

RESEARCH CENTRE

Eni Research Centre in San Donato Milanese has well equipped laboratories with advanced facilities to study, to develop and to complete the characterization of raw materials and final products. The Research Centre of Eni is compliant with UNI EN ISO 9001 for the following activities: "Applied research, technical assistance and laboratory analysis in the energy sector: lubricants, additives, bitumen, special products for automotive and industry" and "Production of pilot plants lubricants, fuels and oil" (EA 34.35 - Certificate No. 676).



QUALITY AND ENVIRONMENT

Eni Refining & Marketing pursues the goal of continuous improvement of products and services through a "Quality Management System" certified in accordance with the UNI EN ISO 9001 and uses automated manufacturing plants with the highest quality and environmental standards. The Eni manufacturing plants adopt an environmental management system certified to the ISO 14001 standard.



Livorno Refinery Certifications:

- ◇ ISO 9001:2015 from July 2018
- ◇ ISO 14001: 1999
- ◇ EMAS: 2004
- ◇ OHSAS 18001: 2011
- ◇ ISO 50001: 2012
- ◇ IATF 16949:2016: on going

CONTACTS

For further information on applications and features, please see technical and safety data sheets at oilproducts.eni.com



Eni is a major integrated energy company committed to growth in the activities of exploring, producing, transporting, transforming and marketing of oil, gas and their derivatives. Eni operates in 71 Countries around the world, employing more than 33,000 people in all energy sectors in which it is involved.

Eni is the leader operator in refining and marketing of petroleum products in Italy, both in retail and wholesale and one of the most relevant player in Europe.

Eni Refining & Marketing is engaged in the production and marketing of high quality products, with advanced performances able to offer solutions to an increasingly demanding and competitive market.

Customers have always a reliable contact and the confidence that a solution can be found to any problem. Eni is constantly looking for identifying and developing new and innovative solutions to meet and anticipate customer's needs.

High quality for enhanced performance



Eni S.p.A - Refining & Marketing

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Eni Clematis rubber process oils



oilproducts.eni.com



TECHNOLOGY AND EXPERIENCE FOR TYRE AND ELASTOMER INDUSTRY

Rubber Process Oils are produced in specialized Refineries

Eni Clematis RL, TD, MS Rubber Process Oils are produced at Eni refining & Marketing Livorno Refinery, one of the five refineries owned by Eni in Italy, totally focused on the manufacturing of base oils and special fluids.

Due to the particular base oils production process, Livorno Refinery is an important and strategic site for safe RPOs production

Selected high paraffinic crude oils and other tested special feedstocks are processed in dedicated plants to produce high quality aromatic process oils useful for several applications, mainly in tyre and rubber manufacturing.

Over the last years, Eni has been committed to the R&D of RPO manufacturing, whose results have been used to upgrade and implement the plants of Livorno Refinery dedicated to the production of Eni Clematis. These modifications turned into an improvement of quality and quantity of these special products, allowing to complete the Eni RPO product line with safe oils.

Whatever the need or application, Eni can provide the best solution thanks to a full range of process oils, including:

- ♦ aromatic safe oils: used as extender oils in the production of rubbers and as free oils in the manufacturing of tyres and other rubber goods;
- ♦ paraffinic oils: suitable for the production of light colour rubbers where colour stability and high oxidation stability are required.



ENI RUBBER PROCESS OILS PROVIDE HIGH PERFORMANCE

- ♦ high **stability**, with a relative inertness towards curing additives;
- ♦ remarkable **compatibility** with rubber and rubber blend. The degree of compatibility plays a central role in the adjustment and control of oil migration and crystallization, helping to minimize and to prevent exudation phenomena, without altering the characteristics or changing the colour of the blend (see table);
- ♦ low **volatility** both during the high temperature production phases and during the storage of the final products;
- ♦ suitable **viscosity** and **plasticity behavior** in order to facilitate the blending and dispersion of the fillers and helping the elastomer workability.

