



DuPont™ Kalrez® Spectrum™

PERFLUOROELASTOMER PARTS

LONG-TERM SERVICE AND EXCEPTIONAL VALUE IN USE IN THE MOST
CHALLENGING CHEMICAL AND HYDROCARBON PROCESSES



The miracles of science™

Keeping Pace with the Chemical Process Industry

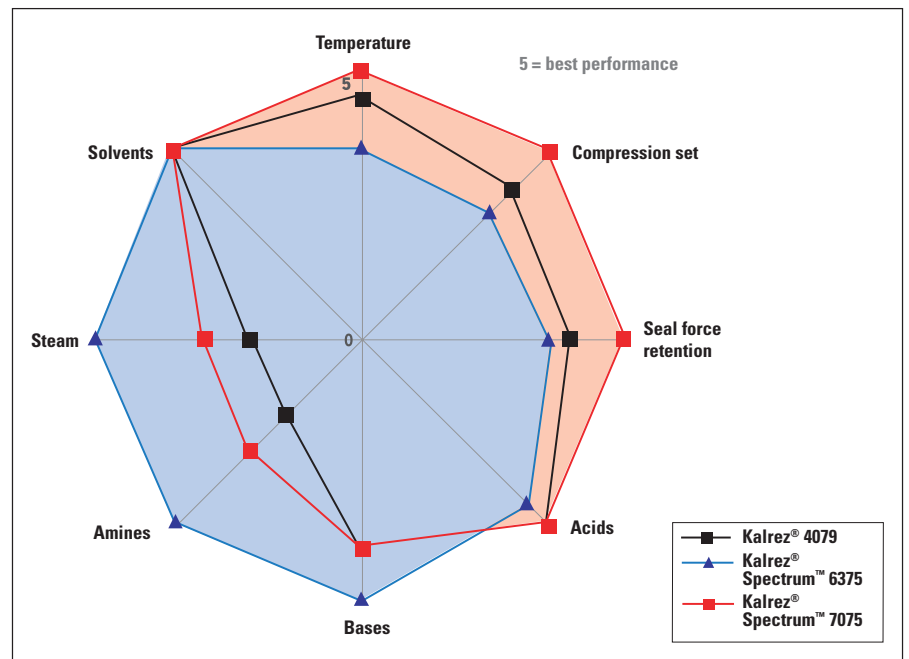


The chemical and hydrocarbon processing industries (CPI and HPI) are changing fast with companies under severe pressure to improve reliability and productivity. Today, processes are not only running longer but at higher temperatures and pressures. Harsher operating conditions and a smaller operating staff are the realities that plant personnel encounter as they are required to increase meantime between maintenance. And every plant manager, design engineer and maintenance supervisor faces a recurring nightmare—the fear of environmental incidents.

High performance DuPont™ Kalrez® perfluoroelastomer parts have been used in aggressive processes and high temperature applications for over 40 years. Today, DuPont™ Kalrez® continues to lead in product innovation to meet the demands in the chemical and hydrocarbon processing industries.

The Kalrez® Spectrum™ family of perfluoroelastomer parts was designed to meet the increased demands in chemical and hydrocarbon processes. Kalrez® Spectrum™ 6375 and 7075 meet different performance requirements, yet overlap to provide the sealing performance needed for today's more aggressive applications.

DuPont™ Kalrez® Spectrum™ 6375—Broad Chemical Resistance DuPont™ Kalrez® Spectrum™ 7075—Thermal Resistance



DuPont™ Kalrez® Spectrum™ Parts are Field Proven in Demanding Applications

Application	Environment	Kalrez® Spectrum™ 6375 Results
Mechanical Seal	Mix of amines and propylene oxide at 40–90 °C	Almost 100% improvement in continuous service
Mechanical Seal	Batch pilot plant reactor operating in EO, PO, amines and methyl chloride at up to 232 °C	Continuous service improved dramatically to almost one year
Mechanical Seal	Ammonia/tar mixture and steam at 35 °C	Improved performance in continuous service over other material
Mechanical Seal	Pure and mixed streams of aggressive and corrosive chemicals such as epichlorohydrin at temperatures from –20 °C to 220 °C	6375 provided successful continuous service
Dynamic and Static Valve Seals	Aggressive solvents, surfactants, and concentrated herbicides from 10–45 °C	Seals are replaced every two months instead of daily

