John Crane

2800X

eXtending the performance of non-contacting pump seals

2800 Series

smiths
bringing technology to life

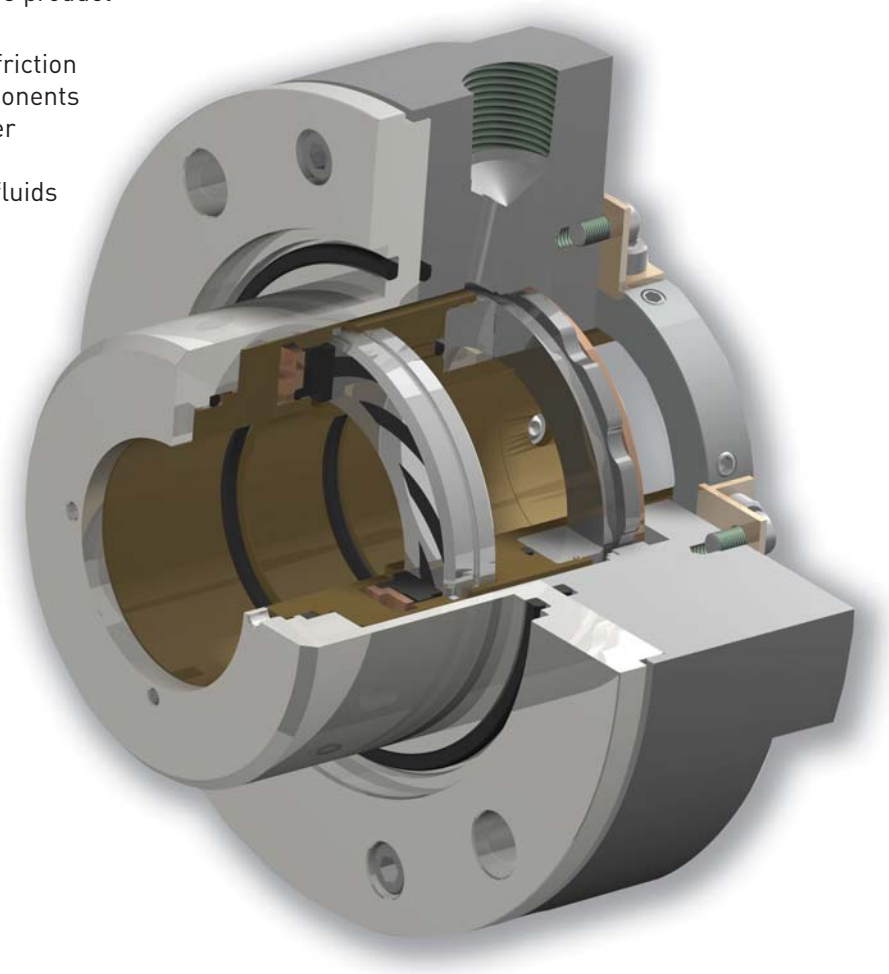
2800X eXtended performance for non-contacting pump seals

eXtended performance - lower, higher, and safer

The John Crane type 2800X is a non-contacting dual seal for non-turbo, large-bore rotating equipment applications, and complements the John Crane type 2800E small-bore range.

2800X seals feature new-patented technology, which provides the basis for a series of enhanced end user benefits.

- Reduced operational costs. Compliant face technology keeps the gap between the seal faces to a minimum, whilst maintaining long life, non-contacting performance. The result is lower gas barrier usage, even with large seals
- Excellent reliability. In addition to thousands of hours testing, 2 years field running of the key technology has been completed successfully before product commercialisation
- Longer seal life. The design, use, and friction characteristics of new polymeric components enables improved performance at lower temperatures and reduced hang-up problems with solid-in-liquid process fluids
- Safer operation. Reverse pressure capability ensures that, in the event of barrier gas failure, the process pressure will close the seal faces, preventing mass escape of process fluid. The result is safer operation, even under breakdown conditions, and no atmospheric discharge
- Wider performance specification. Patented design enables lower and higher speeds and process pressures to be achieved and provides greater re-assurance under common operating conditions



2800X eXtended performance

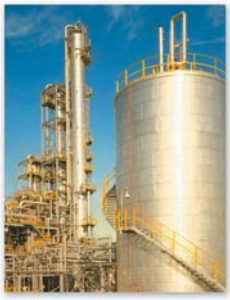
How 2800X works

Spiral grooves are machined into the mating ring faces of each seal head. A suitable pressurised inert gas is injected between the seals. As the pump shaft rotates barrier gas flows in to the spiral grooves. The gas is compressed as it does so, then expands on leaving the spiral grooves. This expansion produces a nett opening force thus separating the faces.

