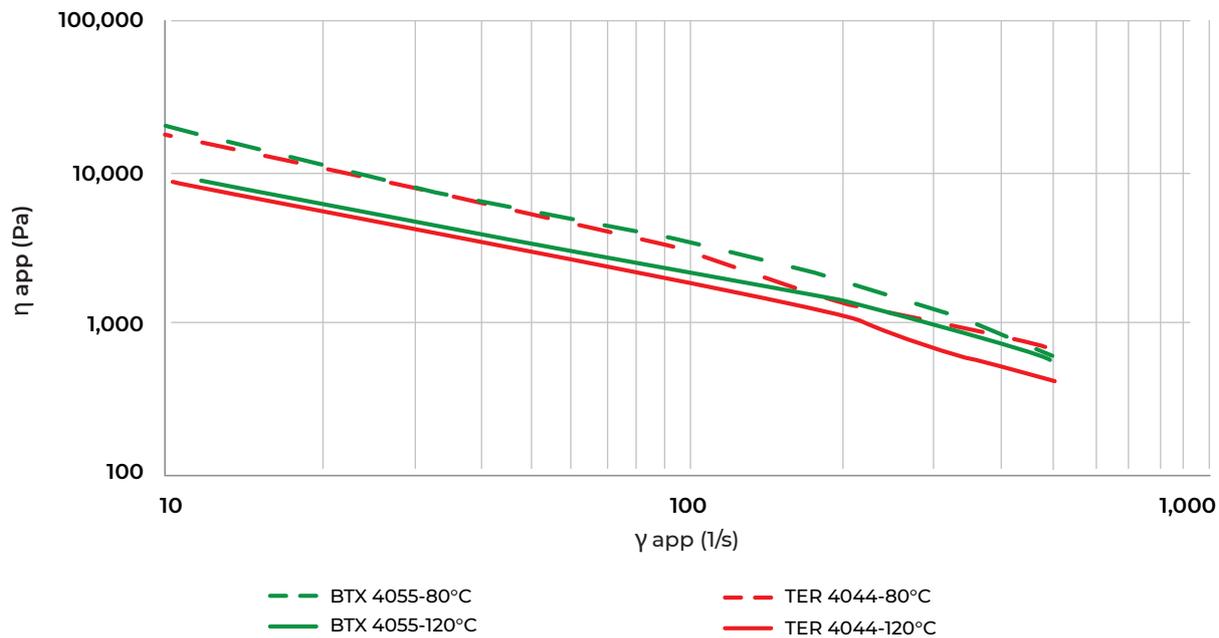
COMPRESSION SET ISO 815		BTX 4055	TER 4044
22h 100°C	%	43	44
22h -25°C	%	41	80





Dutral® BTX 4055 is a highly processable EPDM grade capable of guaranteeing **excellent mechanical properties and high elasticity even at low temperature.**

