AESSEAL®

EXPERIENCE THE EXCEPTIONAL

Turbomachinery Technology

Compressor dry gas seals and systems

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

Company Overview

AESSEAL® is a leading global specialist in the design and manufacture of mechanical seals, bearing protectors and seal support systems.

The company sets new standards in reliability, performance, service and cost. Service has been the key to the success of AESSEAL® and is at the core of the company purpose statement — **'to give our customers such exceptional service that they need never consider alternative sources of supply.**' Through continuous investment, unique modular technology and an unparalleled dedication to customer service we aim to constantly exceed expectation.

Customer Focus

"We aim to deliver a customer experience that surpasses expectation and truly redefines what the world expects from their sealing specialist."

Simplicity. Our modular technology means a streamlined ordering process.

Customer-centric. Our people are encouraged to champion the customers' cause.

Ethical and Responsible. AESSEAL® has been recognized as a Climate Change Champion and has won awards for corporate social responsibility and sustainability.

Partnership. We work with customers to deliver added value and long-term reliability solutions.

Investment. 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.

Engineered Excellence

With a history of world leading innovation, AESSEAL® has unique patented technology for compressor dry gas seals and gas seal control and monitoring systems.

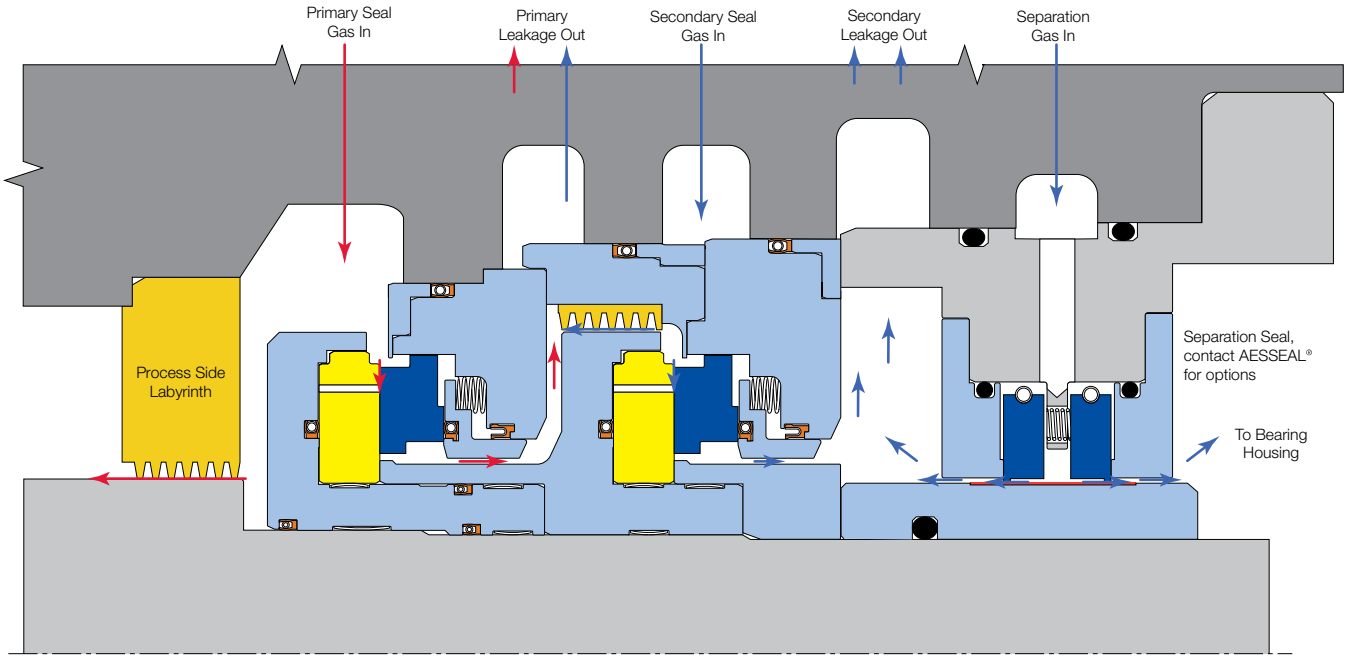
AESSEAL® produces a full range of compressor dry gas seals, pump dry gas seals, contacting and non-contacting gas containment seals and gas lift mixer seals in both uni-directional and bi-directional formats. In addition AESSEAL® engineer dry gas seal conditioning systems to achieve consistently improved reliability, in accordance with API or customer specific requirements.

