

ELASTOMERS

Europrene

NEOCIS® – INTENE®

BR



versalis



Europrene NEOCIS® – INTENE BR

BACKGROUND

Versalis produces a range of Polybutadiene rubbers under the trademarks Europrene Neocis®, Intene® and Europrene® BR HV. Europrene Neocis® is a high 1.4-cis polybutadiene manufactured at the Ravenna plant in Italy. Europrene Neocis® production started in 1984 at the Grangemouth plant in UK. Production was transferred to Ravenna, Italy in 1994. During the years that followed, significant improvements were made to the Ravenna plant. A second production line was installed in 2008 enabling de-bottlenecking and a doubling of production from 40 to 80 kton per year. Intene® is a low 1.4-cis polybutadiene manufactured in the Grangemouth production facility in Scotland, UK. Europrene® BR HV80 is a high 1.2-vinyl polybutadiene produced at the Grangemouth plant. The UK plant at Grangemouth Scotland dates from 1963 and currently has an 80 kt/y capacity.

PROCESS

Versalis polybutadienes are produced by solution polymerization in an aliphatic solvent, thus greatly improving the environmental friendliness of the whole process. All Versalis BR grades are produced by a continuous process with the selection of the appropriate catalyst system determining the (micro)structure of the final product: Europrene Neocis® is manufactured using a proprietary, stereospecific, Ziegler-Natta catalyst based on the rare earth metal Neodymium, allowing a polybutadiene with the highest cis content to be obtained.

Intene®/Europrene® BR HV80 are manufactured using a Lithium-based catalyst system. In the case of the grade Intene® C30AF, a coupling agent is used to obtain a star-branched structure. The finishing process consists of solvent stripping and stabilization with non-staining antioxidant(s). An appropriate extender oil is added where required. The resultant polymer crumb is then dried, baled and packaged.

SUSTAINABILITY

All grades in portfolio are available with ISCC Plus Certification: “Bio Attributed (BA)” and “Bio-Circular Attributed (BCA)” products made from bio naphtha, and “Circular Attributed (CA)” made with a “recycled oil” (r-Oil), a pyrolysis oil obtained from the chemical recycling process of mixed plastic waste. BA, BCA and CA raw materials can be used in production processes together with traditional raw materials. In order to attribute sustainability characteristics to the final product, Versalis applies the Mass Balance approach, an acknowledged methodology that ensures that the sustainability characteristics of the alternative raw material, mixed with traditional naphtha, correspond to those of the final product.

They guarantee identical performance, quality and properties, as they do not differ in chemical composition and physical-mechanical performance from standard products.

MAIN PROPERTIES

Butadiene rubber with high 1.4-cis (Europrene Neocis®) or low 1.4-cis (Intene®) microstructure, represents an important family of synthetic elastomers. Commercial polybutadienes can be grouped into two basic types according to their microstructure.

High 1.4-cis polybutadiene is made using stereospecific Ziegler-Natta catalysts. Polybutadiene made with Neodymium (Nd), Titanium (Ti), Nickel (Ni) and Cobalt (Co) based catalyst systems also belong to this family;

→ low 1.4-cis polybutadiene is made with an anionic Lithium (Li) based catalyst.

Vulcanised BR compounds behave similarly to styrene-butadiene rubber (SBR). They show more heat resistance than natural rubber. They have relatively poor resistance to oil and solvents. Polybutadiene is generally employed in blends with NR or other synthetic elastomers (mainly IR, SBR and NBR), conferring to the final product its typical properties, i.e.:

- excellent abrasion and wear resistance;
- excellent dynamic fatigue resistance (or flex resistance) and therefore an improved cut growth resistance;
- low hysteresis, i.e. low heat build up and low rolling resistance;
- high elasticity, in particular at low temperature;
- good reversion resistance in comparison to NR;
- improved compound flow.

The contribution of such properties to the compound depends on the blend ratio with the other elastomers mentioned and on the micro- and macrostructure of the polybutadiene itself. Europrene® BR HV80 is characterized by a high 1.2-vinyl content (vinyl content 77%), which imparts to this polymer a high rebound resilience within a wide temperature range.



GRADE SELECTION

Europrene Neocis® is characterized by having a very high 1.4-cis content (typical value >95%) and low 1.2-vinyl content (typical value 0.8%). Other notable characteristics are a very high polymer chain linearity and a molecular weight distribution described as medium to broad. Europrene Neocis® is produced in three grades: BR 40, BR 450, BR 60, with the first two digits identifying the Mooney viscosity of the product. Intene® polybutadiene also has a characteristic microstructure: 38% 1.4-cis, 51% 1.4-trans and 11% 1.2-vinyl, and as a typical anionic polymer manufactured in an aliphatic medium, this microstructure remains fixed. In addition to a range of linear Intene® grades, star-branched Intene® (C30) also forms part of the Versalis BR portfolio.