As a result of this process, long seal life with low running and repair costs is achieved, the seal faces are non-contacting and so do not wear.

In addition, installation is much simpler as no complex barrier fluid system is needed.

- Highly reliable
- Low running costs
- Low energy usage
- Kind to the environment
- Zero emissions
- Compatible with API 682
- Safety in design
- Contamination-free sealing
- Easy installation



Be kind to the environment

We live in an era where industry recognises its responsibilities to the greater community more than ever before. Climate change, recycling, emissions, contamination, energy usage, and safety are now key drivers for many societies. The eXtended performance of the new John Crane 2800X seal range provides a positive contribution to rotating equipment users as they respond to these challenges.

According to the Fluid Sealing Association, a 50mm conventional wet seal, rotating at normal pump speeds and pressures uses 10330 KWh of electricity per annum.

The cost of this electricity to the end user is approximately 1000 Euros (at 2007 prices).

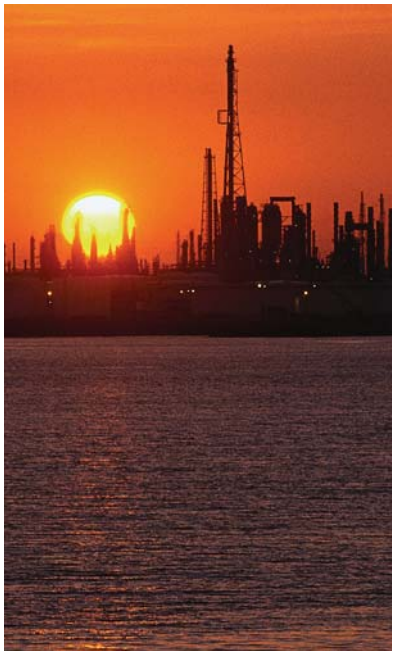
In the process of generating that electricity up to 10 tonnes of carbon dioxide greenhouse gas are emitted, just for one seal.

Fluid Sealing Association calculations show that the use of a 2800X seal reduces these costs and emissions by 92%.

In addition the reflective design of the new 2800X seal range ensures an increased number of common components are used, assisting the re-use, refurbishment, and therefore re-cycling characteristics of the product.

Finally, 2800X seals use no seal water flush, both saving water and eliminating the need for post-flush water treatment.

2800X seals can help you save money AND be kind to the environment.



2800X eXtended performance

eXtended performance for existing applications

The 2800X is designed to retrofit existing installations of 2800, 2800ER, and 2800HP seals, so customers can easily upgrade to 2800X performance as part of their normal service and maintenance programmes.

eXtended performance for API

The American Petroleum Institute seal standard API 682 series strives to promote best practices in the selection and operation of mechanical sealing systems so as to extend seal life whilst meeting environmental emission regulations. In the 2nd edition, the scope of the standard was extended to include non-contacting seals for use in chemical and petrochemical pumps.

The 2800XP seal type has been engineered to meet the new performance and design requirements in category 2, arrangement 3 of the latest API 682 edition.

eXtended performance for special applications

The patented technology and tolerant design of type 2800X seals make them ideally suited for applications requiring specially engineered seals with performance even beyond that of the standard range.

Examples already in customer use include very large (greater than 200mm) seals yet with minimum gas consumption; operating speeds as low as 800rpm yet with full retention of non-contacting characteristics; and pressures of up to 100 bar.

If your process requires special performance capability consult John Crane for industry-leading design and applications engineering expertise.

Broad operating ranges

2800X seals cover a wide range of normal performance capabilities

Temperature : -40˚C to +260˚C, -40˚F to +500˚F

Pressure: to 42 bar g, 620 psi

Speed: 1000 – 3600 rpm

Size range: 20mm to 110mm, 1" – 4", suitable for pumps meeting the requirements of pump standards ANSI B 73.1 and 2, ISO13709, and seal chamber standard ISO 3069H.