Application	Environment	Kalrez® Spectrum™ 7075 Results
Mechanical Seals	Various areas with multiple chemicals up to 300 °C	Improved mechanical properties provides for lower spring tension and smaller components for mechanical seal design innovation
Quick Disconnect Couplings	Marlotherm® LH at 270 °C for 1008 hours	50% reduced volume swell combined with lower coefficient of thermal expansion provides reliable on/off performance
Proprietary New Application	Temperature cycling between 200 °C and 350 °C	Only elastomer that could be used for several hundred cycles resulting from excellent sealing force retention
Hot Glue Delivery Nozzle	Various solvents	Mechanical properties and chemical resistance of 7075 reduced variability of glue flow in the nozzle
Rotary Joint Assembly	Hot oil at 200–300 °C	Improved sealing performance



DuPont™ Kalrez® Spectrum™ Delivers a Broad Range of Fluid Resistance



Chemical and hydrocarbon processors must contain some of the most hazardous materials used in manufacturing. DuPont™ Kalrez® Spectrum™ perfluoroelastomer parts were designed to reliably seal in the most demanding environments.

For applications where there are mixed streams, unknowns in the process, or process excursions, Kalrez® Spectrum™ 6375 provides the broadest chemical resistance. Kalrez® Spectrum™ 6375 withstands aggressive chemical families including acids, amines, bases, aldehydes, ethylene oxide, and hot water/

steam. Such broad chemical resistance makes 6375 the preferred sealing material across many applications which will allow for seal standardization and lower part inventory.

For many years Kalrez® 4079 was the standard for difficult sealing applications. Today Kalrez® Spectrum™ 7075 offers an improved level of chemical resistance over 4079. Although Kalrez® Spectrum™ 6375 is the best choice for most applications requiring chemical resistance, 7075 is the choice for service at elevated temperatures.

Kalrez® Spectrum™ 6375 Offers the Broadest Chemical Resistance

	Kalrez® Spectrum™ 6375	Kalrez® Spectrum™ 7075	Kalrez® 4079
<i>Resistance to:</i>			
Aromatic/Aliphatic oils	A	A	A
Acids	A	A+	A+
Bases	A	B	B
Alcohols	A	A	A
Aldehydes	A	A	B
Amines	A	C	X
Ethers	A	A	A
Esters	A	A	A
Ketones	A	A	A
Steam/Hot Water	A+	B	C
Oxidizers	B	B	B
Ethylene Oxide (Pure)	A	B	X

Ratings: A = Elastomer shows little or no effect (< 10% swell) after exposure to the chemical

B = Elastomer may be affected by the chemical after exposure, as evidenced by slight visible swelling (10–30%) and/or loss of physical properties

C = Elastomer is affected by the chemical after exposure, as evidenced by moderate to severe swelling and/or loss of physical properties

