Elastomer Compatibility Characteristics

UCON™ Oil-Soluble Polyalkylene Glycol (PAG) Lubricant Technology

What You Need to Know

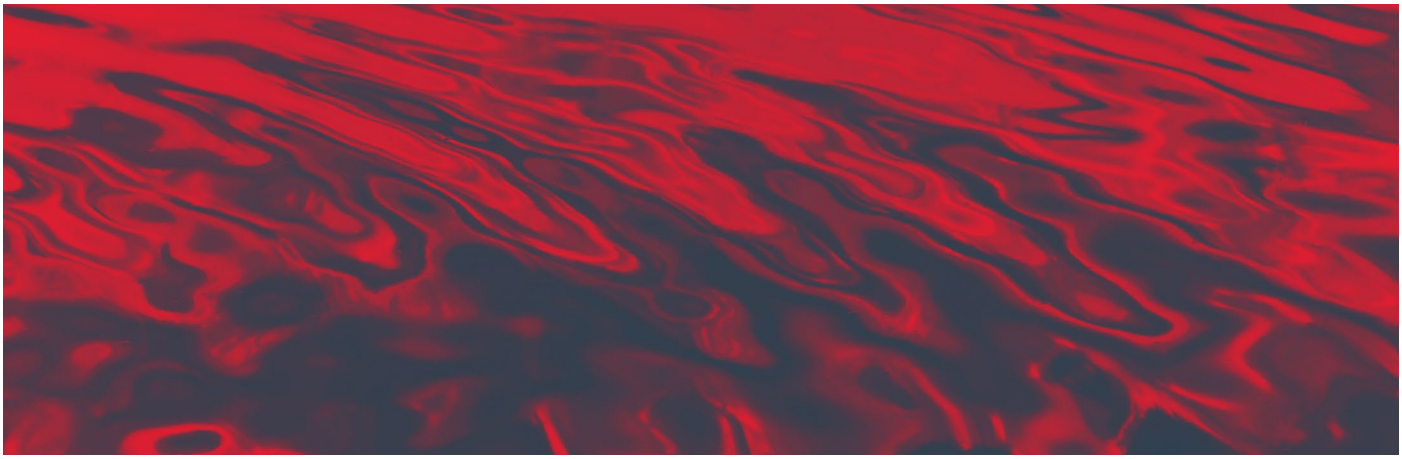
- Elastomer compatibility is a key consideration when formulating lubricants
- UCON™ Oil-Soluble PAGs (OSPs) perform extremely well with HNBR and FKM elastomers
- Due to the complexity of elastomers, it is important to contact a Dow representative in order to learn how to best match OSP with a desired elastomer

Introduction

Oil-Soluble Polyalkylene Glycols (OSPs) can be used as a primary base oil, a co-base oil, or even a performance enhancing additive in formulations. To demonstrate OSP use in formulations, the compatibility of OSPs has been examined on common elastomers, with the following data.

Types of Elastomers

1. Nitrile Butadiene Rubber (NBR): co-polymer of polybutadiene and acrylonitrile; also called Buna N rubbers
2. Hydrogenated Nitrile Butadiene Rubbers (HNBR)
3. Fluoro-Elastomers (FKM): trade names include Viton, Tecnoflon, Fluorel and Aflas
4. Ethylene-Propylene Diene Monomer (EPDM) rubber: ethylenepropylene diene rubber, a terpolymer of ethylene, propylene and a diene component



Test Method

Each of these elastomers were evaluated for their compatibility using ISO-6072. This procedure is a static elastomer test in which the elastomer is submerged in the fluid for a period of 1000 hours. For NBR, HNBR and EPDM, the fluid temperature was maintained at 100°C, but for FKM, the temperature was 130°C.

Results

Base oil	NBR	HNBR	FKM	EPDM
OSP-18	3	1	1	3
OSP-32	3	1	1	3
OSP-46	1	1	1	3
OSP-68	1	1	1	3
OSP-680	2	1	1	3

1 = Very Compatible

2 = Moderate Compatibility; it is recommended the specific manufacturer's grade is tested.

3 = Not Compatible

Note: It is always a good practice to examine the compatibility of your formulated lubricant with the type of elastomer used in the manufacturer's equipment since different compounding techniques for the same elastomer type can show some significant differences.

Explanation

NBR: Showed a broad range of compatibilities depending on the polymer molecular weight. While the low molecular weight products showed moderate swelling, elastomer shrinkage increased for OSP-680. Therefore, it is sometimes recommended that OSP-18 or OSP-32 be added to higher viscosity OSP grades to negate NBR shrinkage. OSP-68 showed negligible volume change. Hardness number also showed a clear correlation to polymer molecular weight. The lower molecular weight OSP grades showed the highest level of softening whereas OSP-680 had a higher degree of hardening. Care should be taken in the selection of the optimum OSP grade when working with NBR.

HNBR: Showed excellent compatibility for all grades and is a preferred choice over NBR.

FKM: Showed excellent compatibility with OSP-18 through OSP-68 with about 1% volume change and minor softening. OSP-680 showed moderate volume shrinkage and minor softening.

EPDM: Showed significant volume shrinkage and hardening with all OSP grades and is not a good choice of elastomer with OSPs when the OSP is being used as the primary base oil in the lubricant composition.

Now You Know

Dow UCON™ OSPs deliver extended fluid life and improved equipment performance. To learn how you can benefit from OSPs or to get more out of your lubricant, contact our Customer Information Group (numbers below) or visit **www.dow.com/ucon/osp** to download a technical data sheet and request a sample.

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