AESSEAL®

EXPERIENCE THE EXCEPTIONAL

Oil, Gas & Petrochemical Industry Products

the AESSEAL® group of companies

designers and manufacturers of mechanical seals,
bearing protectors and seal support systems
which maximize rotating equipment up-time.

www.aesseal.com

From a customer perspective.

In order to refine our offer, and redefine the customer experience, we work effectively as a team, sharing ideas and best practice across our international network. A commitment to delivering an exceptional experience defines our approach and our whole focus as a business is on exceeding expectation.

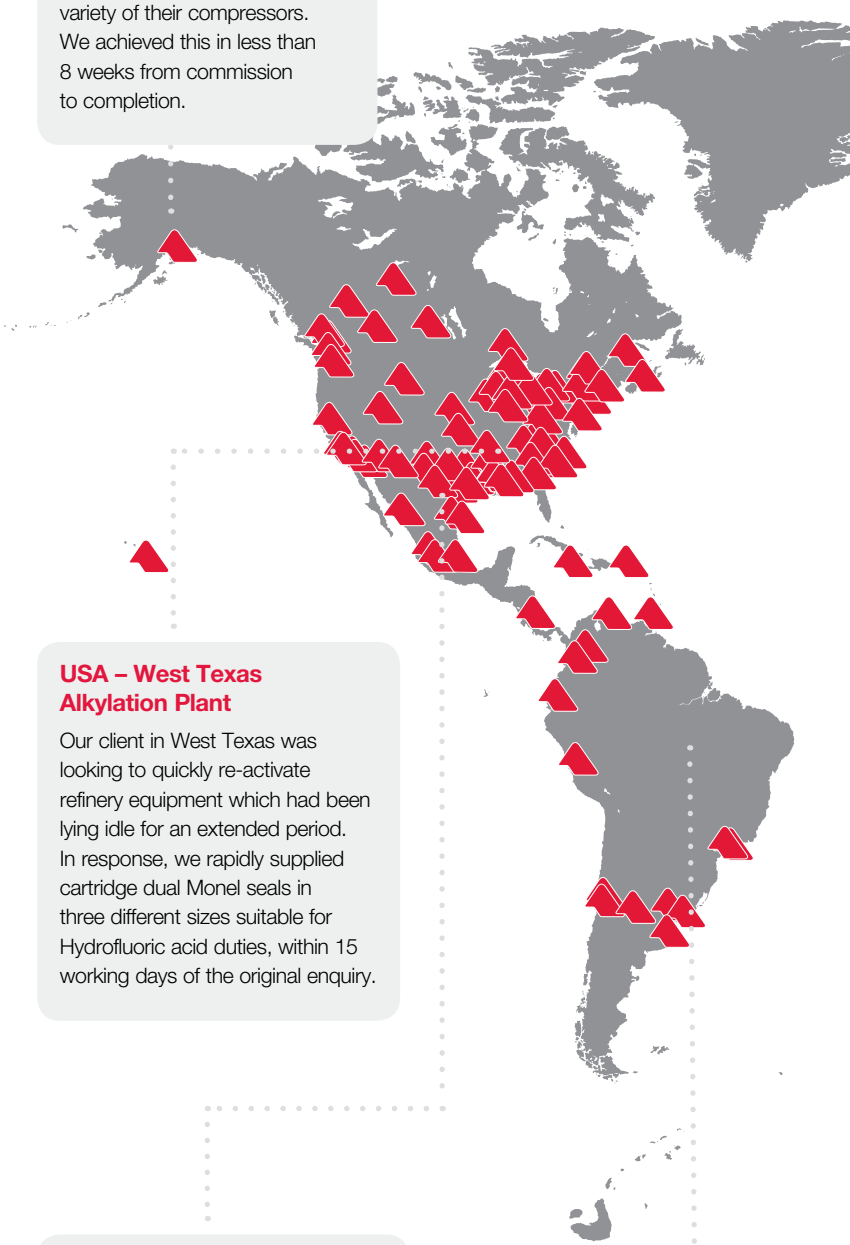
We empower our people to champion the customers' viewpoint, so we can constantly evolve new products and services. We see the world through their eyes. Here, you can see the impact of our work through theirs.

Global

Customer service is provided from 230 locations in 104 countries, including 9 manufacturing and 58 repair locations, with more than 300 customer service representatives who visit industrial plants every day.

Alaska

A customer in Alaska asked us to undertake repair and API617 testing of OEM gas seals on a variety of their compressors. We achieved this in less than 8 weeks from commission to completion.



USA – West Texas Alkylation Plant

Our client in West Texas was looking to quickly re-activate refinery equipment which had been lying idle for an extended period. In response, we rapidly supplied cartridge dual Monel seals in three different sizes suitable for Hydrofluoric acid duties, within 15 working days of the original enquiry.

Mexico

For this customer in Mexico, we successfully sealed their bad actor hot naphtha vertical pumps. Using upgrades which included applying dual API682 qualification tested technologies. This project was achieved without modifications to the pump machinery.

Brazil

Commissioned to undertake a large dual seal upgrade project for a customer in Brazil, we quickly configured and delivered 53A and 53B pressurised dual seal systems.

UK/Aberdeen – Offshore sector

For this offshore customer in Aberdeen, we designed, manufactured and delivered engineered high pressure seals to replace obsolete OEM seals for its main oil line export pumps – all within 48 hours.

Russia – St Petersburg

We successfully installed dual seals to enhance tank storage facilities for our customer in St Petersburg.

Middle East – Saudi Arabia

For this customer in Saudi Arabia, we managed seal repair and a reliability program at a major petrochemical facility. As well as helping improve reliability, we reduced the total cost of ownership.

Far East

We've won a significant contract in the Far East, giving us responsibility for bearing protection for a major global business in this part of the world.

South Africa

We delivered significant MTBF improvement by managing a reliability program for a large population of pumps at our customer's South African petrochemical facility.

$8.5m annual saving from a $0.75m investment

North Africa

By applying Plan 52 dual seals to our customers high pressure LPG pipeline pumping stations in North Africa, we were able to improve reliability and save $8.5M USD of gas, which was previously flared off, per year.

- **API Type A, Category 1 & 2, Cartridge Pusher Single & Dual Seals Using Qualification Tested API 682 Technology**
- CAPI TXS™ seals are intended for use in seal chambers meeting the chamber envelope dimensional requirements of ISO 13709 (API610 11th Edition). Due to the modern compact design the CAPI-TXS™ can also be applied to equipment referenced by other machinery standards with more restrictive seal chamber envelopes (such as earlier editions of API 610)
- Robust and reliable seal face drive reduces high stress points at equipment start-up
- Probably the most compact single and dual API cartridge seals on the market which employ API 682 qualified technology.
- Includes integrated bi-directional pumping device

AESSEAL® taper vane bi-directional pumping ring.

Mechanical seal pumping rings have a mission in life to induce the flow of coolant fluid past the body of a seal ring. This will always be an arduous task because the space available is exiguous at best and the necessary blade to casing clearances, unavoidably large. This task is further complicated where a bidirectionality requirement exists.