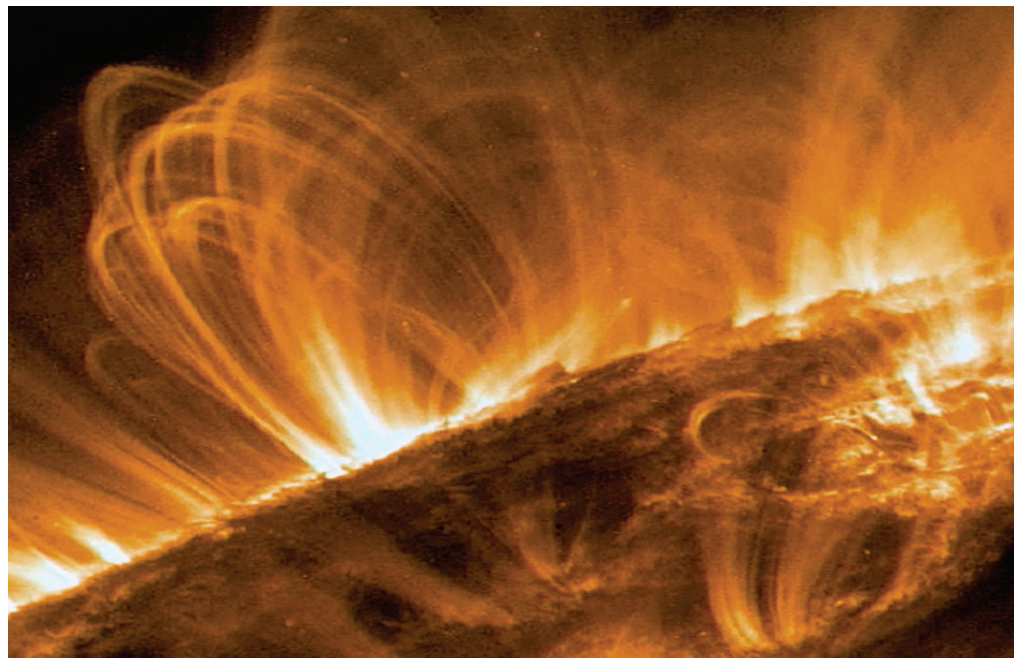
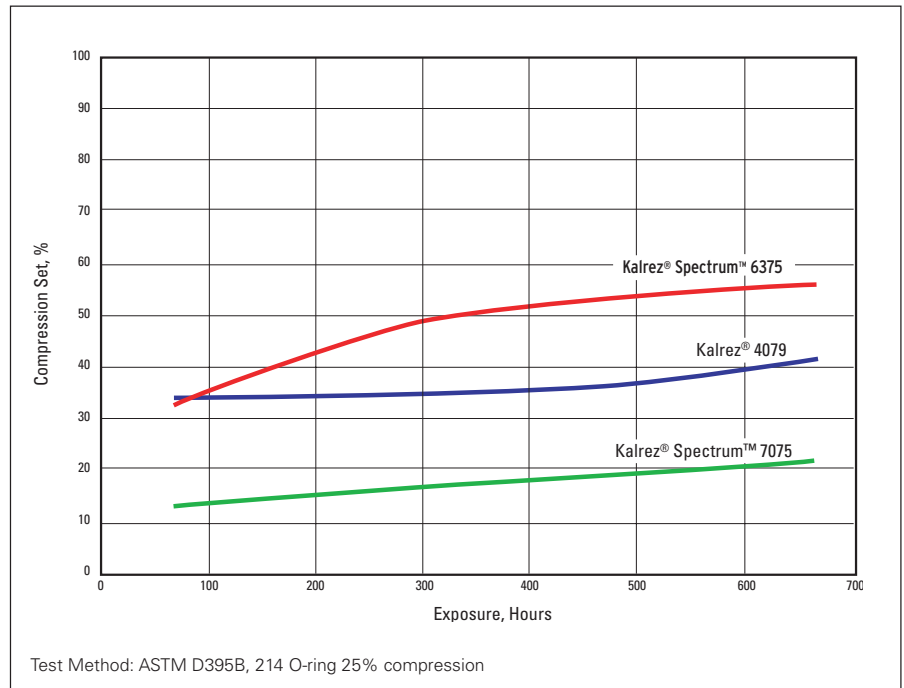
X = Not suitable

Thermal Resistance Compatible with Application Requirements

An elastomer's thermal stability and chemical resistance are usually the first performance characteristics considered when determining elastomeric seal compatibility. DuPont™ Kalrez® Spectrum™ 6375 and 7075 provide end-users options based on specification requirements. Because the majority of the chemical and hydrocarbon processing environments operate below 260 °C, Kalrez® Spectrum™ 6375 is a safe and economical choice for applications in a variety of harsh environments. With an operating temperature up to 275 °C and broad chemical resistance, 6375 provides reliable sealing in a variety of environments to allow for seal standardization and lower inventory.

For operating conditions above 275 °C, Kalrez® Spectrum™ 7075 is the choice over Kalrez® Spectrum™ 6375. Kalrez® 4079 has been the product of choice in higher temperature applications for many years. Now 7075 provides better thermal resistance, compression set and sealing force retention, as well as an overall improvement in chemical resistance. This combination of properties makes it an excellent choice for applications in high temperatures or temperature cycling conditions that require good dynamic properties and excellent compression set.

Compression Set Resistance at 204 °C



From Technical Assistance to Fast, Reliable Supply, You Get More than Just a Product



Latest Updates

We provide our customers with the latest information about sealing performance.

Visit our website www.dupontelastomers.com and read or download the latest product information. Check out the DuPont Chemical Resistance Guide—an online tool that rates the chemical resistance of all elastomers, including DuPont™ Kalrez® and DuPont™ Viton®, in a variety of chemicals.

For more specific information on Kalrez® including seal design, contact us about the Kalrez® Application Guide, a unique interactive software program.

Global Technical Support and Testing

We help you with the technical assistance and support you might need to achieve optimum results in the shortest possible time. Our worldwide technical expertise can help you with product selection and seal design, application testing and development, failure analysis and on-site training.

Customer-Tailored Solutions

Advanced Finite Element Analysis (FEA) offers single-source analysis capability. From designing new seal shapes with concurrent analysis to groove geometry optimization, FEA gives unequalled flexibility. It shortens your product development lead times and brings innovative solutions to the market.