GRADE LIST

High cis types

GRADE	CIS CONTENT %WT	MOONEY VISCOSITY ML (1+4) 100°C	STABILIZER	MAIN APPLICATIONS
Europrene Neocis® BR 40	97	43	Non staining	Tyre tread and sidewall, camelback, conveyor belts, technical goods, hoses, golf balls
Europrene Neocis® BR 60	97	63	Non staining	
Europrene Neocis® BR 450	95	44	Non staining	
Europrene Neocis® BR X 45 EP	97	44	Non staining	
Europrene Neocis® BR X 61 EP	97	60	Non staining	
Agon® HCIS X41HP	97	44	Non staining	High performance tyre tread and sidewall. Recommended for silica tread compounds containing functionalised polymers

Low cis types

GRADE	CIS CONTENT %WT	MOONEY VISCOSITY ML (1+4) 100°C	STABILIZER	MAIN APPLICATIONS
Intene® 50	38	48	Non staining	Tyres, belting, moulded and extruded articles
Intene® C 30 AF	38	40	Non staining	Tyre bead area, solid tyres, high hardness/resilience compounds, moulded and extruded articles

Low cis types for HIPS

GRADE	CIS CONTENT %WT	VISCOSITY CP 5% STY 25°C	STABILIZER	MAIN APPLICATIONS
Intene® 30 AF	38	65	Food approved	Specially prepared materials suitable for the manufacture of ABS and high impact polystyrene
Intene® 40 AF	38	100	Food approved	
Intene® 50 AF	38	170	Food approved	
Intene® 60 AF	38	250	Food approved	
Intene® C 30 AF	38	42	Food approved	

High vinyl grade

GRADE	VINYL CONTENT %WT	MOONEY VISCOSITY ML (1+4) 100°C	STABILIZER	MAIN APPLICATIONS
Europrene® BR HV80	77	70	Non staining	Tyre tread compounds with improved wet/ice grip

Storage conditions: store in vented, dry area at temperatures between 20°C and 30°C; no direct sunlight.



