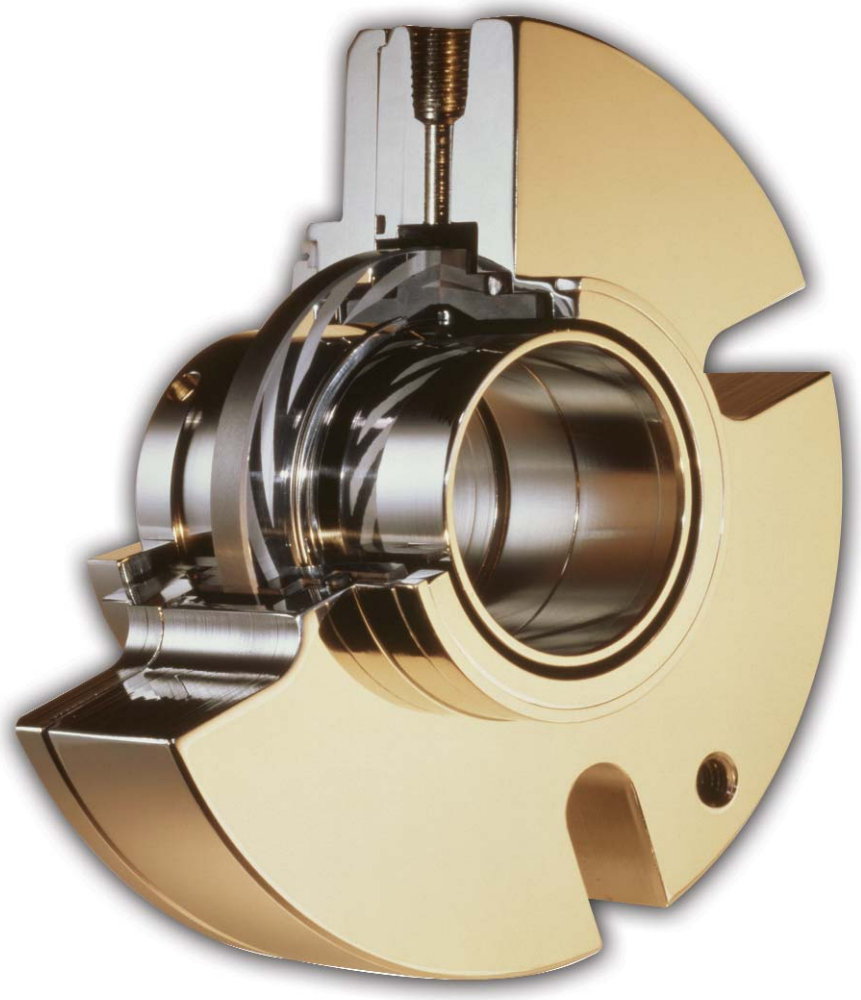
2800E



Non-Contacting, Gas Lubricated Seals for Small-Bore Rotating Equipment

2800 Series

smiths
bringing technology to life

John Crane's gas lubricated, non-contacting Type 2800E Series seals

The John Crane Type 2800E is a non-contacting dual seal for non-turbo small-bore rotating equipment applications, meeting the requirements of standards such as ISO3069C and DIN 24960. As the world leader in spiral groove technology, John Crane has more than 15,000 Type 2800E Series spiral groove seals in use in over 50 countries worldwide, with over 100 million hours of operational time.

Fugitive pump emissions are contained safely throughout the long life of your John Crane seal

- Highest reliability in sealing volatile fluids
- Positive sealing of high purity fluids with virtually no process contamination
- No damage to pump from corrosive fluids leakage
- Zero emissions to atmosphere
- Simple to install
- Pump cavitation and dry-running does not affect seal performance
- Low running costs
- Low energy usage

Our technology for your benefit

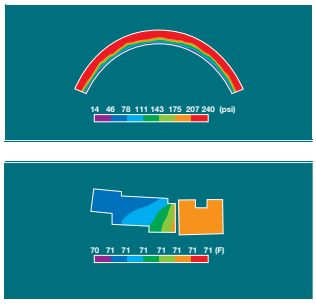
Patented John Crane spiral grooves are machined into the mating ring faces. A suitable pressurised inert gas is injected between the seals. As the shaft rotates, gas flows into the tip of the spiral groove and is compressed at the sealing dam, the ungrooved portion of the mating ring. At the sealing dam, gas is expanded. The resultant film pressure gives an opening force greater than the closing force, thus separating the faces. The Type 2800E Series spiral groove continues to operate, even if barrier gas pressure is momentarily lost, maintaining the gas film between the barrier gas and the process.