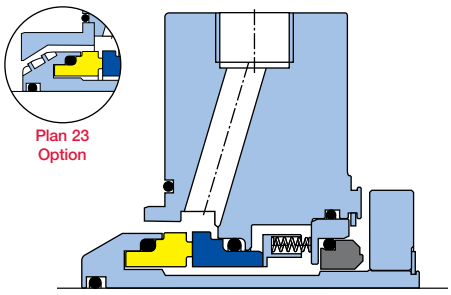
The solution proposed by AESSEAL®, with blades set into opposing directions is, in classic turbomachinery terms, perplexing to say the least. And yet this disconcerting looking device not only works but, as noted in research performed at Cranfield University, does its duty in a surprisingly productive manner.

That AESSEAL® managed to develop an elegant and highly performing solution to its seal pumping needs is a testimony to the inventive spirit that permeates this company.

Dr Joao Amaral Teixeira. Lecturer
Turbomachinery and Icing Group
School of Engineering, Cranfield University

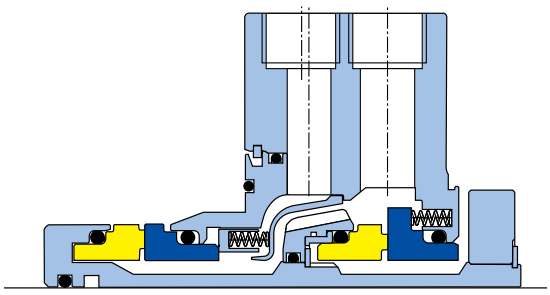
Modern qualification tested sealing technology that fits mature assets without equipment modification

Type A to suit ISO 13709, API 610 11th Edition & more restrictive seal chambers from earlier standards

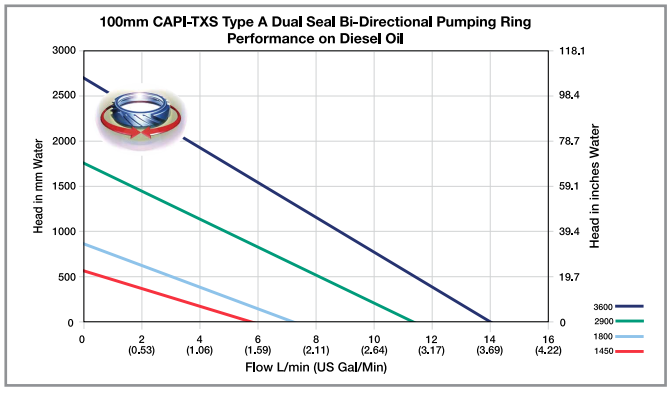


Plan 23 Option

Typical Single CAPI-TXS Type A
(Arrangement 1)

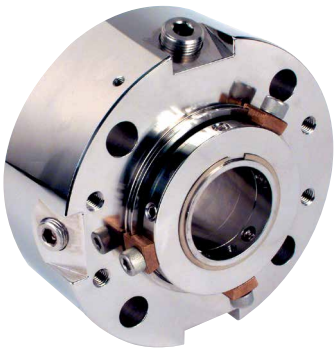


Typical Dual CAPI-TXS Type A
(Arrangement 2 & 3)



Generated Head for CAPI-TXS single plan 52/53/23 on oil (30 centistokes at 30°C/86°F).

The AESSEAL® bi-directional Plan 52/53 and Plan 23 pumping ring design effectively replenishes fluid at the seal faces, irrespective of shaft rotational direction.



The operating pressure of a seal depends upon various factors like seal size, media, face combination, temperature and speed. For safe operating limits for any given application contact your nearest AESSEAL® technical service provider.

- **API Type B, Category 1 & 2, Cartridge Rotary Bellows Single & Dual Seals Using Qualification Tested API 682 Technology**
- CAPI TXS™ seals are intended for use in seal chambers meeting the chamber envelope dimensional requirements of ISO 13709 (API610 11th Edition). Due to the modern compact design the CAPI-TXS™ can also be applied to equipment referenced by other machinery standards with more restrictive seal chamber envelopes (such as earlier editions of API 610)
- 12 edge welded bellows convolutions as standard
- The bi-directional pumping ring and deflector arrangement provide directed barrier fluid flow in the dual seal. This ensures that heat generated at the inboard seal faces is effectively removed

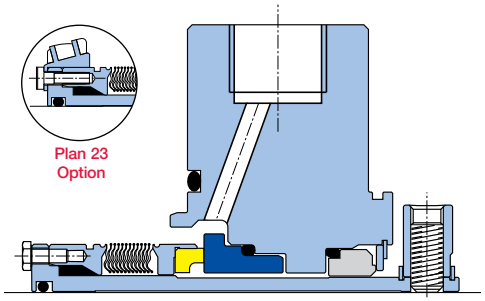
Full destructive test inspection and batch traceability.

Bellows Convolution Materials:
Alloy 718, AM350 and Alloy 276 as standard.

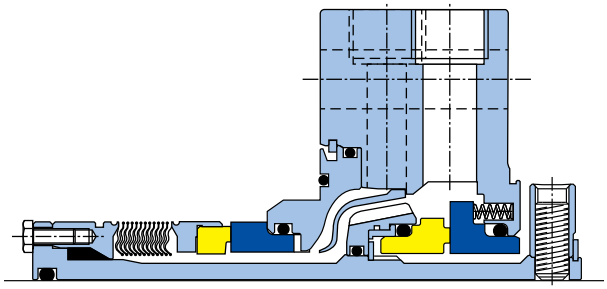
Seal Face Holder Materials:
Alloy 42, 316L S/S and Alloy 276 as standard.

Quality Guaranteed; AESSEAL® conducts destructive tests on bellows components to ensure product quality is maintained

Type B to suit ISO 13709, API 610 11th Edition & more restrictive seal chambers from earlier standards



Typical Single CAPI-TXS Type B
(Arrangement 1)

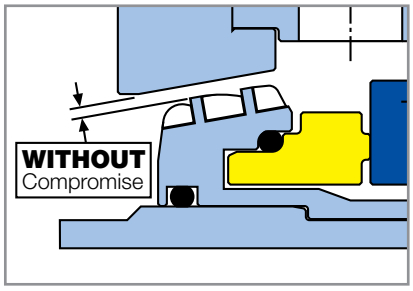


Typical Dual CAPI-TXS Type ES
(Arrangement 2 & 3)

Optimized bellows convolution design.

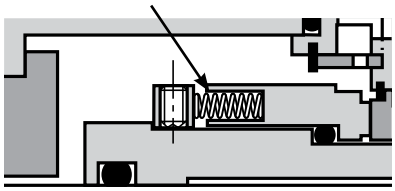
Reduced Stress - 12 convolutions is amongst the highest number to be found in a standard metal bellows seal in the mechanical seal industry. With more bellows convolutions, there is less stress on each convolution in the bellows stack.

- **Qualification Tested API Type A, Category 2 & 3, Cartridge Pusher Single & Dual Seals**
- Stationary flexible element offered as standard for improved pusher design performance as outlined in API 682 Section 6.1.1.5
- Multi-port flush design offered as standard for optimum seal face cooling
- World-leading bi-directional pumping ring performance with 1.5mm (1/16th in) radial clearance between rotor and stator; conforming with API 682 Section 8.6.2.3 **WITHOUT COMPROMISE**



Innovative bi-directional Plan 23/52/53 pumping ring technology produces high fluid head while maintaining large radial clearance.

