



SHELL PROCESS OILS

IN THE TYRE MANUFACTURING INDUSTRY

Shell Process Oils





UNDERSTANDING YOUR NEEDS



Shell is one of the leading manufacturers of process oils and offers value-adding products. These include Shell Flavex 595, which is increasingly being adopted as the extender oil of choice by tyre manufacturers around the world.

Having worked closely with the world's leading rubber and tyre manufacturers for many years, Shell understands the challenges that you face. Maintaining your competitiveness in the global marketplace requires ongoing product performance improvements, and then there is the ever-present need to adapt to new and emerging legislation.

Our technology-leading process oil Shell Flavex 595 can help you to rise to these challenges.

Shell Flavex 595 is a non-labelled process oil used as an extender oil in the manufacture of tyres. It is made using residual aromatic extract (RAE) technology to produce summer, all-season and high-performance tyres. It offers an alternative to traditional distillate aromatic extract (DAE) products and is fully compliant with EU Directive 2005/69/EC, REACH Regulation 1907/2006, Annex XVII (Item 50). Shell supplies this high-quality product internationally to many of the major tyre manufacturers and styrene butadiene rubber (SBR) producers.



MEETING DIRECTIVES

European legislation has been tightened in recent years to protect humans and the environment from the carcinogenic substances that can be found in DAE extender oils.

According to the stringent new requirements set by the REACH Regulation 1907/2006, Annex XVII (Item 50), extender oils have to meet the following requirements:

- <1 mg/kg benzo-a-pyrene (BaP)
- <10 mg/kg sum of eight trigger polycyclic aromatic hydrocarbons (PAH).

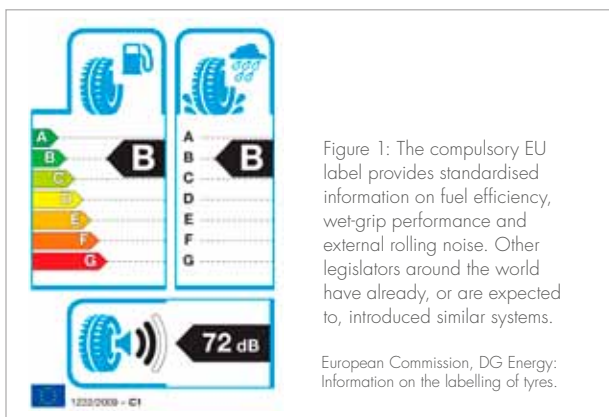
Shell Flavex 595 fulfils these requirements

In addition, providing there is no contamination by other oils, Shell Flavex 595 complies with the H-bay* restriction of a maximum of 0.35% bay protons (according to ISO 21461/2009) and fulfils the mutagenicity index requirement (MI) of <0.4 (according to ASTM D 1687-04). Our experienced process oils experts can help you to understand the impact of current and impending tyre legislation on your business.

*According to EU regulations, the H-bay method only needs to be applied to the final tyre product and not to the individual ingredients.

UNLOCKING COMPETITIVE ADVANTAGE

Legislators worldwide are looking for safety, economic and environmental improvements. The government of Japan was one of the first to take action on tyres, followed by South Korea and the EU. All tyres on sale in the EU, for instance, must bear a sticker or be accompanied by a label that discloses the tyre's fuel efficiency, wet-grip performance and noise characteristics (Figure 1). Moves to implement tyre labelling systems in the USA and China are also under way.



Legislation is not the only factor that is encouraging improvements in tyre technology. Drivers are becoming increasingly safety conscious and their tyres' wet-grip performance is therefore crucial, as it relates to their ability to stop quickly on wet roads. Extender oils have a significant influence on a tyre's performance. Recent laboratory tests, in co-operation with Polymer Service GmbH, focusing on non-functionalised solution styrene butadiene rubber (SSBR) confirmed that Shell Flavex formulations have improved dynamic mechanical properties compared with other extender oils and, therefore, help to enhance the performance of the tyres.

Dynamic mechanical analysis tests, which evaluate the wet-grip performance of a tyre compound, revealed that in formulations using Styron Sprintan® SLR 4602 and SLR 3402, Shell Flavex 595 has a significantly better loss factor ($\tan \delta$) at 0°C, which indicates better wet grip. Table 1 shows the components used in these tests. As shown in figures 2 and 3, Shell Flavex can provide up to a 10% performance advantage compared with other extender oil technologies, such as treated distillate aromatic extract (TDAE) and naphthenic oils.