Compressor Dry Gas Seal Development Programme

The AESSEAL® compressor dry gas seal range has been designed to maintain an optimum sealing interface gap to ensure improved reliability, consistent performance and reduced gas consumption.

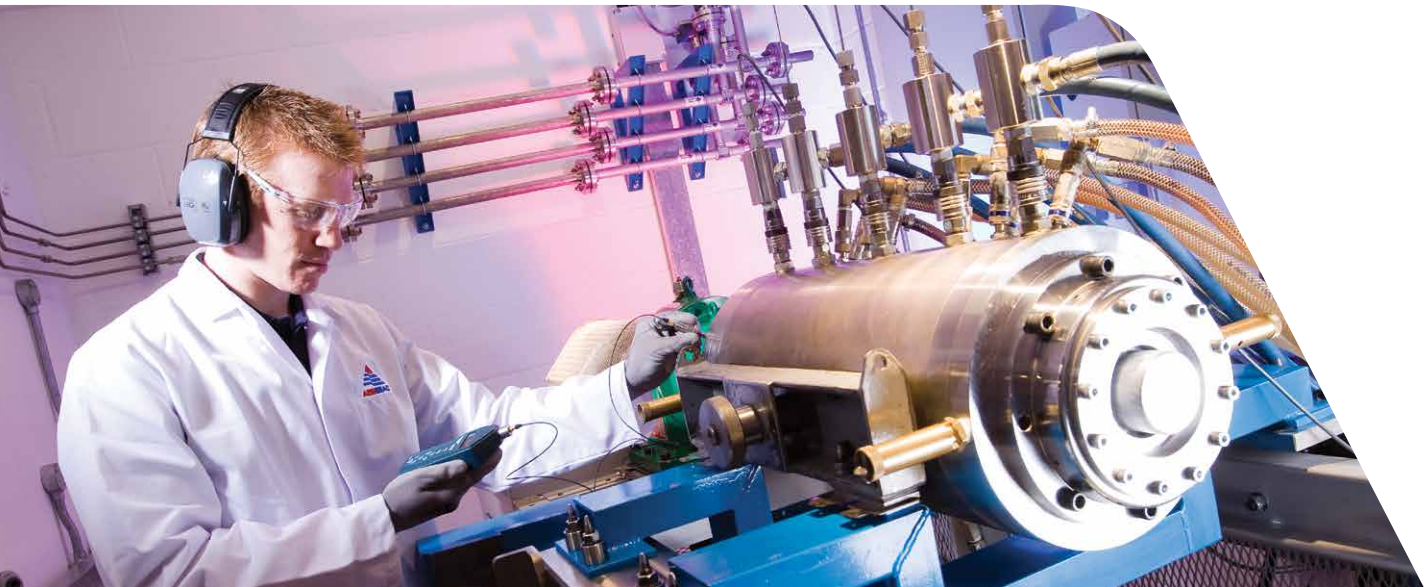
AESSEAL® Design and Testing

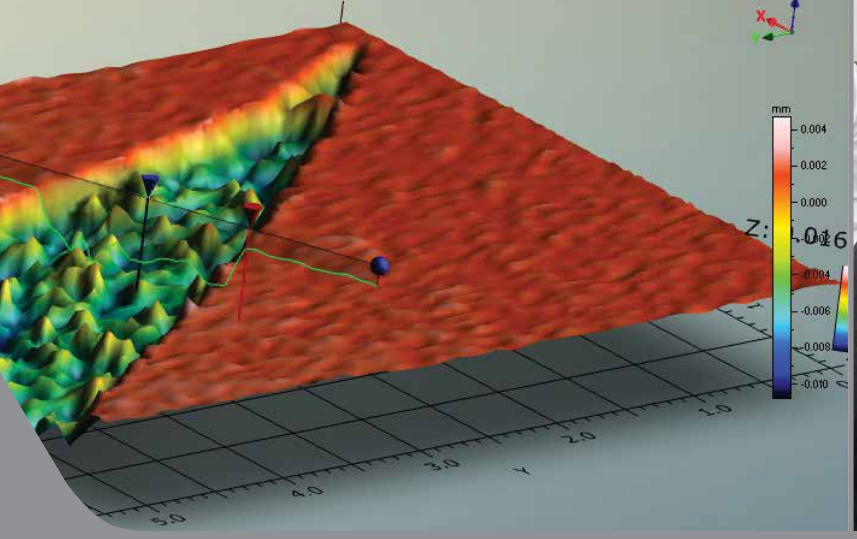
Sophisticated computational facilities and numerical tools are used at AESSEAL® to design and optimize seal performance prior to manufacture and testing. These tools include Predictive Software Code developed in-house, Finite Element Analysis (FEA) and Computational Fluid Dynamics (CFD). All compressor dry gas seals are dynamically tested as standard. The result is world-leading technology that keeps equipment running longer.



Gas flow path schematic - Tandem seal with intermediate labyrinth and separation seal

AESSEAL® compressor dry gas seal test facility





Inspection using 3D multi-sensor analysis

Advanced Face Technology

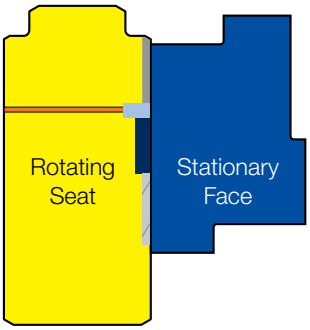