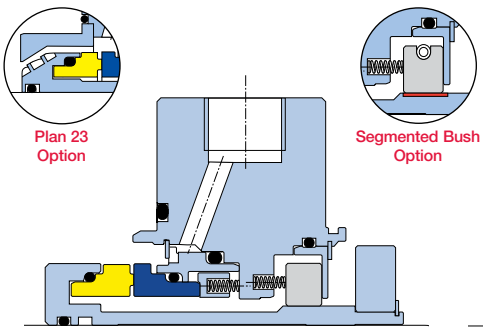
Why place multiple springs in contact with the process media, given that they can clog?



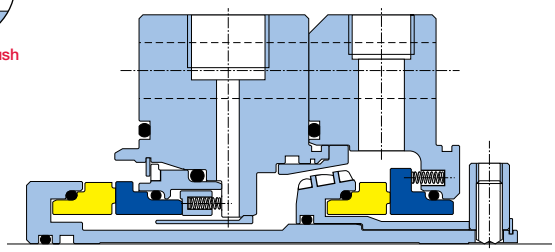
Typical competitor API seal with multiple springs located in process fluid.

All AESSEAL® API seal designs have multiple springs that are protected from the process fluid

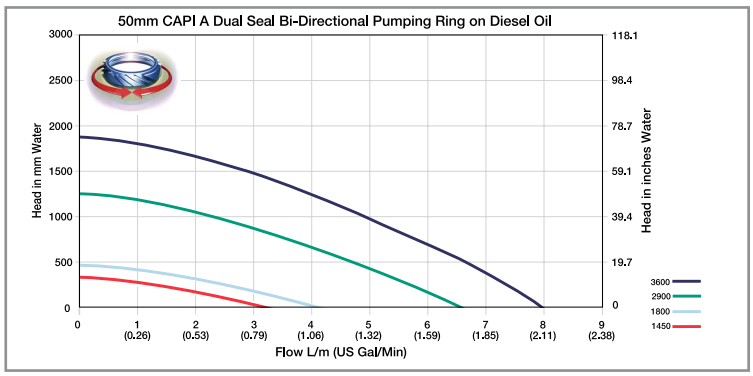
Type A To Suit Modern API 610 (ISO 13709) Edition Pumps



Typical Single CAPI Type A
(Arrangement 1)



Typical Dual CAPI Type A
(Arrangement 2 & 3)



50mm (2.000") CAPI Type A dual seal bi-directional pumping ring performance on diesel oil.

The operating pressure of a seal depends upon various factors like seal size, media, face combination, temperature and speed. For safe operating limits for any given application contact your nearest AESSEAL® technical service provider.

- **Qualification Tested API Type B, Category 2 & 3, Cartridge Bellows Single Seal**
- Effective seal face heat dissipation achieved by a directed barrier fluid flow path, irrespective of shaft rotational direction
- Multi-port flush design offered as standard for optimum seal face cooling
- 12 edge welded bellows convolutions as standard

CNC inside diameter bellows welding operation.

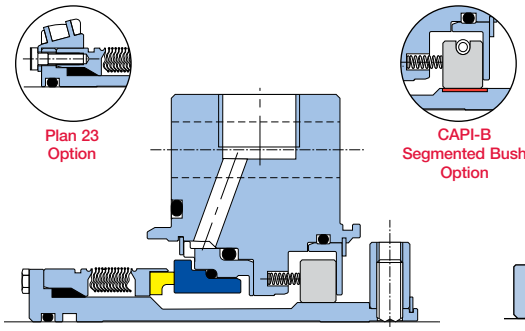
Bellows Convolution Materials:
Alloy 718, AM350 and Alloy 276 as standard.

Seal Face Holder Materials:
Alloy 42, 316L S/S and Alloy 276 as standard.

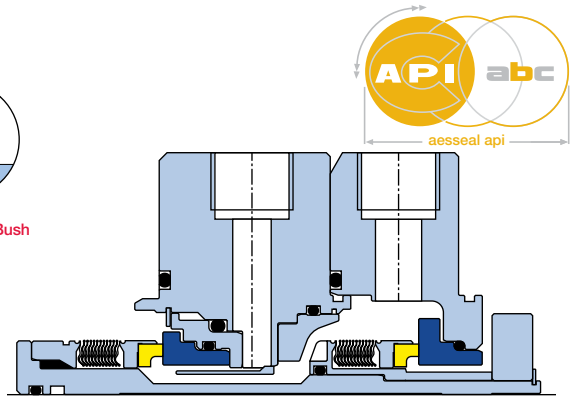
Quality Guaranteed;

All AESSEAL® bellows are welded using the latest CNC technology

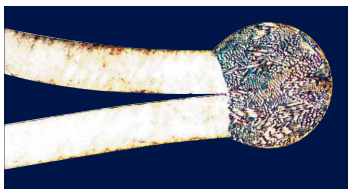
Type B To Suit Modern API 610 (ISO 13709) Edition Pumps

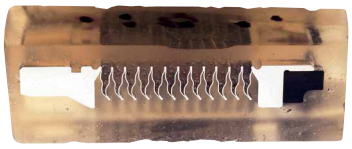


Typical Single CAPI Type B
(Arrangement 1)



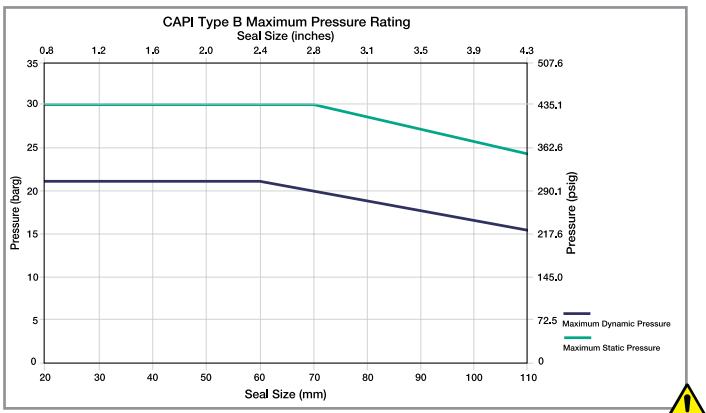
Typical Dual CAPI Type B
(Arrangement 2 & 3)





Increased Durability

Axial and radial deflections impact less on each of the bellows convolutions in a stack of 12 compared to a stack of 8. A 12 convolution stack is more able to accommodate installation tolerances and will maintain a more consistent face pressure as the seal wears during use.



Seal size vs. pressure rating for single CAPI Type B (S7C) seal Antimony Carbon/SiC @ 176°C (349°F).

The operating pressure of a seal depends upon various factors like seal size, media, face combination, temperature and speed. For safe operating limits for any given application contact your nearest AESSEAL® technical service provider.