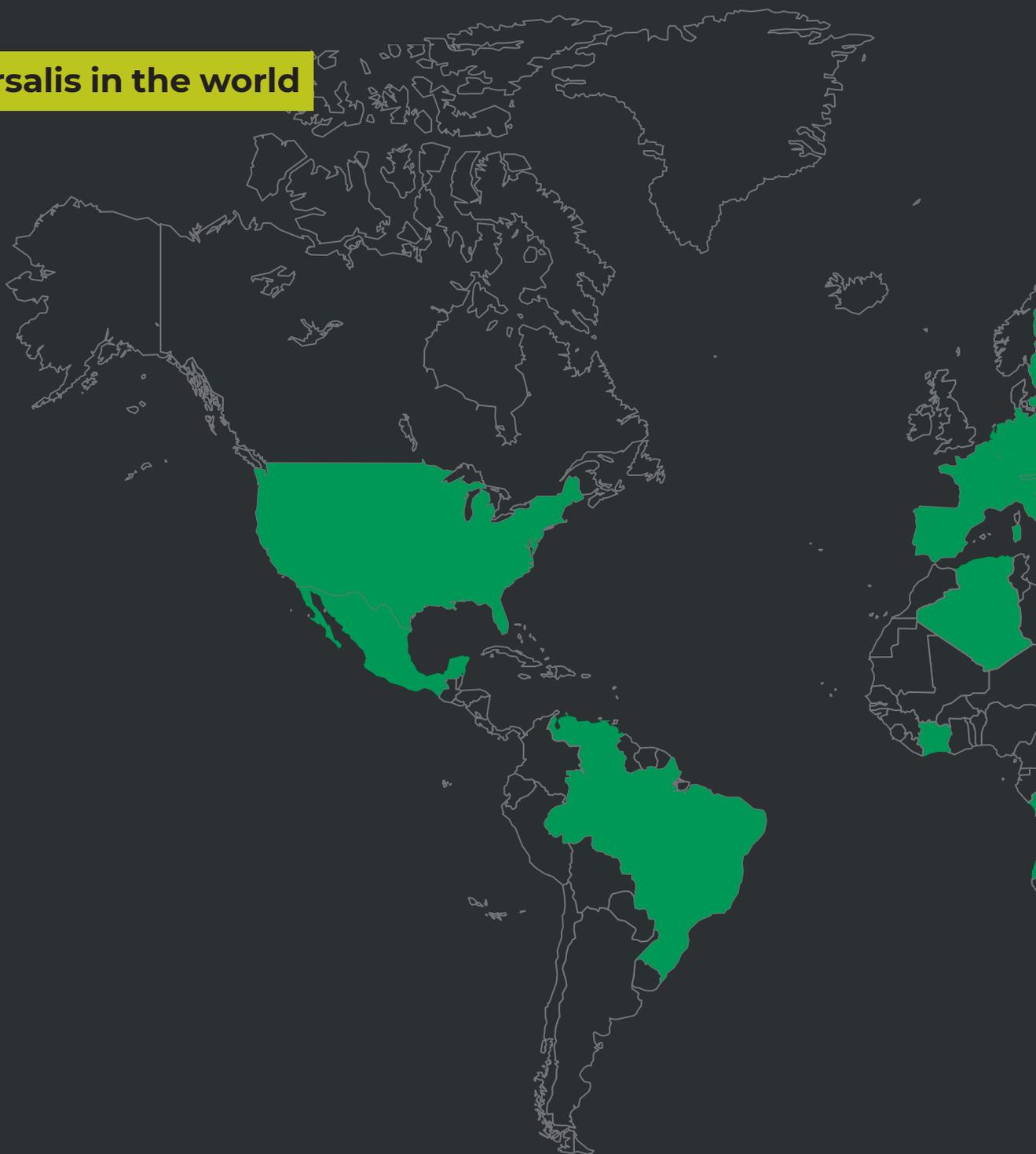




Significant differences are observed in flow behaviour when Dutral®BTX 4055 and Dutral®TER 4044 based compounds are compared: broad MWD and semi-crystalline composition of Dutral® TER 4044 enhance shear thinning at higher shear rates with a temperature-depending “gap widening” effect.

