PEROXIDES FOR RUBBER ROLLER INDUSTRY

Products targeted to cure between 250° (120°C) & 400°F (205°C)

Stability	Peroxide	Temperature, °F	Polymers
High to Low	Luperox® 101XL45	350-400	EPDM, EPR, FKM, NBR, HNBR, MQ
	Vul-Cup® 40KE	340-350	EPDM, EPR, FKM, NBR, HNBR, MQ
	DiCup® 40KE	310-350	EPDM, EPR, FKM, NBR, HNBR, MQ
	Luperox® 230XL40	290-310	EPDM, EPR, NBR
	Luperox® 231XL40	280-300	EPDM, EPR, NBR
	Noviper® DB 50	250-300	MQ

Peroxides are used when property enhancement is needed beyond sulfur based cure systems. The carbon-carbon bond that is created with peroxide has bond strength of 350 kilojoules/mole and is more stable than a carbon-sulfur bond (285 kj/mole) or a sulfur-sulfur bond (170 kj/mole).

WHAT PROPERTIES ARE CRITICAL IN YOUR ROLLER APPLICATION?

Peroxide Advantages

- Heat Stability
- Improved Compression Set
- Improved Aging (Oxidation Resistance)
- Color Stability

If you NEED improved Heat Resistance, Compression Set, and Oxidation Resistance,
You need **PEROXIDES!**

WHAT POLYMER SYSTEM ARE YOU WORKING WITH?

Polymers	
NBR	Arlanxeo
NBR/PVC	Hexpol Compounding
EPDM	Arlanxeo
SBR	Synthos S.A.
Silicone	

WATCH OUT! CERTAIN RAW MATERIALS REDUCE PEROXIDE EFFECTIVENESS

Compound additives can cause problems by consuming peroxide generated free radicals and reducing the state of cure. Key properties like compression set are compromised when raw materials are not carefully selected to minimize this interference.

FILLERS

Fillers with high surface area can reduce peroxide efficiency due to absorption of free radicals. The acidity of fillers can also cause cure retardation. Black and non-black fillers that are neutral to basic are best choices.

Fillers that are slightly acidic include products such as kaolin clays. If you must use clay, add a slightly basic material, like Enviropeg™ E-3350 (PEG) or Triethanolamine (TEA) to help reduce the affect of the acidity by being preferentially absorbed onto the filler surface.

FILLERS

Neutral and Basic Fillers are **BEST**

Carbon Black ..... pH 8
Calcium Carbonate ..... pH 9
Austin Black® 325 ..... pH 7

ACIDIC FILLERS

Clays – GK & Natka Clays will **RETARD** Cure

(GK Line) Calcined ..... pH 5
Water Washed ..... pH 4
Natka® 1200 (hard clay) ..... pH 5

SILICA

Hi-Sil®/Agilon® 454G-D .... pH 6.5 – 7.3
Silane treated silica is **BEST**

PROCESS OILS AND PLASTICIZERS

WHEN YOU USE OILS AND PLASTICIZERS, BEWARE. THEY CAN DEACTIVATE PEROXY RADICALS.

Paraffinic oils such as Harwick's Stan-Lube 10, 60, and 80 are the best choice since they have a low aromatic content to minimize interaction with free radicals.

Naphthenic oils such as Harwick's Stan Plas 100, 1200, and 2000 that are hydrotreated would be second choice since they contain a low level of aromatic content, and will affect the peroxide cure more than paraffinic oil.

Aromatic oils have the highest level of aromatic content and inhibit a peroxide cure. They are not recommended.

Nitrile compounds use **synthetic ester plasticizers** like Polycizer® DOP, DOA, DOS and TOTM. Ester plasticizers are excellent for peroxide-cured compounds.

HYDROCARBON OILS

Best: **Paraffinic - Stan Lube 80**
Adequate: Naphthenic - Stan Plas 2000
Worst: Aromatic - Stan-Flux LV-1

POLYCIZER®/PLASTICIZER

Phthlate: DINP, DBP, DOP, DIDP
Sebacates: DBS, DOS
Adipates: DOA, DBEEA

All work well with Peroxides

WHEN YOU DO STABILIZE, USE THE BEST!

Polymeric antioxidants, like Stangard® TMQ, are very effective with peroxide. The high molecular weight protects well and tends not to scavenge radicals (but it is a staining AO). In non-black compounds, Stangard® ODP, along with an imidazole can be used. Wingstay® SP, a styrenated phenol, and imidazole synergist, is a good choice as well.

STABILIZERS (Antioxidants)

Stangard® TMQ
Stangard® ODP
Wingstay® SP