- **Qualification Tested API Type C, Category 2 & 3, Cartridge Bellows Single & Dual Seals**
- Effective seal face heat dissipation achieved by directed barrier fluid flow path
- World-leading bi-directional pumping ring performance with 1.5mm (1/16 in) clearance between rotor and stator, conforming with API 682 Section 8.6.2.3 **WITHOUT COMPROMISE**
- Segmented floating containment bush operates on a hard plated cartridge sleeve as standard (single seal)

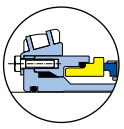
CNC outside diameter bellows welding operation

Bellows Convolution Materials:
Alloy 718, AM350 and Alloy 276 as standard.

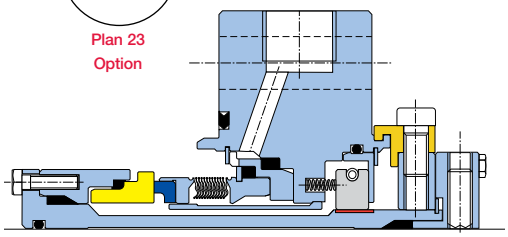
Seal Face Holder Materials:
Alloy 42, 316L S/S and Alloy 276 as standard.

AESSEAL® uses modular technology to provide rapid delivery

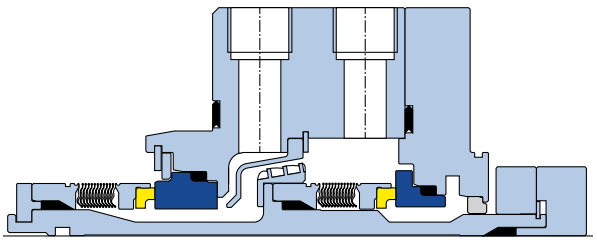
Type C To Suit Modern API 610 (ISO 13709) Edition Pumps



Plan 23 Option



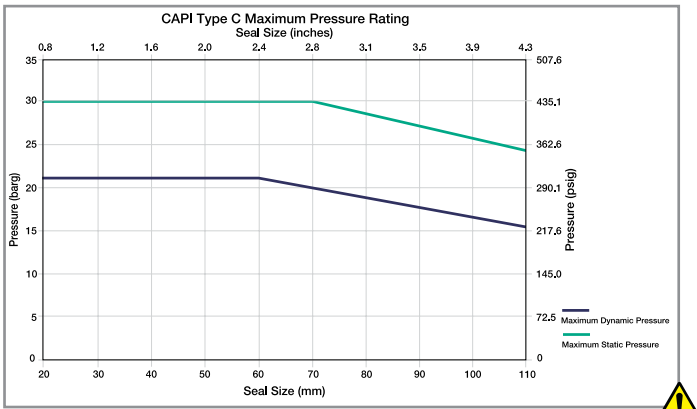
Single CAPI Type C
(Arrangement 1)



Dual CAPI Type C
(Arrangement 2 & 3)

Part Name	Material of Construction	Sulphur Content					
		<0°C (<32°F)		</=200°C (392°F)		>200°C (392°F)	
		<2%	>2%	<2%	>2%	<2%	>2%
Bellows	AM350	√		√		√	
	Alloy C-276	√	√	√	√		
	Alloy 718	√	√	√	√	√	√
Ends	316L	√	√	√	√		
	Alloy 42	√		√		√	
	Alloy C-276	√	√	√	√		
	Alloy 625	√	√	√	√		
Sec. Seal	Graphite	√	√	√	√	√	√

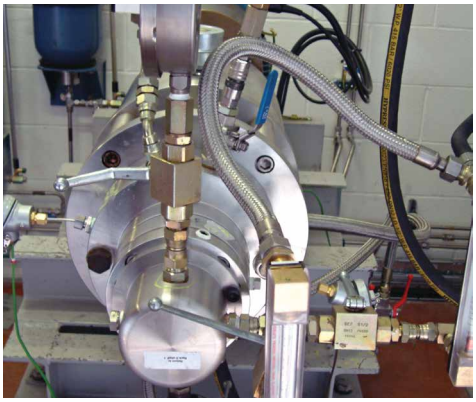
Bellows material selection for hydrocarbon duties containing sulphur.



Seal size vs. pressure rating for single CAPI Type C (S7C) seal Antimony Carbon/SiC @ 176°C (349°F).

The operating pressure of a seal depends upon various factors like seal size, media, face combination, temperature and speed. For safe operating limits for any given application contact your nearest AESSEAL® technical service provider.

- **Qualification Tested Secondary Containment Seal Technology for use with Type A Pusher designs**
- Eliminates the need for liquid barrier systems
- High heat dissipation properties due to the AESSEAL® close-coupled technology supplied in a robust, short working length pusher design
- Both contacting & non-contacting spiral groove face technology
- Bi-directional option available
- Typically used with plans 72, 75 or 76



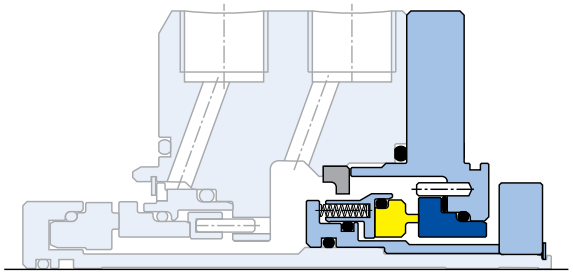
CAPI-CS™ qualification testing.

AESSEAL® silicon carbide gas lift face.

Containment seal technology that exceeds the requirements of API 682 Edition 3, Section 4.2 and ISO 21049

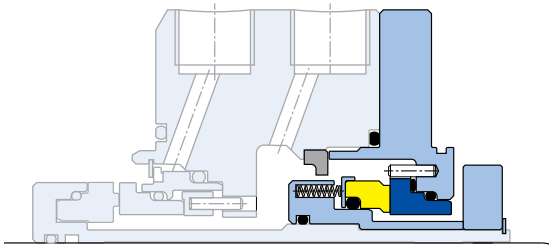
Secondary Containment Seals

Contacting



Dual CAPI Type A-CS™
(Arrangement 2)

Non-Contacting



Dual CAPI Type A-NCCS™
(Arrangement 2)

Tests carried out in line with API 682 containment seal test criteria demonstrate that the AESSEAL® containment seals far exceed the qualification test requirements and emissions objectives.

Life testing at full stuffing box conditions demonstrated that the AESSEAL® containment seal designs will far exceed the 8 hour API 682 uninterrupted service objective by at least 100 times.

Predictive life (face wear) testing provided validation that the AESSEAL® containment seal design will exceed the 25,000 hour API 682 uninterrupted normal service objective (sealing VOCs).

