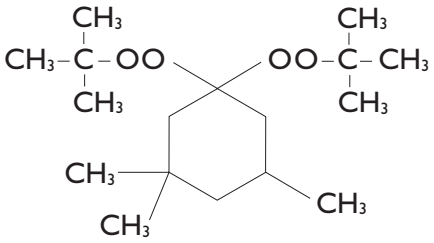
LUPEROX® 231XL40-SP

Perketal Scorch Protected

Luperox® 231XL40-SP is a scorch-protected evolution of the Luperox® 231XL40.
It is a 40% extended grade on calcium carbonate and silica belonging to the perketal grades range.
The chemical formula of the active substance is



1,1'-di(tert-butylperoxy)-3,3,5-trimethylcyclohexane
CAS No: 6731-36-8 - M.W.: 302.4 g/mol

Typical properties

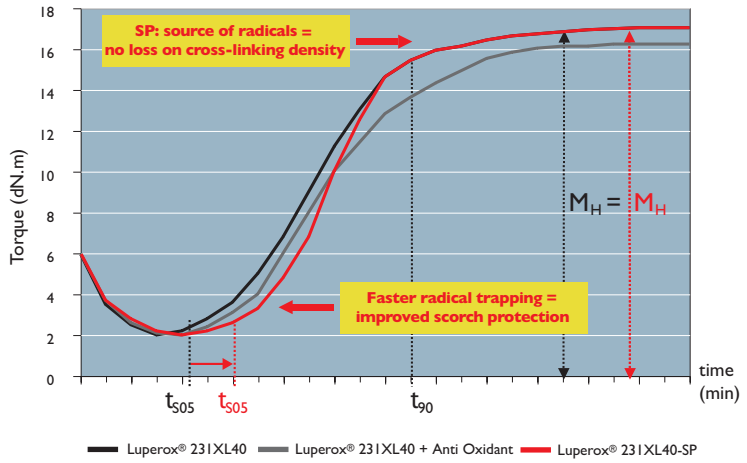
Appearance	powder
Peroxide content	40%
Active oxygen	4.2%

Scorch protection

Luperox® 231XL40-SP provides an outstanding scorch protection and overcomes the usual limitations encountered with classical "scorch retarders."

As shown in *fig. 1*, the main advantages over classical "scorch retarders" lie in:
- the faster free radical trapping process leading to a better scorch protection;
- the steady crosslink level (no loss of crosslinking density).

Fig. 1: Comparison of curing profiles of Luperox® 231XL40 / Luperox® 231XL40+ Anti-Oxidant / Luperox® 231XL40-SP

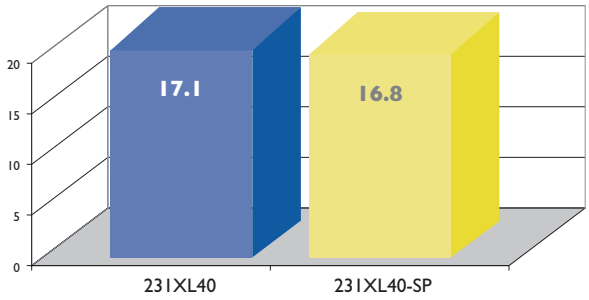


Performances

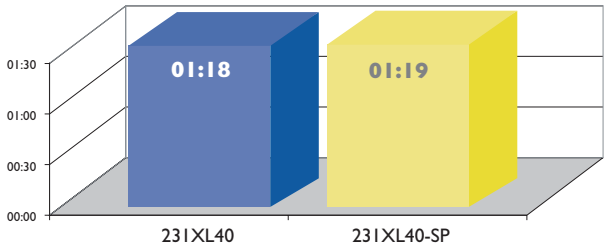
Compared to Luperox® 231XL40, Luperox® 231XL40-SP offers in an EPDM compound:

- **Similar cure time (t_{90}) and cross-linking density (M_H)**

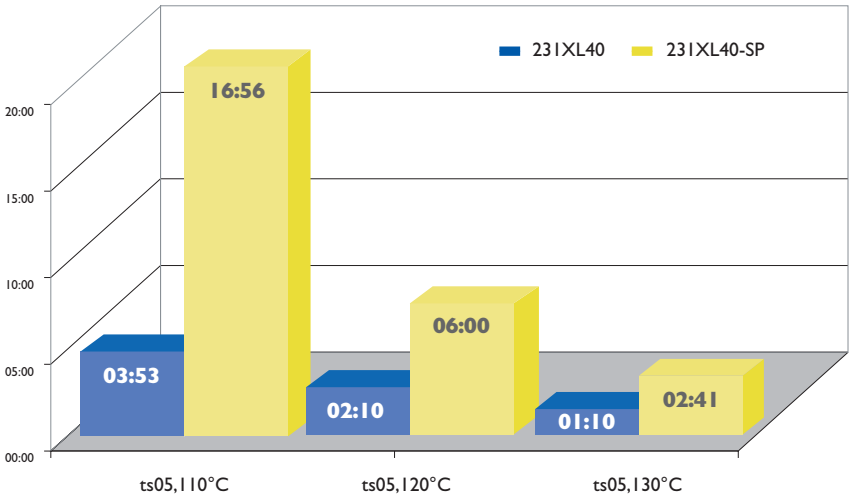
M_H 170 °C (dN.m)



t_{90} 170 °C (min:s)



- **Scorch time (ts_{05}) which is five times higher at standard compounding temperatures (at 110 °C);**



Advantages

The improved scorch protection is beneficial at each step of the transformation process.

