

ELASTOMERS

**Europrene<sup>®</sup>**

E-SBR



versalis



**Europrene®**  
**E-SBR**

## BACKGROUND

Versalis is one of the major producers of Emulsion SBR. The plant, is situated in Ravenna (Italy) has been on stream since 1957 with a 120 kt/y capacity of Europrene®.

## PROCESS

Europrene® Emulsion SBR is made by the “cold” polymerization process. Styrene and Butadiene monomers are polymerized in water in the presence of an emulsifier (fatty or rosin acid soaps), an initiator and a modifier. The initiator generates radicals via redox decomposition during the reaction between chelated iron/organic hydroperoxide and a reducing agent. The molecular weight and polymer structure is primarily controlled by the addition of a chain transfer agent. When the desired conversion is reached, the polymerization is terminated by the addition of a shortstop. Residual butadiene and styrene are then removed from the latex which is first stabilized with an appropriate non-staining antioxidant and then coagulated with inorganic acid and chemical aids. In the case of oil extended grades, this is added prior to coagulation. The resulting crumb is then washed, dewatered, 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

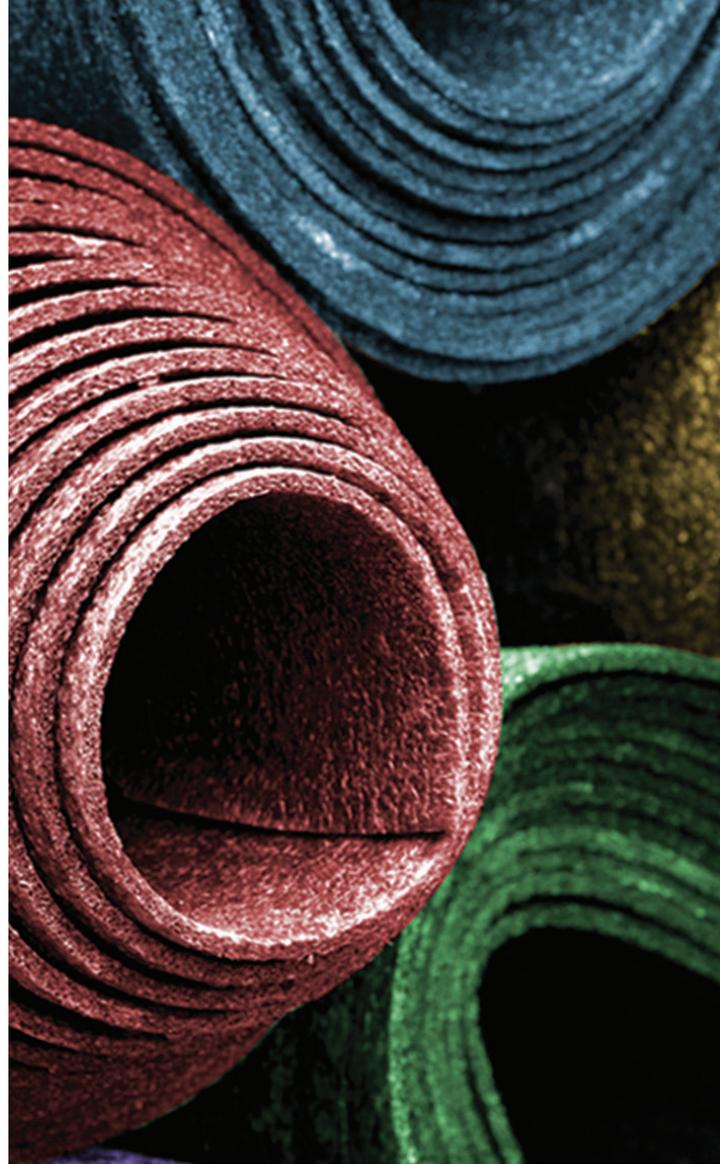
Europrene® covers a range of styrene contents between 23.5 and 63%. The microstructure of the butadiene units is dependent on the reaction temperature, with the cis content decreasing as the temperature decreases. Vinyl (or 1,2 butadiene content) remains more or less constant with the temperature. Thus, the microstructure of an E-SBR has the following typical values: 1,4 trans 72%, 1,4 cis 12%, 1,2 vinyl 16%. Because of the double bond of the butadiene, vulcanization via sulphur and accelerator is possible.