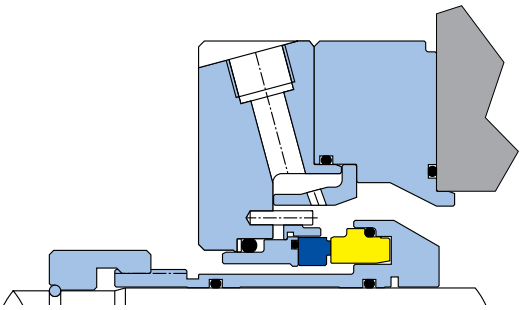
High Pressure Seals

CFC™/HPVS™ and CFFC™/HPVD™

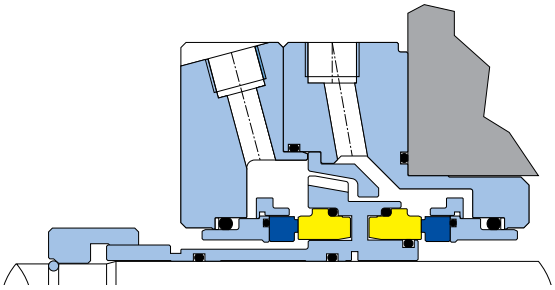
These robust seals are designed for use on difficult applications including oil pipeline pumping, water injection and boiler feed duties.

- High speeds – Stationary multi spring design for even face loading
- High pressures – Robust seal faces minimize the effects of pressure distortion
- Monolithic seal faces – maintain flatness under temperature fluctuations
- Axial displacement capacity to accommodate machine build tolerance and differential thermal expansion
- Seal face design optimized using FEA and hydrodynamic algorithms
- Seal face loading factory set and statically tested prior to despatch
- Sculpted lug drive – for improved torque transmission
- Compact & robust design – allows seal to be fitted on close bearing centre pumps

High Performance Seals



CFC™ / HPVS™



CFFC™ / HPVD™

Finite Element Analysis and hydrodynamic algorithms are used to optimize the monolithic seal face design in order to maintain a stable fluid film. The seals are engineered for maximum service life and have been laboratory tested to extremes beyond their rated capability.

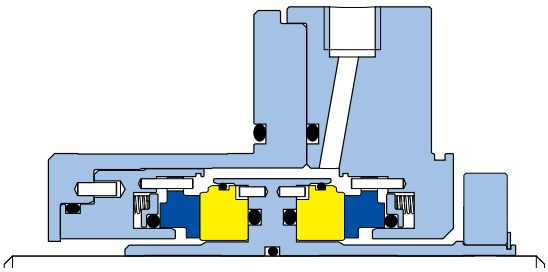
Pump Dry Gas Seals

The advantages of sealing pumps with dual pressurised dry gas seals are becoming widely recognized throughout industry. AESSEAL® has developed a range of pump dry gas seals to suit every application.

CAPI-74™ Face to Face Category 2 & 3 Seals

- A non contacting seal primarily designed for API 610 pumps which require seals to API 682 standard
- API 682 qualification tested designs
- Non-contacting spiral groove face technology
- Bi-directional option available
- ZERO process emissions
- Low running costs
- Specially engineered variants available on request

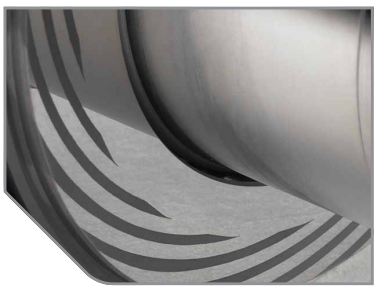
Dry Gas (Non-contacting) Seals for API 610 Pumps



CAPI-74™
(Arrangement 3)

The CAPI-74™ Face to Face configuration is a stationary design, bi-directional, balanced, internally-mounted, cartridge design pusher seal with multiple springs. It is a non-contacting dual seal primarily designed for pumps meeting ANSI/ API standard 682 that can provide zero emissions in service.

bi-directional



uni-directional

Compressor Dry Gas Seal Range

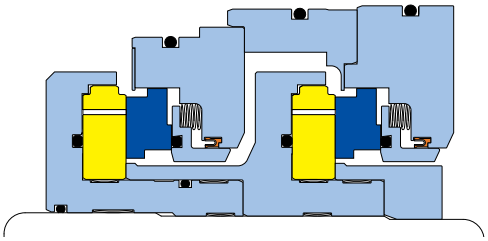
AESSEAL® produces compressor dry gas seals in all configurations, incorporating a number of unique features which combine enhanced performance with increased life.

Both uni-directional and bi-directional designs are available and can be backed up by one of our range of separation seals.

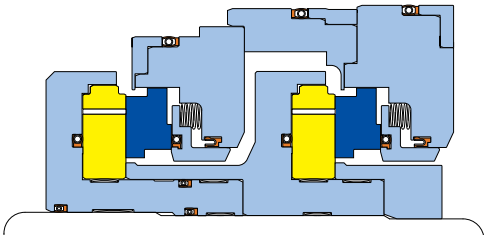
HHCS™ - Hydrostatic and Hydrodynamic Compressor Seal

This unique, patented hydrostatic and hydrodynamic Dry Gas Compressor seal technology offers robust protection for the sealing surfaces during start-up, coastdown, slow roll and upset conditions.

Gas Compressor Seals

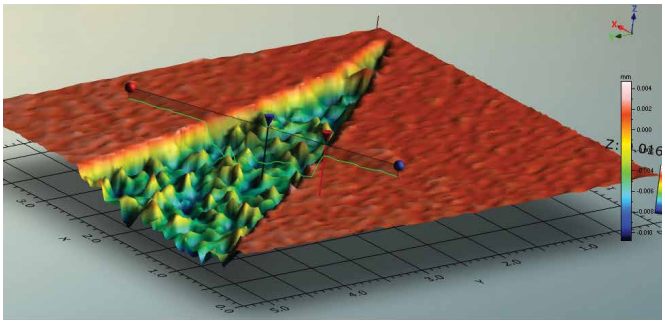


HHCS
(Elastomer Variant)



HHCS
(Polymer Variant)

- Increased hydrostatic lift for early face separation at much lower pressure differential than conventional seals
- Supplied in 410 stainless steel as standard with exotic alloy options on request
- Dynamic leakage considerably lower than comparable conventional spiral groove seals
- Available with Silicon Carbide seats as standard. Silicon Nitride seats available on request. Mating faces available in Carbon and synthetic diamond coated Silicon Carbide
- Capable of withstanding unintentional reverse rotation
- 'O' ring and spring energized polymer versions available
- Designs available in tandem or tandem with intermediate labyrinth for increased integrity
- Fully shrouded seats adopted as standard



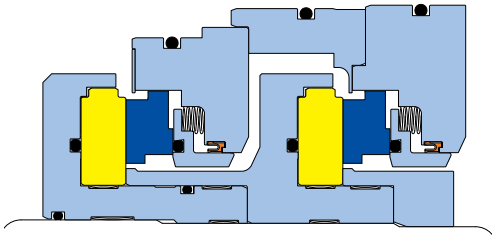
Inspection using 3D multi-sensor analysis

CCS™ - Conventional Compressor Seal

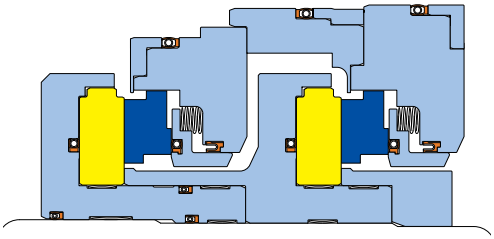
Ideally suited for retrofitting wet compressor seals and bushings or as a replacement for existing Dry Gas seals.