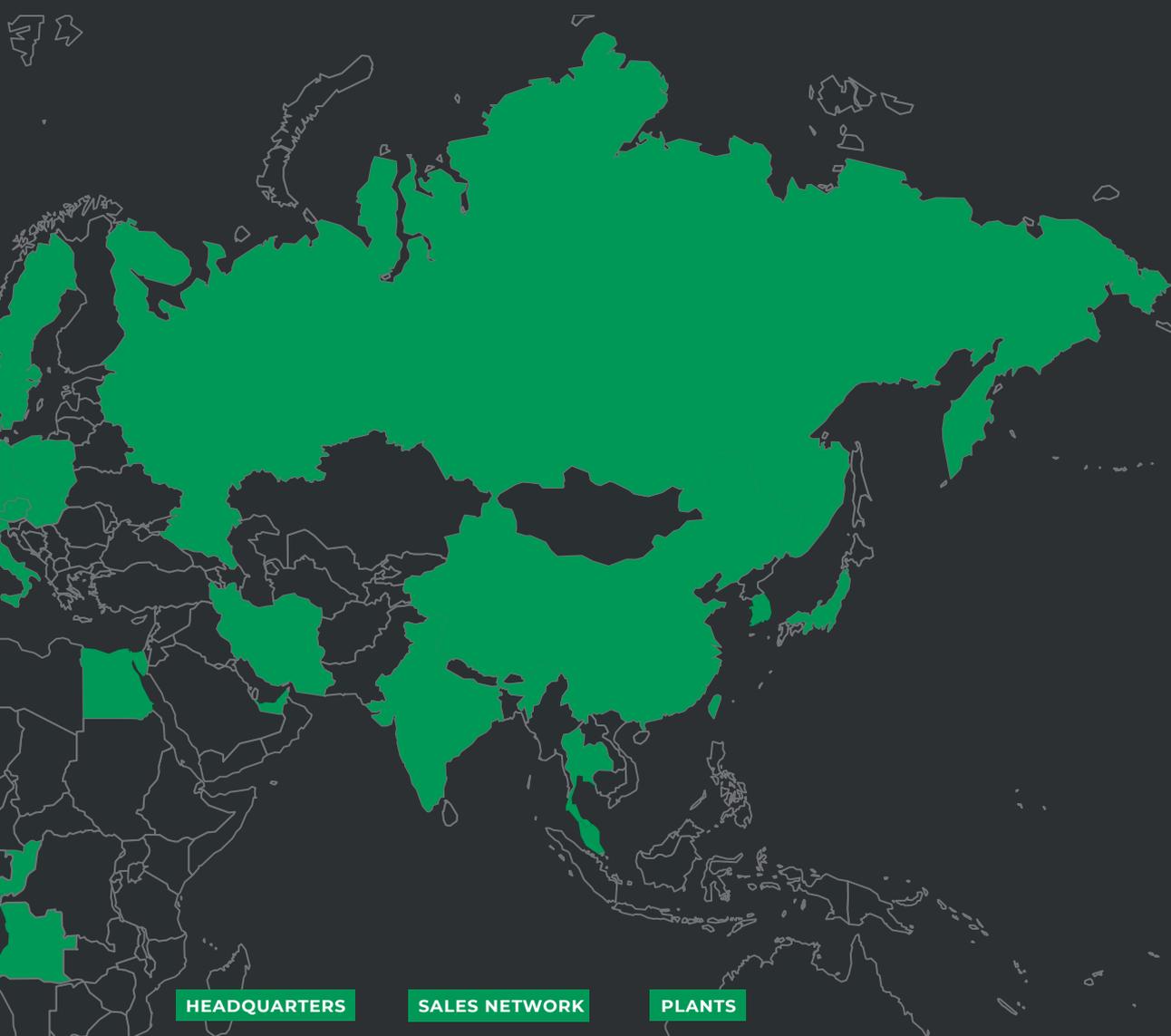


Versalis in the world



Versalis is focused on establishing itself as a solution provider, offering a range of increasingly market-oriented products at an international level. The company is present in the APAC region through its Shanghai-based subsidiary, Versalis Pacific Trading; in Mumbai, India; in Singapore; and in South Korea through LVE, a joint venture with Lotte Chemical.

Versalis can also count on subsidiaries Versalis Americas – with offices in Houston, Texas – and Versalis Mexico. Furthermore, Versalis serves the oil and gas industry with offices in Ghana and in Congo, with its portfolio of oilfield chemicals. Thanks to a widespread sales network, distributors and sales agents, Versalis can serve all markets worldwide.



HEADQUARTERS

San Donato Milanese, Milan (Italy)

LICENSING

Algeria
 Brazil
 China
 Egypt
 India
 Iran
 Japan
 Malaysia
 Portugal
 Qatar
 Romania
 Russian Federation
 Slovak Republic
 South Korea
 Spain
 Taiwan
 USA
 Venezuela

R&D

ITALY
 Ferrara
 Mantua
 Novara
 Porto Torres
 Ravenna
 Rivalta Scrivia

SALES NETWORK

Austria
 Belgium
 China
 Congo
 Czech Republic
 Denmark
 France
 Germany
 Ghana
 Greece
 Hungary
 India
 Italy
 Mexico
 Poland
 Portugal
 Romania
 Russian Federation
 Singapore
 Slovak Republic
 South Korea
 Spain
 Switzerland
 Sweden
 Turkey
 United Arab Emirates (VPM, a joint venture with Petrochem/Mazrui Energy Services)
 UK
 USA

PLANTS

ITALY
 Brindisi:
 - Steam cracking
 - Aromatics
 - Polyethylene
 Crescentino:
 - Bio-ethanol
 Ferrara:
 - Elastomers
 - Polyethylene
 Mantua:
 - Intermediates
 - Styrene
 - Styrenics
 Porto Marghera:
 - Recycled polymers
 Porto Torres:
 - Elastomers
 - Renewable chemistry
 Priolo:
 - Steam cracking
 - Aromatics
 Ragusa:
 - Polyethylene EVA
 - Butadiene
 Ravenna:
 - Elastomers

FRANCE
 Dunkerque:
 - Steam cracking
 - Polyethylene EVA

GERMANY
 Oberhausen:
 - Polyethylene EVA

HUNGARY
 Százhalombatta:
 - Styrenics

SOUTH KOREA
 Yeosu (LVE, a joint venture with Lotte Chemical):
 - Elastomers



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