At the heart of any gas seal is the interface between the rotating and stationary sealing elements. AESSEAL® utilizes state-of-the-art laser scanning inspection technology to ensure consistent groove geometry.

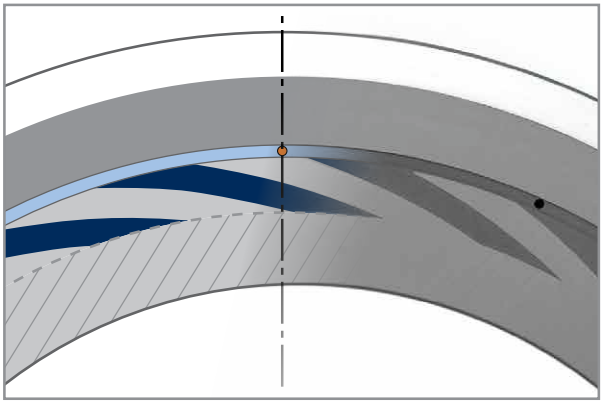
Uni-directional, bi-directional and patented DualDam™ seal face technology means AESSEAL® has a design to suit the most arduous application. Laser scanning ensures sub-micron accuracy.

Uni-directional | Bi-directional | DualDam™

Our patented DualDam™ technology provides a more stable gas fluid film in all phases of operation to ensure a more reliable seal.

The DualDam™ gas intensifying design comprises 5 elements which combine to provide an optimum sealing interface. The design specifically addresses the period of transition between static and dynamic operation. This is the period where many dry gas seals are generally considered to be most vulnerable to a break down in the sealing interface. The 5 elements are described below.