- Supplied in 410 stainless steel as standard with exotic alloy options on request
- Available with Silicon Carbide seats as standard. Tungsten Carbide and Silicon Nitride seats available on request. Mating faces available in Carbon and synthetic diamond coated Silicon Carbide
- 'O' ring and spring energized polymer versions available
- Designs available in single, double, tandem or tandem with intermediate labyrinth for increased integrity
- Fully shrouded seats adopted as standard
- Bi-directional seal designs available

Gas Compressor Seals



CCS
(Elastomer Variant)

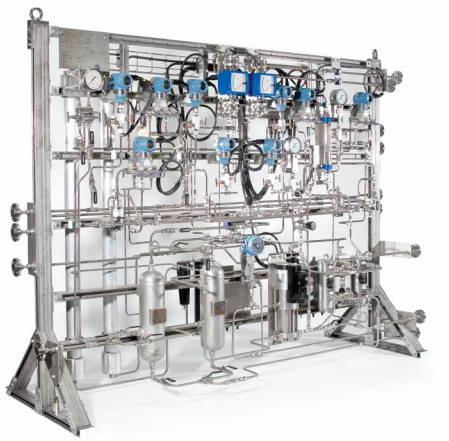


CCS
(Polymer Variant)

Compressor Dry Gas Seal Support Systems

High quality compressor dry gas seal support systems engineered to customer requirements for all seal configurations and applications. Each AESSEAL® gas conditioning system contains the key API modules plus various enhancements derived from our own field experience, to ensure the highest degree of compressor dry gas seal reliability and longevity.

For every application AESSEAL® performs a detailed phase analysis in-house to determine the required level of gas conditioning.



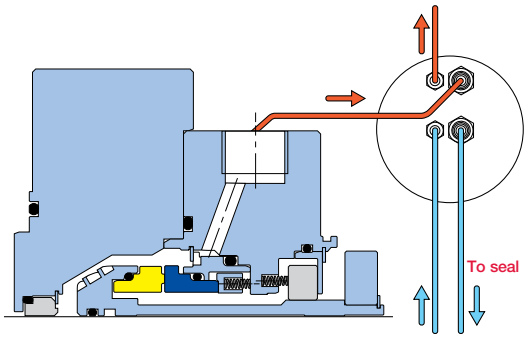
Cartridge API Plan 23 Seals

CAPI23™

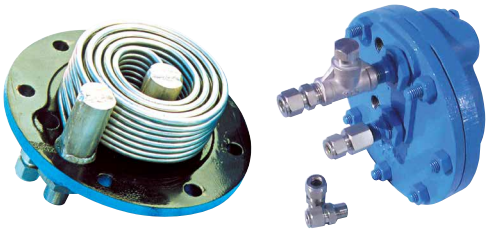
The AESSEAL® range of single cartridge mechanical seals incorporates a pumping ring which has been specifically designed to idealize the conditions at the seal faces. The CAPI23™ is best suited for hot process applications.

- All seal faces are of monolithic construction and therefore are less likely to 'face rotate' in high or low temperature applications
- Finite Element Analysis has been used to optimize seal face drive. Precise, solid machined drive lugs / pins minimize backlash between the drive ring and seal face
- The large volume of process fluid around the seal faces improves heat dissipation, helping to increase seal life
- The CAPI23™ is a true cartridge Plan 23 seal. This avoids the time consuming operation of setting and aligning a separate seal and pumping ring
- The stationary seal construction helps to minimize spring fatigue for optimum performance on high shaft speed applications

Single API Plan 23 Seals for Hot Applications



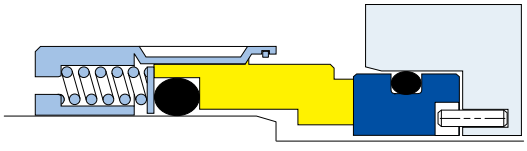
CAPI23™
(Showing cooler installation)



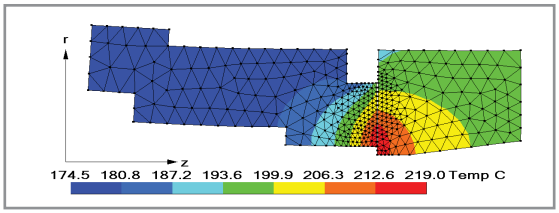
CAPI23™ Standard System Kit

Interchangeable Component Seal Ranges

- Direct replacements for traditional 'non cartridge' seals
- Dimensionally interchangeable
- Large numbers of seal and mating ring types available 'off the shelf'



M02S™ component seal



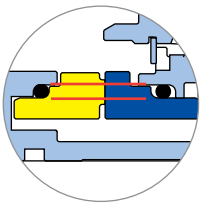
2D-Axisymmetric Finite Element Analysis review showing temperature distribution.

6.1.1.11 - For vacuum services, all seal components shall be designed with a positive means of retaining the sealing components to prevent them from being dislodged.

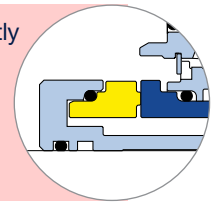
7.2.1.1 - "The inner seal shall have an internal (reverse) balance feature designed and constructed to withstand reverse pressure differentials up to 0.275 MPa (2.75 bar) (40 psi) without opening or dislodging".

AESSEAL® designs have pressure balanced seal faces which perform excellently in both positive and negative pressure applications. This feature prevents seal face distortion and damage that can result with positive restraining means.

Inboard seal faces are also reverse pressure balanced as standard.



The AESSEAL® Type A standard seal design is a true fully integrated cartridge design. The seal rotary face is directly mounted into the sleeve. The stationary seal face and flexible element is carried within the gland plate. Traditional API 682 designs are component seals mounted onto the cartridge sleeve with drive set screws and springs in contact with the process media, as depicted in 3.10 below. True cartridge designs are more compact providing greater liquid volume in the seal chamber and are more readily adapted to older machinery.



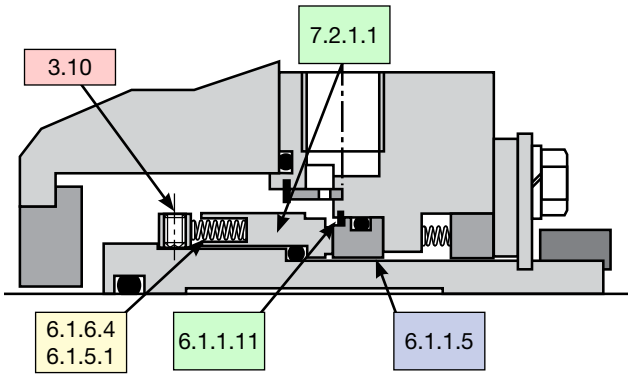
6.1.1.5 - a stationary flexible element should be provided if… surface speed exceeds 23m/s (4500 ft/min)…if pump case or gland plate distortion and mis-alignment exist due to pipe loads, thermal distortion, pressure distortion… if perpendicularity of the seal chamber mounting surface to the shaft is a problem.

AESSEAL® Type A seal designs have, as standard, a Stationary flexible element. This configuration is deemed to provide added user value, as described by the specification, over a rotary configuration. Rotary designs are available on request.