COMPONENT	DESCRIPTION	PRODUCER
TDAE	Product X	Competitor A
Naphthenic	Product Y	Competitor B
RAE	Shell Flavex 595	Shell Process Oils
SSBR1	Sprintan® SLR 4602	Styron Deutschland GmbH
SSBR2	Sprintan® SLR 3402	Styron Deutschland GmbH

Table 1: Components used during dynamic mechanical analysis tests on Shell Flavex 595 in SSBR.

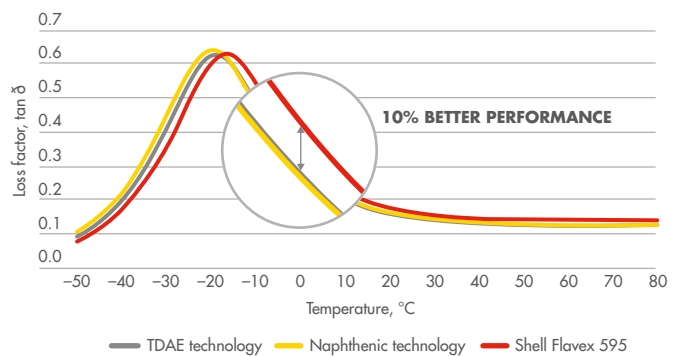


Figure 2: Loss factor for Styron Sprintan® SLR 4602.

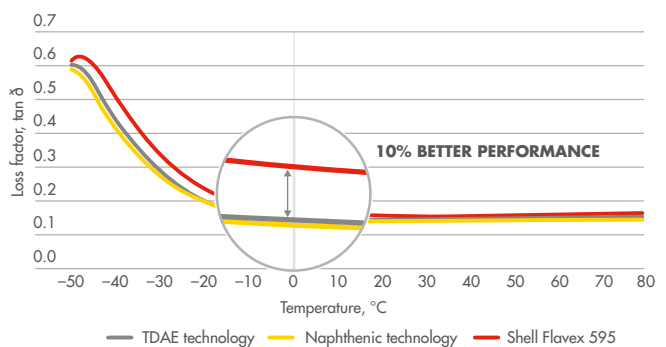


Figure 3: Loss factor for Styron Sprintan® SLR 3402.



SHELL FLAVEX 595 OPENS EXCITING NEW OPPORTUNITIES BY UNLOCKING COMPETITIVE ADVANTAGES FOR BOTH TYRE AND SBR MANUFACTURERS, AND COULD PROVIDE A REAL EDGE FOR YOUR PRODUCTS.



SHELL PROCESS OILS CAN HELP TYRE MANUFACTURERS TO ENHANCE THE PERFORMANCE OF THEIR PRODUCTS AND MEET ENVIRONMENTAL LEGISLATION. CRUCIALLY, SHELL HAS A TRULY GLOBAL PRESENCE AND EXCELLENT SUPPLY COVERAGE.

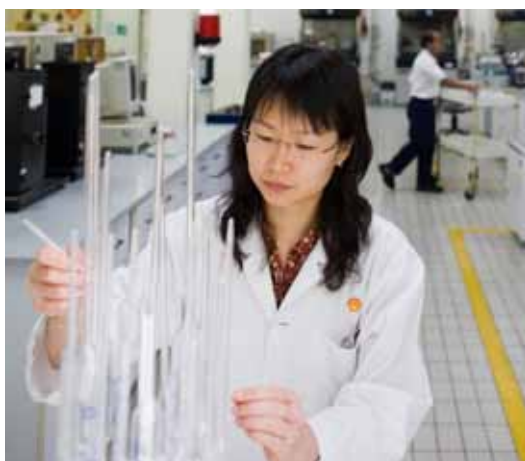
GLOBAL REACH

AT SHELL, WE UNDERSTAND THE CRUCIAL ROLE THAT EXTENDER OILS HAVE ON A TYRE'S PERFORMANCE.

Our international organisation has established a dedicated supply chain that includes four supply points around the world: the Netherlands, Germany, South Africa and Singapore (Figure 4). To ensure global availability, these sites maintain significant stocks to meet customers' requirements.



Figure 4: Shell's dedicated supply chain includes four strategically located supply points.



COMPREHENSIVE PRODUCT AND SERVICE PROVISION

Shell is constantly investing to develop better process oils to support your business.

Whatever your needs or application, Shell can provide a full range of process oils, including

- **naphthenic oils: Shell Gravex and Shell Edelex**
- **paraffinic oils: Shell Catenex and Shell Flavex**
- **white oils: Shell Ondina and Shell Risella.**

In addition, Shell offers expert consultation and technical advice to support your business needs.



FIND OUT MORE: TALK TO SHELL PROCESS OILS

If you are interested in unlocking valuable competitive advantages, talk to us about the benefits that Shell Flavex 595 could have for your business.



www.shell.com/processoils