

DuPont™ Kalrez®

Perfluoroelastomer Parts

Selecting the Appropriate Kalrez® Seal Material for Ethylene Oxide Service

Technical Information — June 2013

Overview— Temperature and Chemical Concentration Influence Seal Performance

Ethylene oxide (EO) is considered the oxirane with highest reactivity. It is one of the most aggressive chemical streams that elastomer seals encounter in chemical processing and/or transportation operations. Other substances in the same category, such as propylene oxide (1,2-epoxy propane) and butylene oxide (1,2-epoxybutane), should have a similar though less aggressive effect on elastomeric seals. End-users should be careful when selecting seal materials for EO or other oxirane service. As a result of recent laboratory testing, review of historical data and feedback from end-users, DuPont has determined that seal performance is particularly sensitive to the temperature and concentration of EO.

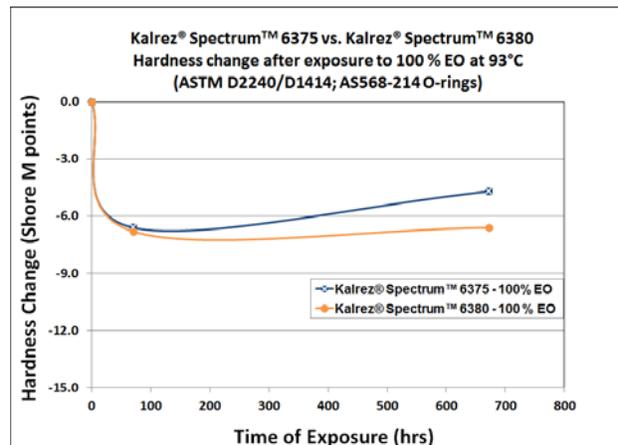
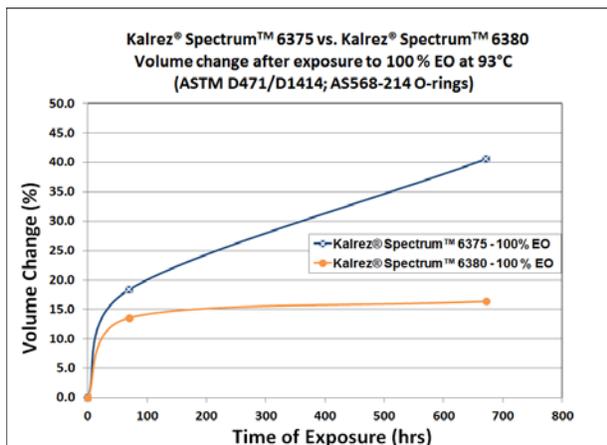
Typically, EO is handled pure and near ambient temperatures when in its final stages of production, transfer and transportation. But in some processing operations, EO may be diluted with water at different concentrations and temperatures. When handling 100% EO or similar oxiranes at ambient temperatures, both DuPont™ Kalrez® Spectrum™ 6375 and 6380 perfluoroelastomer parts can be used. However, when oxirane streams are above ambient temperature and/or diluted with water, DuPont™ Kalrez® Spectrum™ 6380 parts are suggested for service.

It is suggested that customers perform their own evaluation trials since the process conditions of individual customers are unique and cannot be precisely simulated by laboratory tests.

Seals Used in Transportation of 100% EO

In laboratory testing at 93 °C (200 °F), Kalrez® Spectrum™ 6380 exhibited lower volume swell and less hardness change than Kalrez® Spectrum™ 6375 in 100% EO (Figures 1 and 2). As a result, DuPont™ Kalrez® Spectrum™ 6380 parts are suggested for service in oxirane streams above ambient temperature.

Figures 1 and 2: Kalrez® Spectrum™ 6375 versus Kalrez® Spectrum™ 6380

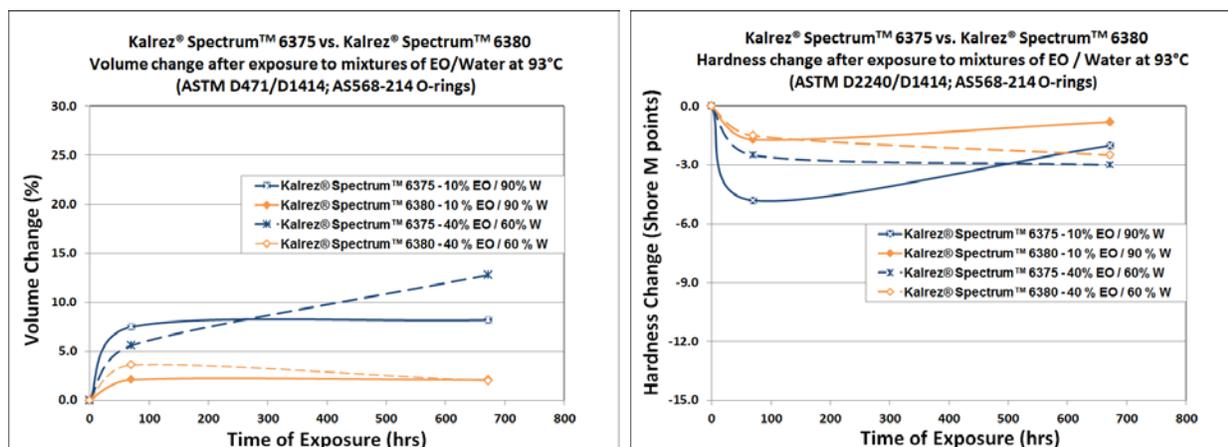


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Seals Used in Less Than 100% EO Concentration

Unlike chemical transportation where 100% EO is encountered at ambient or near ambient temperatures, mixtures of EO are used at higher temperatures and are more representative of actual plant processing conditions. Additional DuPont laboratory testing of EO has shown that elastomeric seals may perform differently in the presence of water. Testing in diluted ratios of 10% EO/90% water and 40% EO/60% water at 90°C (200°F) suggests that Kalrez® Spectrum™ 6380 is the best product for these types of environments.

Figures 3 and 4: In diluted concentrations of EO, Kalrez® Spectrum™ 6380 demonstrates better retention of physical properties than Kalrez® Spectrum™ 6375.



DuPont suggests that all elastomeric seals be tested under actual service conditions to determine their suitability for use in a particular application. Please refer to the product datasheets for additional properties or contact a Kalrez® Application Engineer for more information.

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