Lessons from the API 682 3rd Edition Specification

AESSEAL® is believed to be the only major mechanical seal and system supplier to the global Hydrocarbon Processing Industry, which has applied 21st century best seal design practice to create a range of API qualified products, in the literal and importantly the spirit of the specification.

The clues, which help to illustrate this fact, are given in the API 682 specification. Clear similarities should be apparent between these points and the designs of non-AESSEAL® supply.

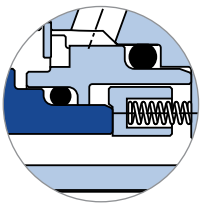


Non-AESSEAL® design showing typical API 682 seal configuration.

6.1.6.4 - Unless otherwise specified, seals with multiple coil-springs shall be Alloy C-276 …..

6.1.5.1 - The single spring has advantages and disadvantages. For corrosive services, the wire in single springs is significantly greater in cross-section providing a greater corrosion allowance……Multiple coil-spring seals tend to be more axially compact than single coil-spring seals. Multiple springs also tend to provide a more even loading.

All AESSEAL® API designs have multiple Alloy C-276 springs, which are not in contact with the process media. This standardized approach is clearly more suitable for all applications, specifically those for sealing corrosive media.



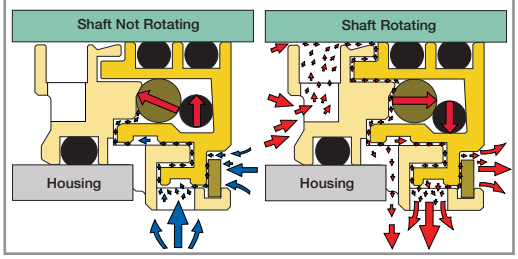
- Verification Tested contacting & non-contacting bearing seal designs
- Proven to increase equipment reliability in pumps, electric motors, fans, pillow blocks, steam turbines and gearboxes
- Designs which conform to IEEE Std. 841-2001
- No shaft wear. Retro-fittable on shafts previously worn by lip seals
- Easily rebuildable without special tools or equipment

"With bearing protection truly essential in a reliability-focused plant, I have carefully analyzed both the new LabTecta design and the results of thorough testing.

I firmly conclude this ingenious field-repairable isolator will prove highly cost effective and lead to demonstrable equipment failure reductions".

Heinz P. Bloch P.E.
Independent Professional Engineer

Why do some bearing isolator suppliers promote devices that are not repairable?

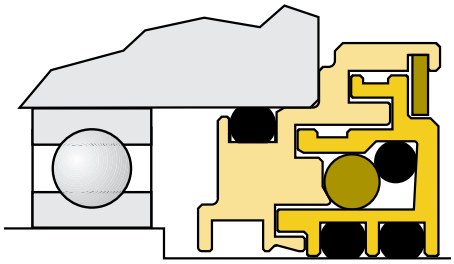


LabTecta®66 with integral shut-off device which resembles a valve seat.

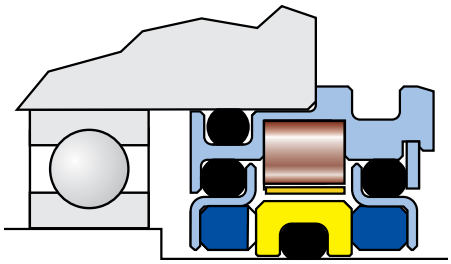
Splash and flooded lubrication ✓
Oil mist lubrication ✓
Grease packed ✓
Field repairable ✓

Eliminate the cause of over 50% of bearing failures with the LabTecta®66 IP66-certified bearing protector

Bearing Seals, Protectors & Isolators

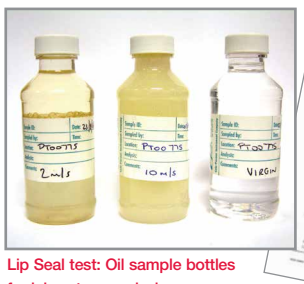


LabTecta®66

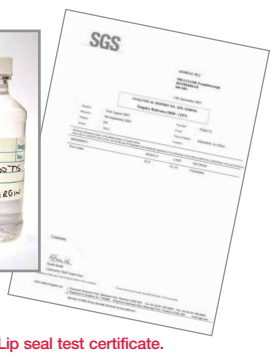


MagTecta™ OM

AESSEAL® bearing seals have been rigorously benchmark tested against other "sealing" devices with results independently analysed by third party laboratories.

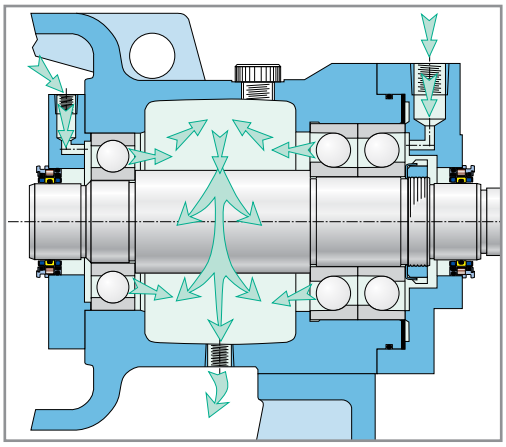


Lip Seal test: Oil sample bottles for laboratory analysis.



Lip seal test certificate.

The MagTecta-OM™ is a face seal that prevents oil mist pollution, and has been applied to thousands of pieces of equipment in the hydrocarbon processing industry.



API preferred oil mist lubrication arrangement.

The AES-28™ is available in a choice of three inventoried vessels. This range includes a screwed connection vessel, the socket welded vessel and the butt welded vessel.

A variety of component options are available to adapt the vessel to specific pump applications. These options include electrical equipment which is supplied as intrinsically safe or explosion proof.

- ASME VIII Div.1 2007, 2008a
- Coded Welders to ASME IX
- PED 97/23/EC Module B1+D
- Certified by TÜV

For additional piping plans refer to the API Piping Plan Booklet.

API Plan 53A seal support system.

API Plan 53B seal support system.

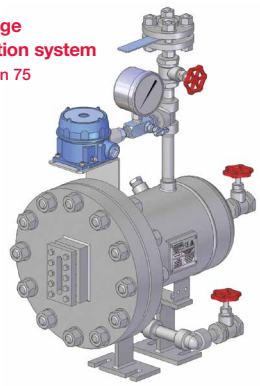
53B Quality through Modularity and Standardization

The innovative design concept permits 12 modular options to be applied to create an API 53B System for any application. This unique approach facilitates efficient stock control which in turn provides AESSEAL® API 53B Systems with rapid delivery times. Modularity eases the production of documentation for each Plan 53B product and also makes it easier to determine the correct solution for the application. AESSEAL® has dedicated over 5,000 man-hours to examining and deciphering the finer details of API 682, ASME VIII Div 1, 2007, 2008a and PED 97/23/EC.

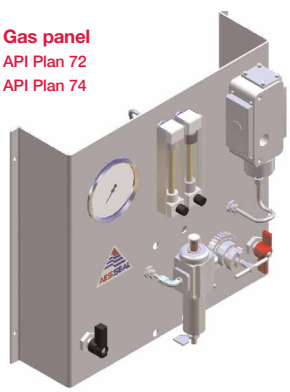
These man-hours have been invested to create a Plan 53B manufacturing process that will guarantee quality product and short lead times.