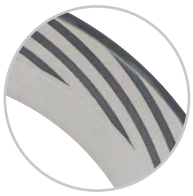


Outer Dam
Feed Hole
Annular Slot
Spiral Groove
Inner Sealing Dam

Pictorial view of Pressure Intensifying System

During the static condition the outer sealing dam acts in conjunction with the feed holes and annular slot to provide controlled pressure decay. This allows for a pressure balance to be achieved providing a small opening force on the seal face. This opening force is known as the **hydrostatic** lift component of the separation mechanism. When conventional equipment is started there is a brief period where the seal faces will contact before sufficient **hydrodynamic** lift force is generated to separate the faces. Hydrostatic lift technology helps to eliminate this contact reducing the risk of seal failure.

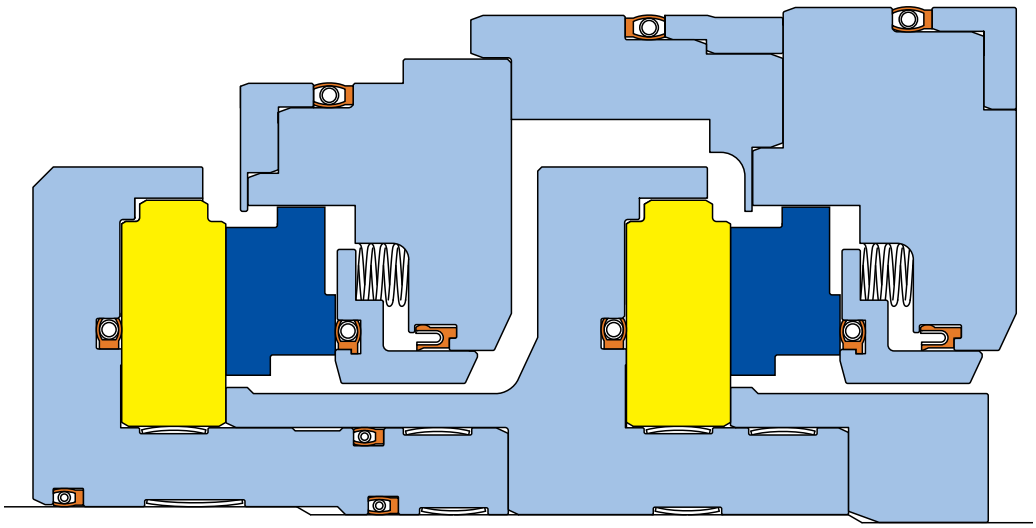
Compressor Dry Gas Seals



CCS™ — Conventional Compressor Seal

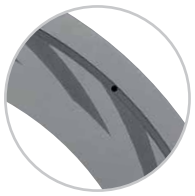
The CCS™ is a compressor dry gas seal that utilizes proven spiral groove lift technology to provide reliable compressor sealing across a wide range of operational duties. This seal is ideally suited for the retrofitting of wet compressor seals and the replacement of existing dry gas seal products.

- 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 as single, double, tandem or tandem with intermediate labyrinth, for increased integrity
- Fully shrouded seats adopted as standard
- Bi-directional seal designs also available



Separation Seals

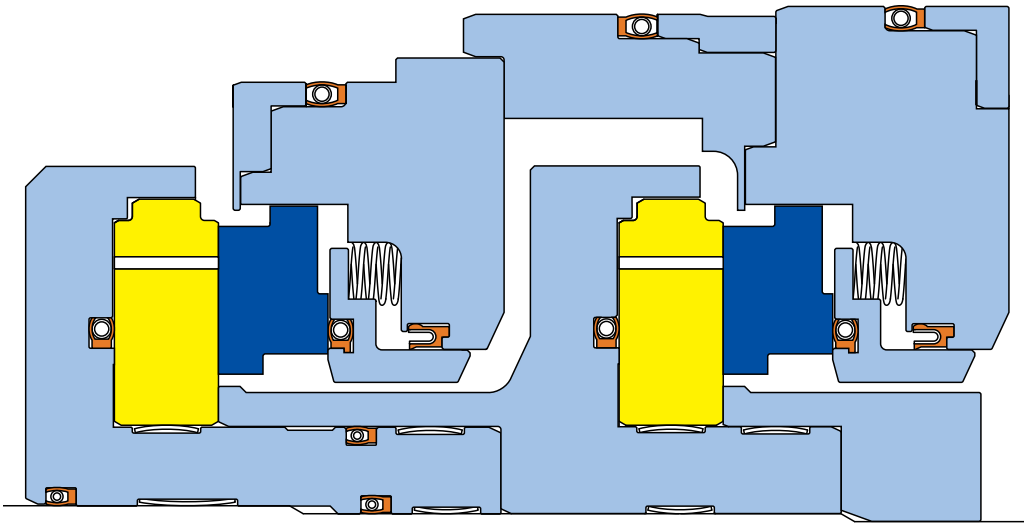
AESSEAL® offers both labyrinth and dual bush non-contacting separation seals, supplied individually or as an integral part of the gas seal cartridge. This device provides a positively pressurised chamber protecting the dry gas seal from potential bearing oil migration and preventing gas ingress to the bearing chamber.