Compounding:

- It is possible to **speed up the process** by increasing the mixing speed. Typically, the compounding temperature can be increased by 10-15 °C with no additional scorch threat.
- It is possible to envision a **one-step mixing** process when not applicable with a standard grade.
- A better scorch protection should bring a better **consistency** of the mixing.
- In the rubber formulation, it is possible to **reduce the amount of antioxidant**, as the SP additive used may also act as an antioxidant.

Curing:

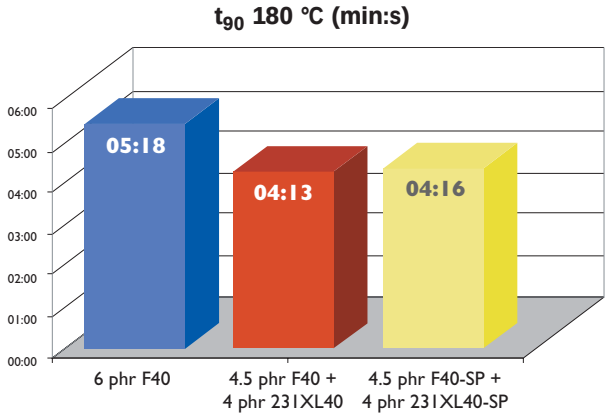
- In **injection molding** process, temperature of the mold can be increased, resulting in a significant improved **productivity**: faster filling of the mold, faster curing.
  Design of the molds can be optimized (more prints): allowing higher **productivity** and much more possibilities for peroxide-cured molded rubber goods.
- With an **extrusion process**, temperature of extrusion as well as speed can be increased resulting in a higher **productivity**.
  The improved scorch protection should also reduce the downtime devoted to the equipment cleanup (gels) leading to more production time.

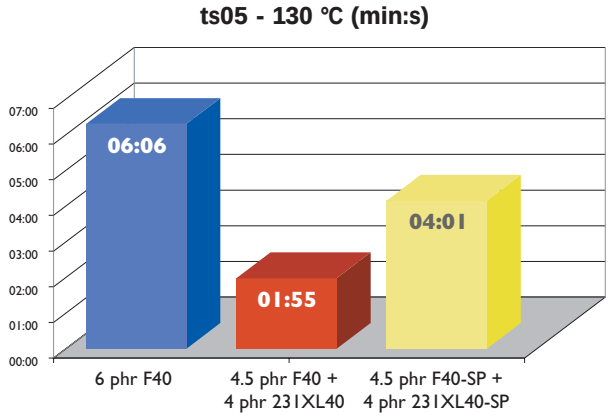
Curing Booster

Luperox® 231XL40-SP can be used as a **curing booster**.

When it is mixed in appropriate quantities with Luperox® F40-SP, the Scorch Protected version of Luperox® F40, it is possible to get a faster curing than Luperox® F40 alone while keeping the crosslinking density the same and the scorch time at a good level.

The following graph shows that 4 phr of Luperox® 231XL40-SP mixed with 4.5 phr of Luperox® F40-SP lead to almost 20% shorter curing time (t90) than 6 phr Luperox® F40.





Meanwhile, the blend of Scorch Protected products (F40M-SP / 231XL40-SP) provides a twice-longer Scorch Time (ts05) than the blend of standard grades (F40 / 231XL40).

Main applications

Luperox® 231XL40-SP is mainly used as a curing agent to manufacture:
- hoses and profiles;
- rubber seals and gaskets;
- technical goods;
- wires and cables;
- golf balls;
- EPDM and EVA based shoe soles.

Dosage

Typical ranges of Luperox® 231XL40-SP concentration used for some polymers are listed in the following table:

Polymer	Luperox® 231XL40-SP (phr)
EPM	6 - 15
EPDM	6 - 15
EVA	3 - 6

The appropriate quantity of Luperox® 231XL40-SP depends on the required characteristics of the finished product.

Decomposition products

The major decomposition products of Luperox® 231XL40-SP in inert media are:
- acetone;
- tert-butyl alcohol;
- methane;
- carbon dioxide;
- trimethyl-cyclopentane;
- 3,3,5-trimethylcyclohexanone.

Safety, handling, storage and transport

Please refer to the Material Safety Data Sheet.

A global chemical player, Arkema consists of 3 coherent and balanced business segments: Vinyl Products, Industrial Chemicals, and Performance Products. Present in over 40 countries with 18,600 employees, Arkema achieves sales of 5.2 billion euros. With its 6 research centers in France, the United States and Japan, and internationally recognized brands, Arkema holds leadership positions in its principal markets

Arkema
4/8, cours Michelet - 92800 Puteaux (France)
Tel.: 33 (1) 49 00 80 80 - Fax: 33 (1) 49 00 83 96
www.arkemagroup.com

Arkema Inc.
2000 Market Street, Philadelphia
PA, 19103 (USA)
Tel.: 1 800 558 5575 - Fax: 1 215 5120

www.luperox.com

DIRCOM - 3733 E/06.2005/10 /DPO - - Arkema - Société anonyme au capital de 520 868 934 euros - 319 632 790 RCS Nanterre - Printed in France - Median Impressions