Additional Systems

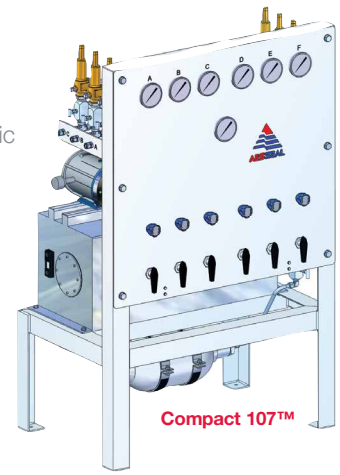
Leakage detection system
API Plan 75



Gas panel
API Plan 72
API Plan 74



The Compact 107™ is an innovative AESSEAL® specific design that combines the benefits of API Plans 53A, 53B and 54. The System can be used to supply pressurized barrier fluid to a number of seals.



Compact 107™

Company Overview

AESSEAL® is a leading global specialist in the design and manufacture of mechanical seals, bearing protectors and seal support systems. With operations in six continents, AESSEAL® is the world's 4th largest supplier of mechanical seals, achieving growth through exceptional customer service and innovative products that provide real customer benefits.

For every seal developed by AESSEAL®, we use state-of-the-art computational facilities and numerical tools to design and optimize seal performance prior to manufacture and testing. These tools include Predictive Software Code developed in-house, Finite Element Analysis (FEA) and Computational Fluid Dynamics (CFD). Our numerical tools are used for seal design, performance optimization, special product application and troubleshooting. In combination with an extensive test program the result is world-leading technology that keeps your equipment running longer.

Over 7% of annual sales revenue has been reinvested in R&D over several decades. This has almost certainly led to the most advanced range of sealing technology available globally.

Environment

- we are BS EN ISO 14001 certified in branches in three continents
- we save in excess of 25 billion US gallons (95 billion litres) of water for customers each year
- our products reduce harmful emissions and energy consumption
- we encourage environmental improvements from our suppliers

Community

- we sponsor CAD software in 14 schools
- we mentor students of all ages and abilities
- we actively improve the quality of life for under-privileged and disadvantaged groups
- we promote the use of foreign languages in schools

The AESSEAL UK mechanical seal test facilities are probably the most technically advanced in Europe.

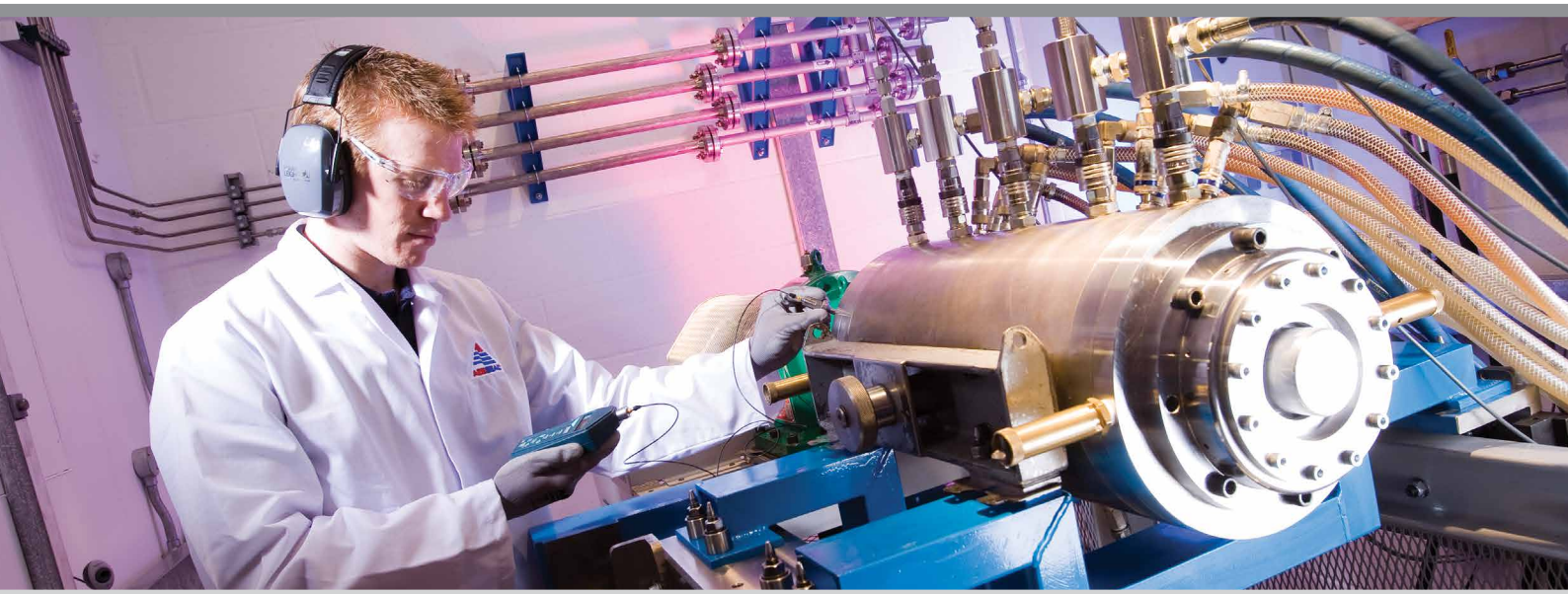
Computer-controlled test bays can be programmed to validate seal designs to any pre-determined cyclic pressure, temperature and shaft speed configuration. Take a three-minute tour by visiting **www.aesseal.com/journey-of-a-seal.aspx**

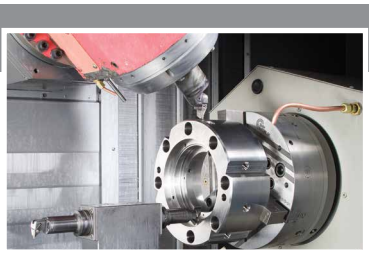
Research & Development Test Facilities

Shaft Speed: Up to 45,000 rpm **Pressure:** Up to 5,000 psig (350 barg) **Temperature:** Up to 536ºF (280ºC)

• Flashing & Non-Flashing Hydrocarbons • Caustics, Water and Hot Oil • Volatile Organic Compounds

AESSEAL® is the only international mechanical seal company that is both certified to and produces all API seals to ISO 29001, the reference quality standard for the Oil and Gas industry.





Ethical

- we reject all types of corruption
- we promote equal opportunities
- we invest in regions of economic deprivation
- we communicate with our stakeholders in their native language

Health & Safety

- we are OHSAS 18001 certified
- we aim to reduce noise pollution and manual handling operations
- we are committed to the Five S's (sorting, straightening, shining, standardizing, and sustaining)
- we have a company-wide unlimited budget for any safety-related issue

> Our purpose is to give our customers such exceptional service that they need never consider alternative sources of supply.

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Experience the exceptional – contact your local representative to see how we can help you. Full details at:

www.aesseal.com