The polymer Tg increases with higher styrene content, while the processability and mechanical properties of the compound are enhanced. The abrasion resistance is slightly decreased. Due to its composition, E-SBR has a limited resistance to oil and weathering but, properly compounded, it is suitable for use in outdoor applications.

## GRADE SELECTION

In accordance with the classification adopted by the IISRP (International Institute of Synthetic Rubber Producers), the E-SBR types are grouped as follows:

- series 1500 cold polymerized E-SBR dry polymers. All of them have the same styrene level and can be differentiated by viscosity;
- series 1700 cold polymerized E-SBR oil extended grades, the other two digits differentiate E-SBR in term of composition (low or high styrene level) and oil type. Grade selection is made on molecular weight and bound styrene content. The high styrene grades are chosen to improve tread grip;
- Europrene® HS 630, a self-reinforcing SBR, is used in blends with general purpose rubber to obtain high hardness, high modulus and improved abrasion resistance.



## GRADE LIST

### Emulsion polymerized styrene - butadiene rubber - dry types

GRADE	BOUND STYRENE %WT <sup>(1)</sup>	MOONEY VISCOSITY <sup>(2)</sup>	PACK. N°	MAIN APPLICATIONS
Europrene® 1500	23.5	52	1 - 2	Tyres, retreading, conveyor belts, hoses, mechanical goods
Europrene® 1502	23.5	52	1 - 2	Tyres, footwear, sheeting, light coloured mechanical goods, flooring, adhesives
Europrene® 1502 F	23.5	52	1	Articles in contact with foodstuffs
Europrene® 1509	23.5	35	1 - 2	Footwear, microcellular soles, injection moulding, carpet underlay, extruded and calendered goods
Europrene® 1509 F	23.5	30	1 - 2	Footwear, microcellular soles, carpet underlay, injection moulded, extruded and calendered goods

All grades are nitrosamine free.

(1) ASTM D 5775 (2) ASTM D 1646, ML (1 + 4) 100°C

### Emulsion resin - rubber masterbatch - HSR

GRADE	BOUND STYRENE %WT <sup>(1)</sup>	MOONEY VISCOSITY <sup>(2)</sup>	PACK. N°	MAIN APPLICATIONS
HS630	63	56	3 - 4 - 5	High hardness soles and sheeting, microcellular sheeting flooring, hoses, technical goods with high hardness

All grades are nitrosamine free.

(1) ASTM D 5775 (2) ASTM D 1646, ML (1 + 4) 100°C

## Emulsion polymerized styrene - butadiene rubber - oil extended types

GRADE	BOUND STYRENE %WT <sup>(1)</sup>	MOONEY VISCOSITY <sup>(2)</sup>	OIL TYPE	TYPE p.h.r. <sup>(3)</sup>	PACK. N°	MAIN APPLICATIONS
Europrene® 1723	23.5	50	TDAE	37.5	1 - 2	Tyres, retreading, conveyor belts, hoses, mechanical goods
Europrene® 1739	40	52	TDAE	37.5	1 - 2	High hysteresis tyre tread compounds with improved wet road grip
Europrene® 1783	23.5	50	RAE	37.5	1 - 2	Tyres, retreading, conveyor belts, hoses, mechanical goods
Europrene® 1789	40	55	RAE	37.5	1 - 2	High hysteresis tyre tread compounds with improved wet road grip

All grades are nitrosamine free

(1) ASTM D 5775 (2) ASTM D 1646, ml (1 + 4) 100°C (3) ASTM D 5774

## STORAGE AND PACKAGING

The Europrene® grades have to be stored in vented, dry area at temperatures between 20°C and 30°C, avoiding direct sunlight. The shelf life of Europrene® grades is 18 months.

PACK. N°	PACKAGING DESCRIPTION	CRATE DIMENSION (mm)	NOMINAL NET WEIGHT (kg)	BALE (BAG) WEIGHT (kg)	BALE (BAG) DIMENSION (mm)	BALES (BAGS) TOTAL	BALES (BAGS) X LAYERS
1	Wooden crate	1530x1145xh1090	1050	35	700x350x180	30	6x5
2	Returnable metal crate	1465x1150xh1123	1260	35	700x350x180	36	6x6
3	Bags on wooden pallet	1100x1300x2000	1100	20	-	55	5x11
4	Bulk in wooden crate	1520x1145x1090	500	-	-	-	-
5	Bulk in tank truck	-	18500	-	-	-	-

All products are supplied in bale form, each bale is wrapped with PE film, except HS630.

## 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



**versalis**

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