As a result of this unique technology, you achieve zero emissions, plus:

- **MTBPM extended up to 10 times.** Several chemical companies have documented that their Mean Time Between Planned Maintenance (MTBPM) has been extended by more than 2,000% with Type 2800E Series seals on difficult applications
- **Lower repair costs.** Because there's no contact, the seal faces do not wear. And that can mean a seal life in excess of five years is possible
- **Lower energy costs.** Type 2800E Series seal uses 10% of the energy of a typical liquid lubricated dual seal. Your savings are even greater compared with a sealless pump. A typical magnetic drive pump consumes up to three times more power than a wet seal system
- **No need for water.** Because there's no contact, there's no heat generation, so there's no need to cool seals with water. You eliminate water treatment costs

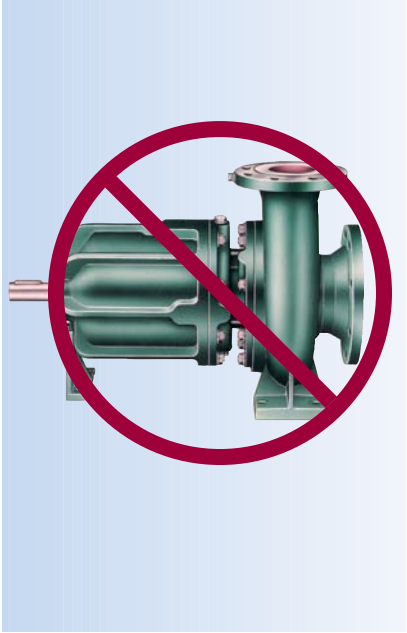
Type 2800E Series seals give you proven performance

John Crane proprietary computer programs—CSTEDY[SM] and CTRANS[SM]—have assured optimal design of critical components for peak performance. The resulting performance predictions, based on analysis of the combined effects of pressure, temperature, fluid sealed and face and seal geometry, have since been proven in thousands of installations.



John Crane's gas lubricated, non-contacting Type 2800E Series seals

An alternative to magnetic drive pumps



With Type 2800E Series seals, you don't need inefficient mag drive pumps.

By eliminating sealless pumps, you eliminate:

- Capital expenditures for replacement of existing pumps to comply with emission legislation
- Expensive operation due to losses in magnetic couplings
- Maintenance problems due to fluids that are poor lubricants, abrasive or corrosive, affecting sleeve bearing life
- Liquid flashing in the drive area that can result in dry-running the bearing with catastrophic pump failure
- Pump intolerance to system upsets or off-curve operation
- Expensive repair that often includes taking the pumps out of service

Existing equipment can be easily upgraded with the Type 2800E Series. The seals yield longer MTBPM and lower operating costs, resulting in overall lower life cycle costs.

An alternative to conventional wet seals

Conventional pressurised dual wet seals can offer similar emission containment characteristics as 2800E Series gas seals. The choice of technology therefore rests on the precise application and plant infrastructure. 2800E series seals excel in many performance critical applications including

- Reactive or temperature sensitive media
- Air (oxygen) sensitive processes
- Cold applications
- Processing of extremely pure materials

Low running costs are a particular feature of 2800E Series gas seals, as indicated on the following chart. The Fluid Sealing Association provides a Life Cycle cost calculator, enabling application - specific cost estimates to be determined.

Comparison of cost of alternative technologies

(The double liquid lubricated mechanical seal is the basis for comparison)

	Double liquid lubricated mechanical seal	Sealless pump series Mag drive	Type 2800E Series
Installation Costs	100	80-175	90-110
Operating Costs	100	110-150	40-90
Cost of Single Repair	100	175-200	105-150
Mean Time Between Repair	100	100-250	200-350
Total Life Costs	100	125-130	65-90

1. Based on 10 years. 2. Installation costs include the pump, motor and coupling in case of a long coupled pump, the seal, and barrier and monitoring systems, Plan 53 for wet seal and nitrogen system for gas seals. 3. Operating cost includes electricity, emission, and cooling water/nitrogen consumption where applicable. 4. In summary, the major advantage of a Type 2800E Series seal is the greatly improved MTBR and its lower total life costs.