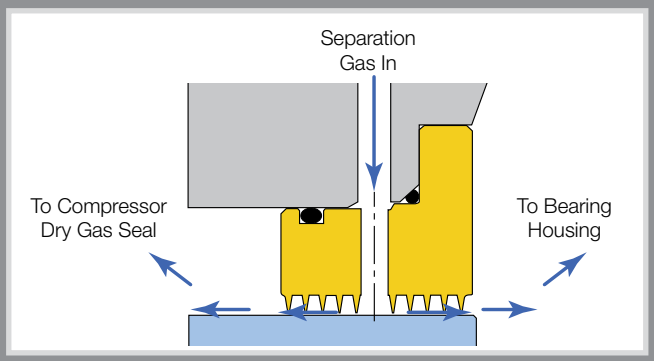


HHCS™ — Hydrostatic and Hydrodynamic Compressor Seal

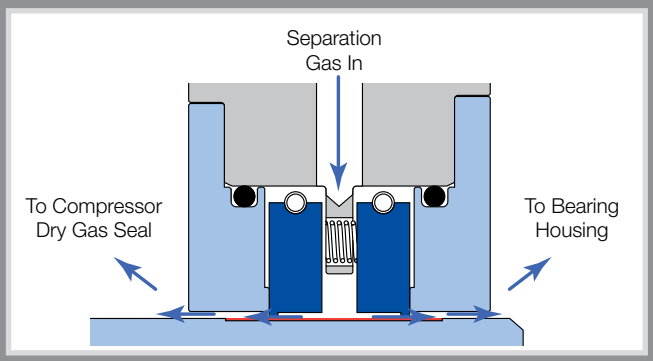
The HHCS™ is a compressor dry gas seal that utilizes patented DualDam™ hydrostatic and hydrodynamic face technology that provides lift even under static conditions. This unique action provides zero face contact under starting, stopping and slow roll conditions.

- Unique, patented DualDam™ compressor dry gas seal technology offers robust protection for the sealing surfaces during start-up, coastdown, slow roll and upset conditions
- Supplied in 410 stainless steel as standard with exotic alloy options on request
- 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 as tandem or tandem with intermediate labyrinth for increased integrity
- Fully shrouded seats adopted as standard
- Bi-directional seal designs also available