Oil	Physical properties	Suitability with rubber
Aromatic	<ul style="list-style-type: none">• the best compatibility with rubber• final rubber product exhibits high strength	<ul style="list-style-type: none">• mainly used as extender oil for SBR (Styrene Butadiene Rubber) and BR (Butadiene Rubber)• can also be used for CR and (Chloroprene Rubber) related rubber products
Paraffinic	<ul style="list-style-type: none">• good ozone resistance• good light stability	<ul style="list-style-type: none">• mainly used as process oil for EPDM (Ethylene Propylene Diene Monomer) and IIR (Isoprene Rubber)

Eni Clematis RL,classified as RAE LA (Residual Aromatic Extract Low Aromatic)

Safe, not labeled aromatic oil with low content of polycyclic aromatic hydrocarbons (PAHs) and low value of mutagenicity index (MI) used as extender oil in the production of rubbers and in the manufacturing of tyres and other rubber goods. Eni Clematis RL offers an alternative to traditional distillate aromatic extract (DAE).

Eni Clematis TD,classified as TDAE (Treated Distillate Aromatic Extract)

Safe, not labeled aromatic process oil used as extender oil in the production of OE SBR and BR and as free oil in the manufacturing of tyres and other rubber goods.

Eni Clematis MS,classified as MES (Mild Extraction Solvate)

Safe, not labeled aromatic oil used as extender oil in the production of rubbers and in the manufacturing of tyres and other rubber goods.

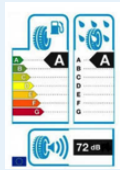
CHARACTERISTICS	CLEMATIS RL	CLEMATIS TD	CLEMATIS MS
Density at 15°C, kg/m³	970 - 1005	940 - 970	895 - 925
Viscosity at 40°C, mm²/s	--	370 - 500	160 typical
Viscosity at 100°C, mm²/s	50 - 75	17 - 22	13 - 17
Flash Point COC (ASTM D 92), °C	>230	>240	>220
Pour Point, °C	<20	<30	<-6
Viscosity Grade Costant	0.87 - 0.94	0.86 - 0.93	0.825 - 0.865
Tg, °C	-35 typical	-50 typical	-60 typical
Ca/Cn/Cp (ASTM D2140)	34/22/44 typical	23/29/48 typical	10/25/65 typical
Refractive Index at 20°C	1.535 - 1.560	1.520 - 1.540	1.495 - 1.505
Aniline Point, °C	45 - 75	60 - 75	--
Sulphur content, %wt	<6	<3	<2



Eni's way of doing business is based on keeping a strong focus on health, safety and environment. European legislation has been tightened in recent years to protect humans and the environment from the hazardous substances that can be present in extender oils.

According to the stringent new requirements set by the REACH (EC 1907/2006) Regulation in Annex XVII (Item 50), **Eni Clematis Oils** meet the following requirements:

- ♦ the sum of 8 specific polycyclic hydrocarbons is limited to a max of 10 ppm;
- ♦ a marker PAH, Benzo(a)pyrene, is limited to a max of 1 ppm;
- ♦ these limits are considered to be met if the DMSO extract (IP 346) is less than 3% as long as the correlation with the PAH content is checked at least every 6 months;
- ♦ vulcanized rubber compounds must not exceed the limit of 0.35% Bay protons (ISO 21461).



Regulation (EC) 1222/2009 is in force since 2012. This tyre labelling system focuses on braking efficiency under wet conditions, fuel consumption and noise reduction, making these paramount criteria when assessing the quality of a tyre.

ADDITIONAL ENI RUBBER PROCESS OILS

Eni Celtis (900 series)

high paraffinic oils recommended as process oils in the production of styrene-butadien e rubbers (SBR) and low unsaturation elastomers such as butyl rubbers (IIR) and ethylene-propylene termopolymers (EPDM).

Eni Celtis

are designed to improve the workability of elastomers during calandering, extrusion and moulding. They facilitate the addition and blending of pigments, additives, carbon-black, and other components. These oils are available in several viscosity grades to cover the widest possible field of applications.

Eni Esar 130

low viscosity distilled aromatic oil to meet the elastomer industry needs when a high solvency is requested and the use of labeled process oils is allowed.