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 John Crane Type 2800E Series 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.

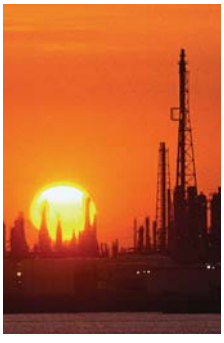
The cost of this electricity to the end user is typically approximately 1000 Euros (at 2007 prices).

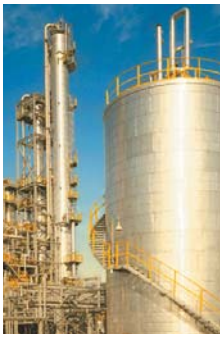
In the process of generating that electricity up to 10 tonnes of Carbon Dioxide greenhouse gas are emitted, just for one seal.

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

In addition, Type 2800E Series seals use no seal water flush, both saving water and eliminating the need for post-flush water treatment.

Type 2800E Series seals can help you save money AND be kind to the environment.





The Type 2800E Series seal family

Evolving with customer needs and technology development, the Type 2800E Series seal family now offers variations according to specific application needs of customers.

2800E seal range categories

2800E	The most popular types for all general applications up to 16 bar g, 1450-3600rpm speeds, and max 6% by volume solids in suspension.
2800EX	Specially adapted version capable of handling up to 20% by volume solid in suspension.
2800EH	Specially adapted version capable of running at very low machine speeds, from 300-1450 rpm.

Broadest operating ranges

The Type 2800E Series seal family covers a wide range of performance capabilities

	2800E	2800EX	2800EH
Temperature	-40°C to +260°C (-40°F to +500°F)		
Pressure	to 16 bar g	to 16 bar g	to 6 bar g
Speed	1450-3600rpm	1450-3600rpm	300-1450rpm
Solid Handling	6% max	20% max	6% max

Materials of construction

SEAL COMPONENTS	**MATERIALS**	
Description	**Standard**	**Options**
Face/Primary Ring	Metal filled carbon	Sintered silicon carbide (inboard)
Seat/Mating Ring	Tungsten carbide	Silicon carbide
Metal Components	316 stainless steel	Alloy C20, Alloy C-276 Titanium
O-Rings	Fluorocarbon	Ethylene propylene Perfluoroelastomer

Supporting Type 2800E Series seals

All you need is readily available, low-cost barrier gas

The barrier gas required in a Type 2800E Series system is any suitable clean dry gas supplied to the seal at 20 to 30 psig/1.5 to 2.0 bar g above the process pressure.

Suitable gases are highly economical plant nitrogen, bottled nitrogen or plant instrument air, and no forced circulation is required.

Type 2800E Series total barrier gas consumption is typically just 0.05 to 0.5 SCFH/25 to 240 ml/min.

A minute amount of gas is consumed by the Type 2800E Series seals into the process and atmosphere. For further details on barrier consumption, refer to specification sheet, S-2800ER/Eng or S-2800-E.

Proven control is simplified

To ensure maximum reliability of your Type 2800E Series seal, John Crane provides a range of compact, easy-to-install barrier gas control systems. Designed specifically to interface with Type 2800E Series seals, these systems:

- Regulate barrier gas flow and pressure to dry-running seals
- Filter barrier supply gas
- Monitor seal performance
- Prevent back flow of process fluid into the panel by way of a check valve
- Have an optional pressure switch that provides a signal for an alarm in the event of supply pressure loss
- Have an optional flow switch that provides a signal for an alarm in the event of high barrier gas flow to the seal
- Have two flow meters; the lower shows normal gas consumption and the upper shows excessive gas consumption

Barrier Gas Enclosed Unit

Barrier Gas Panel

System Components

1) Filter/coalescing element
2) Pressure regulator
3) Pressure gauge
4) Flow meter
5) Check valve
6) Ball valve
7) Pressure switch (optional)
8) Flow switch (optional)

John Crane's gas lubricated, non-contacting Type 2800E Series seals

Type 2800E Series 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

Large-Bore applications

In addition to the Type 2800E Series seal range for small-bore equipment, John Crane also offers the 2800X Series, which meets the requirement of large-bore and API equipment standards.

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

Europe
Slough, UK
Tel: 44-1753-224000
Fax: 44-1753-224224

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

Latin America
São Paulo, Brazil
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

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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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