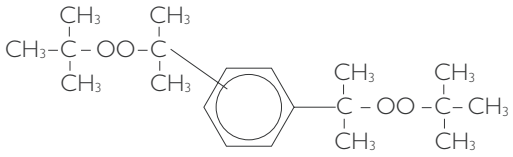
LUPEROX® F40P-SP2

Scorch Protected Bisperoxide

Luperox® 40P-SP2 is a highly scorch protected evolution of the Luperox® F40P.
It is a 40% extended grade on calcium carbonate and silica.
It has been specifically designed to provide efficient scorch protection for injection molding processes in any type of elastomer system including EPDM, HNBR, CPE.
The chemical formula of the active substance is:



1,3 1,4-Bis(tert-butylperoxyisopropyl) benzene
CAS No: 25155-25-3 - M.W.: 338.5 g/mol

Typical properties

Appearance	Powder
Peroxide content	40%
Active oxygen	3.8%

Scorch protection

Luperox® 40P-SP2 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:
- faster free radical trapping leading to better scorch protection;
- consistent crosslinking level (no loss of crosslinking density).

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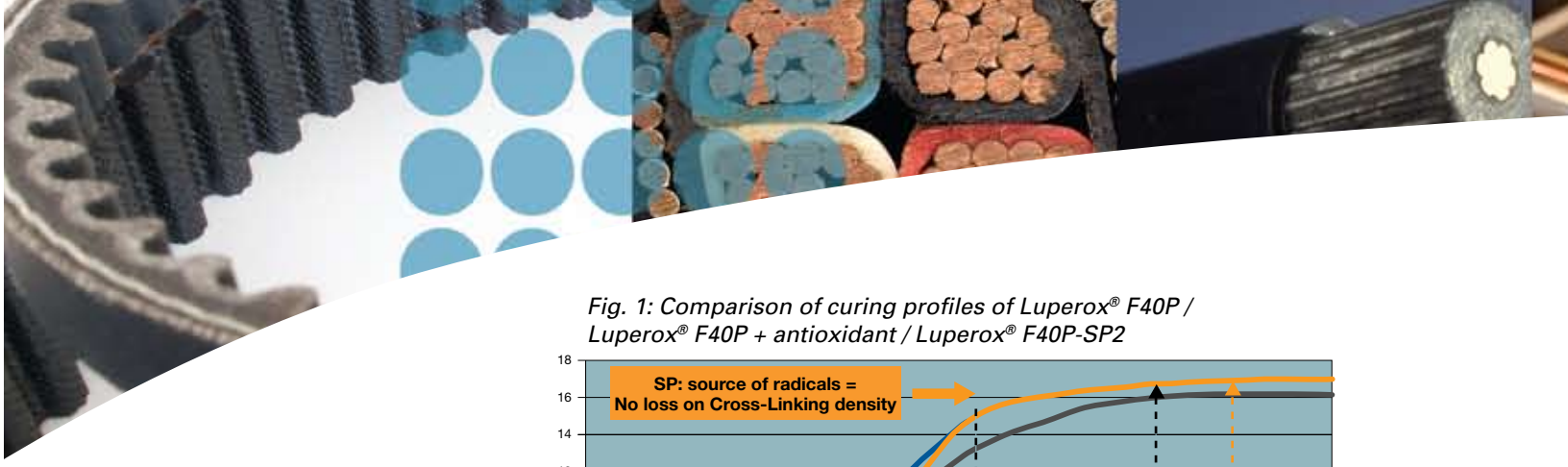
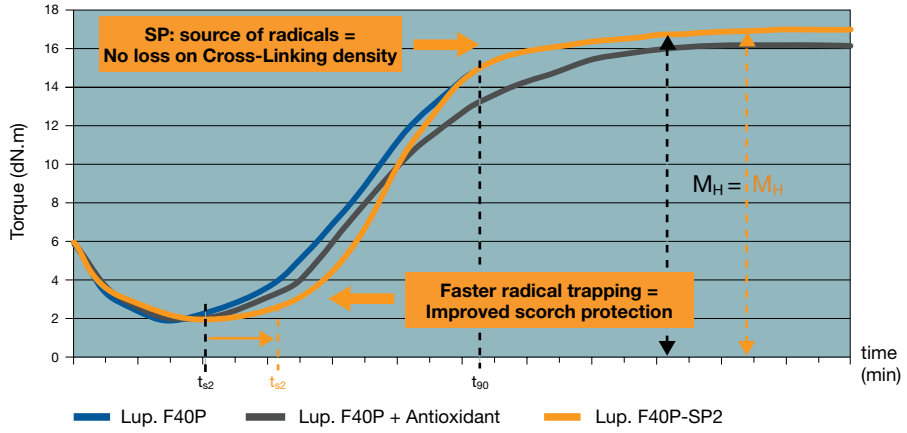


Fig. 1: Comparison of curing profiles of Luperox® F40P / Luperox® F40P + antioxidant / Luperox® F40P-SP2