Materials of Construction

SEAL COMPONENTS	MATERIALS	
Description	**Standard**	**Options**
Face/Primary Ring	Ni-Cr impregnated carbon graphite	Sb impregnated carbon graphite
Seat/Mating Ring	Ni-bonded tungsten carbide	API 682 Ni-bonded tungsten carbide API 682 self sintered silicon carbide Self sintered silicon carbide
Metal Components	316 stainless steel	Alloy C-276 Titanium
O-Ring	Fluorocarbon Perfluoroelastomer High temperature perfluoroelastomer	Nitrile Ethylene propylene

2800X eXtended performance

Where and when to use 2800X seals

2800X seals excel in many performance-critical applications, including

- Reactive or temperature-sensitive media, where local process 'hot spots' can cause unwanted chemical reactions, such as reactive monomers in polymerisation processes
- Air (oxygen) - sensitive processes especially where unwanted oxidation reactions could occur
- Cold applications, such as ammonia processing
- Processing of extremely pure materials, where no contamination is permissible
- Where process liquids are near the gas/liquid phase equilibrium, because pump cavitation and dry running does not significantly impact on gas seal performance
- Light hydrocarbons (e.g. benzene, solvents, propane)
- Vertical slow-running pumps

Supporting 2800X seals

A barrier gas is required to operate a 2800X seal, in the form of a clean, dry gas supplied at 3 bar, 43 psi above the process pressure. Suitable gases include plant nitrogen, bottled nitrogen, or plant instrument air. A minute amount of this barrier gas is consumed by the 2800X seal and released to atmosphere. Examples also exist of the use of noble gases for ultra-pure applications.

John Crane provides a comprehensive range of compact, easy-to-install barrier gas control systems. These support systems are designed as required to fulfil a range of tasks and operating environments.

- Regulate barrier gas flow and pressure
- Filter barrier supply gas
- Monitor seal performance
- Boost pressure where available gas pressure is below process pressure
- Provide alarm systems for excessive barrier gas consumption
- Provide alarm systems for supply pressure loss

For optimum performance, we recommend that support systems be designed with regard to the intended process conditions. For individual installation design, please contact John Crane.

2800X Seal Range Categories

2800X seals are divided into 3 seal types according to the performance requirements of the application.

2800XA Seal Type	For applications up to 21 bar g and standard size range and geometry
2800XP Seal Type	For applications including API up to 42 bar g
2800XS Seal Type	Engineered seals for special sizes and applications beyond the normal parameters

2800X eXtended performance

Type 2800 Seals Serve this Partial List of Representative Fluids:

Acetone
Acetic anhydride
Acrylonitrile
Alkyl resins
Amines
Ammonia
Anhydrous cyclohexane
Benzene
Bisphenol acetate
Butadiene
Chlorine gas
Dichlorobutadiene
Dichloroethane
Ethanol
Ethyl chloride
Ethyl hexanol bottoms
Formaldehyde
Gasoline
Glacial acrylic acid
Hydrocarbon
Isobutyl alcohol
Kerosene
LPG
Methanol
Methylene chloride
Molten chemical tar
Nitric acid
Organic acid
Phenol
Plastic pigment
Propane/butane
Propane with caustic
Recycle gas
Santotherm 59
Slurry water
Sodium carbonate
Sodium hydroxide
Spent methanol & chemical
Styrene
Sugar solutions
Sulphuric acid
Therminol
Therminol 59
Toluene
Wastewater/hydrocarbon
Xylene

Small-bore applications

In addition to the 2800X range of seals for large-bore equipment, John Crane also offers the type 2800E series, which meets the requirements of small-bore rotating equipment standards such as ISO 3069C/ DIN 24960

For your nearest John Crane facility, please contact one of the locations below.

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North America
Morton Grove
Tel: 1-847-967-2400
Fax: 1-847-967-3915

Latin America
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Tel: 55-11-3371-2500
Fax: 55-11-3371-2599

Middle East & Africa
Dubai, United Arab Emirates
Tel: 00-97-1488-39510
Fax: 00-97-1488-37766

Asia Pacific
Singapore
Tel: 65-6512-5200
Fax: 65-6512-5233

If the products featured will be used in a potentially dangerous and/or hazardous process, your John Crane representative should be consulted prior to their selection and use. In the interest of continuous development, John Crane Companies reserve the right to alter designs and specifications without prior notice. ISO 9001, ISO 14001, ISO/TS 16949 Certified. Details available on request.

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