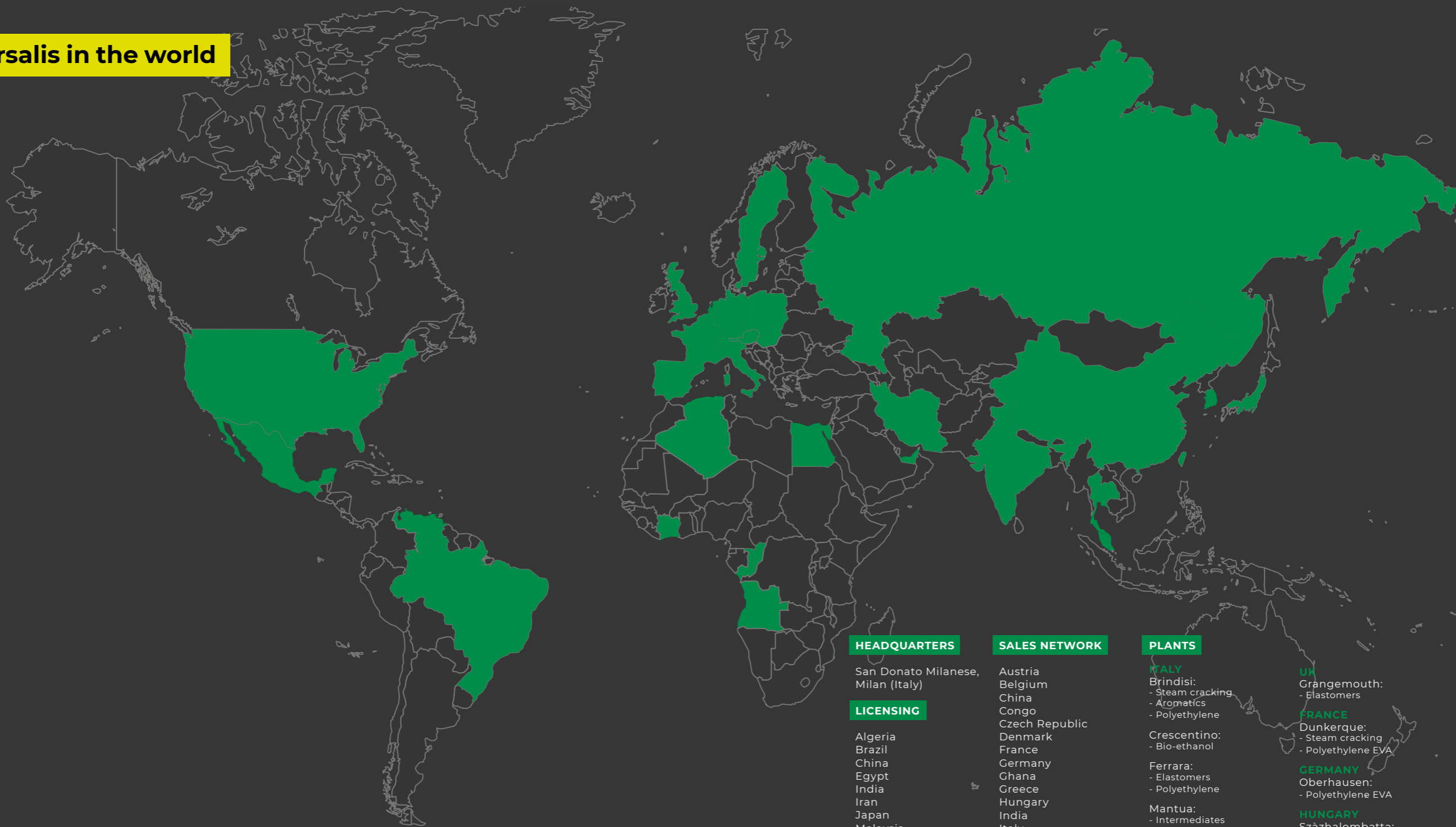
STORAGE AND PACKAGING

Europrene Neocis®, Intene® and Europrene® BR HV80 should be stored in a vented, dry area at a temperature between 20°C and 30°C with the avoidance of exposure to direct sunlight. The shelf life of Europrene Neocis® is 18 months minimum. The shelf life of Intene® and Europrene® BR HV is 12 months minimum.



GRADE	PACKAGING	DIMENSION (mm)	NOMINAL NET WEIGHT (kg)	PHYSICAL FORM	BALE DIMENSION (mm)	BALES WEIGHT (kg)	BALES TOTAL	BALES X LAYERS	FILM TYPE
Europrene Neocis® BR 40	Returnable metal crate	1465x1150xh1123	1260	Bales	700x350xh180	35	36	6x6	PE
Europrene Neocis® BR 40	Wooden crate	1530x1145xh1090	1050	Bales	700x350xh180	35	30	6x5	PE
Europrene Neocis® BR 60	Returnable metal crate	1465x1150xh1123	1260	Bales	700x350xh180	35	36	6x6	PE
Europrene Neocis® BR 60	Wooden crate	1530x1145xh1090	1050	Bales	700x350xh180	35	30	6x5	PE
Europrene Neocis® BR 450	Returnable metal crate	1465x1150xh1123	1260	Bales	700x350xh180	35	36	6x6	PE
Europrene Neocis® BR 450	Wooden crate	1530x1145xh1090	1050	Bales	700x350xh180	35	30	6x5	PE
Europrene Neocis® BR X 45 EP	Returnable metal crate	1465x1150xh1123	1260	Bales	700x350xh180	35	36	6x6	PE
Europrene Neocis® BR X 45 EP	Wooden crate	1530x1145xh1090	1050	Bales	700x350xh180	35	30	6x5	PE
Europrene Neocis® BR X 61 EP	Returnable metal crate	1465x1150xh1123	1260	Bales	700x350xh180	35	36	6x6	PE
Europrene Neocis® BR X 61 EP	Wooden crate	1530x1145xh1090	1050	Bales	700x350xh180	35	30	6x5	PE
Agon® HCIS X41HP	Returnable metal crate	1465 x 1150 x H1123	1260	Bales	660 x 350 x h200	35	36	6x6	PE
Intene® 50	Returnable metal crate	1465x1150xh1123	1190	Bales	660x330xh200	33	36	6x6	PE
Intene® C30 AF	Returnable metal crate	1465x1150xh1123	900	Bales	660x330xh200	33	30	6x5	PS
Intene® 30 AF	Returnable metal crate	1465x1150xh1123	1190	Bales	660x330xh200	33	36	6x6	PS
Intene® 40 AF	Returnable metal crate	1465x1150xh1123	1190	Bales	660x330xh200	33	36	6x6	PS
Intene® 50 AF	Returnable metal crate	1465x1150xh1123	1190	Bales	660x330xh200	33	36	6x6	PS
Intene® 60 AF	Returnable metal crate	1465x1150xh1123	1190	Bales	660x330xh200	33	36	6x6	PS
Europrene® BR HV80	Returnable metal crate	1465x1150xh1123	990	Bales	660x330xh200	33	30	6x5	LDPE-EVA-PE

Versalis in the world



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

UK
Grangemouth:
- 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

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.



versalis

Versalis spa

Piazza Boldrini, 1
20097 San Donato Milanese (MI) - Italy
Ph. 0039 02 520.1

info.elastomers@versalis.eni.com
versalis.eni.com

Technical service

technicalmanagement@versalis.eni.com