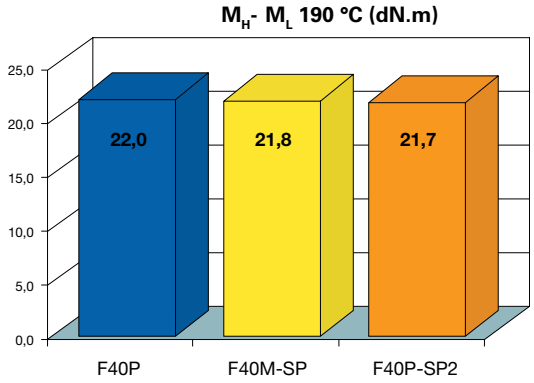


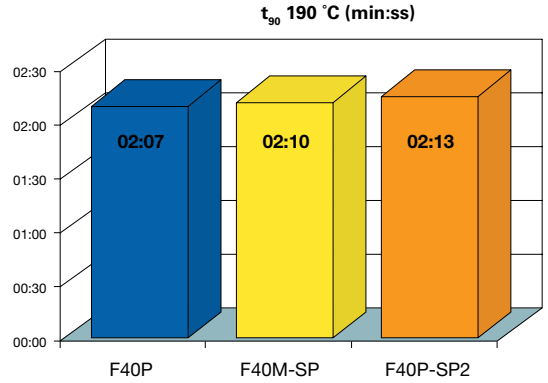
Performances

Luperox® F40C-SP2 has been evaluated in an EPDM compound (EPDM DUTRAL TER 4049) compared to standard Luperox® F40P and to masterbatch Luperox® F40M-SP. The peroxide concentration used is 8 phr.

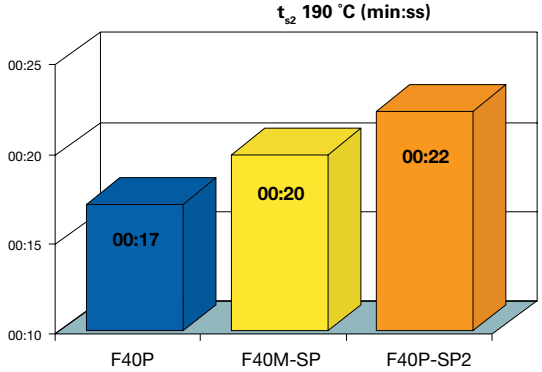
The rheometer test (RPA) run at 190˚C provides the following results:

- **No significant change of cross-linking density (M_H-M_L) and cure time (t_{90})**



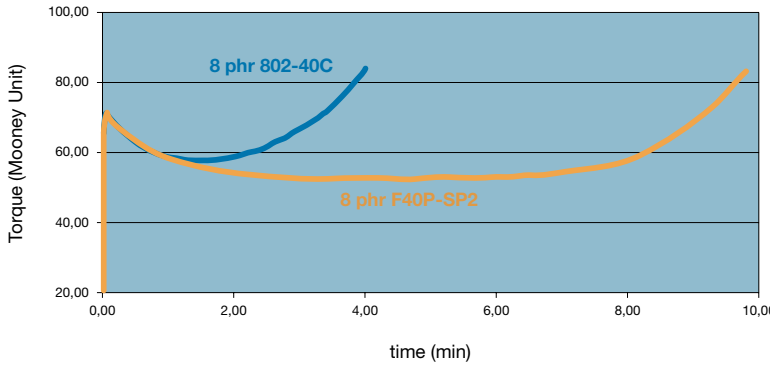


- **The protection time or "Scorch Time at curing temperature" (t_{S2} at 190°C) is increased by 30% for Luperox® F40P-SP2 versus +18% for Luperox® F40M-SP.**



The Mooney Viscometer test run at 145°C shows an exceptional scorch protection:

Mooney MV 2000: Scorch Time t_{s05} at 145°C



The Scorch Time (t_{S05}) is 3 times longer with Luperox® F40C-SP2 than Luperox® F40P.

Advantages

The exceptional scorch protection offered by Luperox® F40P-SP2 brings multiple advantages:

Reduction of the formulation cost

- Possible to **reduce the amount of antioxidant** in the formulation thanks to the outstanding scorch protection provided by Luperox® F40P-SP2 itself.

Compounding

- Possible to **speed up the process** by increasing the mixing speed.
- Possible to envision a one-step mixing process when not applicable with a standard grade.
- Improved scorch protection should allow for longer mixing and a **better consistency** of the final compound.

Curing

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

Main applications

Luperox® F40P-SP2 has been specifically designed to provide a very efficient scorch protection in stringent conditions such as injection molding processes or for the curing of reactive polymers such as HNBR or CPE. Therefore, it can be used for many types of applications including:

- O'rings;
- Molded technical goods;
- Hoses and profiles;
- Rubber seals and gaskets;
- Wires and cables;
- EPDM and EVA based shoe soles.

Dosage

Typical ranges of Luperox® F40P-SP2 concentrationused for some polymers are listed in the following table:

Polymer	Luperox® F40P-SP2 (phr)
EPDM	6 - 12
HNBR	6 - 10
CPE	4 - 8

The appropriate quantity of Luperox® F40P-SP2 depends on the required characteristics of the finished product.

Decomposition products

The major decomposition products of Luperox® F40P-SP2 in inert media are the same than F40P:
- acetone;
- tert-butyl alcohol;
- methane;
- m,p-diacetyl benzene;
- m,p-diisopropanol-benzene.

Safety, handling, storage and transport

Please refer to the Material Safety Data Sheet.

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