In Any Shape You Want

- Standard O-rings in AS-568, metric and JIS sizes
- Customized O-rings in various cross-sections and diameters
- Valve seats, diaphragms, gaskets, packer seals, T-seals, column fittings, custom shapes

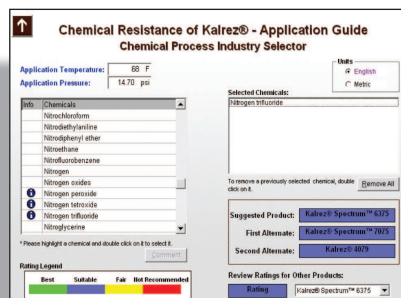
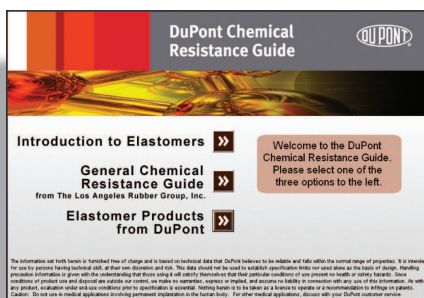
Fast Delivery

Upon agreement and request, standard O-rings and make-to-stock parts can be delivered within 48 hours to most European and North American destinations.

A Worldwide Presence Network

DuPont™ Kalrez® parts are readily available through an extensive network of worldwide authorized distributors. Our authorized distributors can give you the technical assistance needed to help solve your sealing problems.

Visit the DuPont Chemical Resistance Guide at:
www.dupontelastomers.com



FAQs

How are DuPont™ Kalrez® Spectrum™ products different from other Kalrez® products? Kalrez® Spectrum™ perfluoroelastomer parts were designed to provide the best value and performance to meet the demands of the chemical and hydrocarbon processing industries (CPI/HPI) for broader chemical resistance, higher thermal resistance and better sealing force.

Which Kalrez® Spectrum™ product is best to use when my process has multiple chemical streams? Kalrez® Spectrum™ 6375 has the broadest chemical resistance and is, therefore, more suitable for processes with multiple chemical streams or even unknown chemical streams. And, even if the process requires hot water flushes or

steam cleaning, Kalrez® Spectrum™ 6375 will most likely handle the job.

What is best to use in my temperature-cycling process? Kalrez® Spectrum™ 7075 has the highest thermal resistance and sealing force retention, which makes it suitable for processes which elevate in temperature for a period of time and then return to lower process temperatures, while retaining its resilient properties.

How economical are the Kalrez® Spectrum™ products? Kalrez® Spectrum™ 6375 is more economical than other Kalrez® products. Additional savings may be obtained if you standardize on Kalrez® Spectrum™ 6375 to handle all your existing applications versus carrying multiple types in inventory.

Kalrez® Spectrum™ 7075 should have comparable economics to Kalrez® products you have used in the past.

Is Kalrez® 4079 being phased out? Absolutely not! Kalrez® 4079 has been the industry standard for over 30 years and is specified in many applications where it demonstrates outstanding performance. We will continue to make and supply our current products that meet the value and performance requirements of our many loyal customers and end users. In addition to our current product line, we will continue to develop the Kalrez® Spectrum™ line of products to meet the ever increasing requirements of the chemical and hydrocarbon industries.

Visit us at: kalrez.dupont.com or vespel.dupont.com

Contact DuPont at the following regional locations:

North America

800-222-8377

Latin America

+0800 17 17 15

Europe, Middle East, Africa

+41 22 717 51 11

Greater China

+86-400-8851-888

ASEAN

+65-6586-3688

Japan

+81-3-5521-8484

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Kalrez® perfluoroelastomer parts are not routinely tested using the USP testing protocol. Cured samples made only from compounds 6221 and 6230 have been tested in accordance with USP protocols and meet the requirements of a USP Class VI polymer. USP testing was done to support use of Kalrez® parts in pharmaceutical processing and food processing applications. While USP Class VI compliance materials are not required for pharmaceutical and food processing applications, many pharmaceutical and food processing customers including customers seeking ISO 9000 certification, have requested compliance. Testing of any finished article that incorporates Kalrez® perfluoroelastomer parts is the responsibility of the manufacturer or seller of the finished article if certification that meets USP standards is required.

Caution: Do not use in medical applications involving permanent implantation in the human body. For other medical applications, discuss with your DuPont customer service representative and read Medical Caution Statement H-50103-3.

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