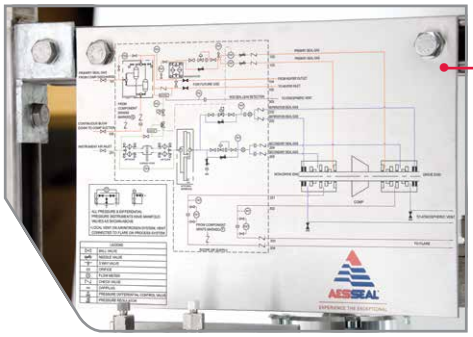


Labyrinth separation seal



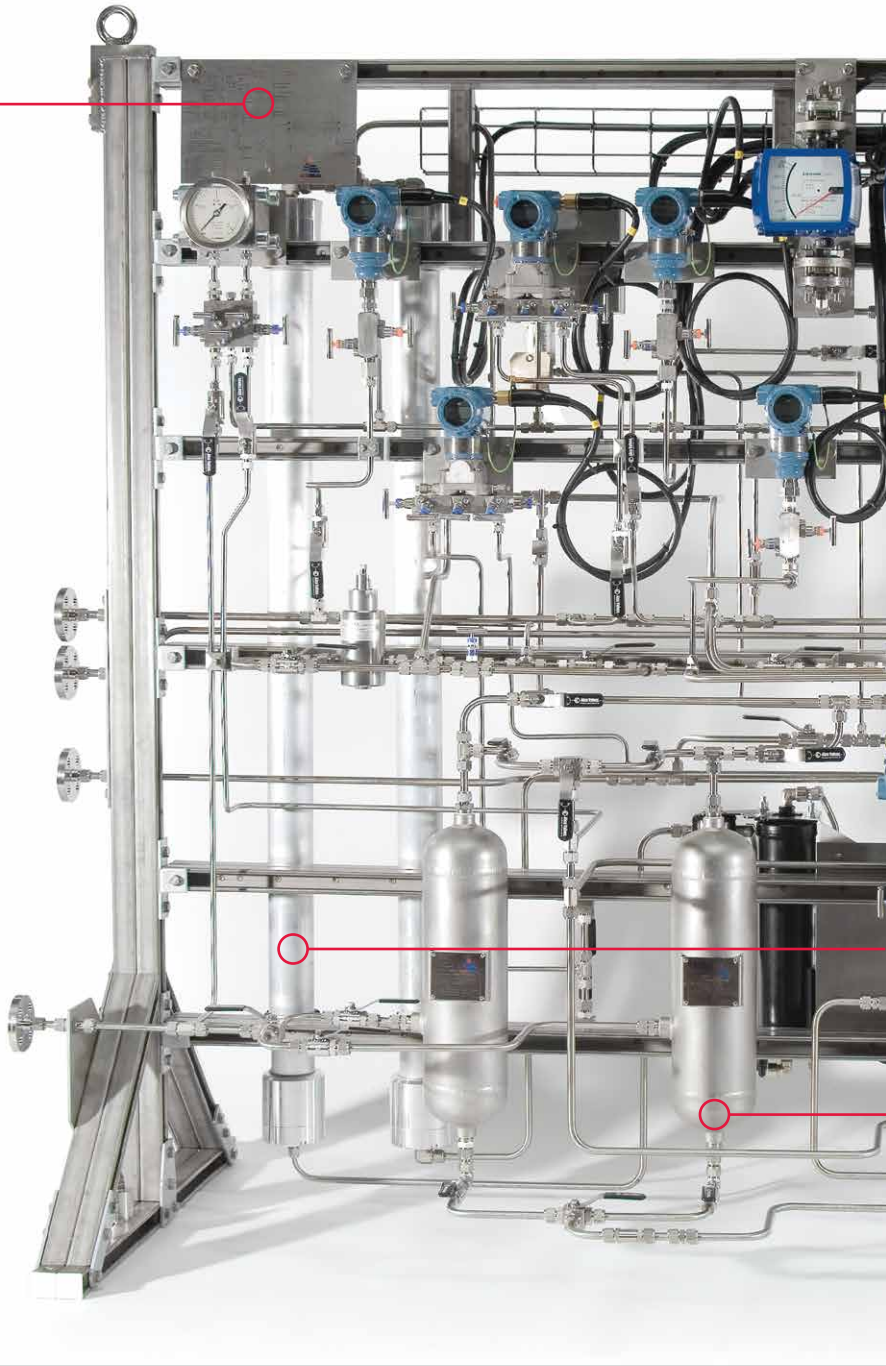
Dual bush non-contacting separation seal

Compressor Dry Gas Seal Systems



Colour coded P&ID for ease of identification

User friendly operation with gauges at eye level and accessible instruments and controls



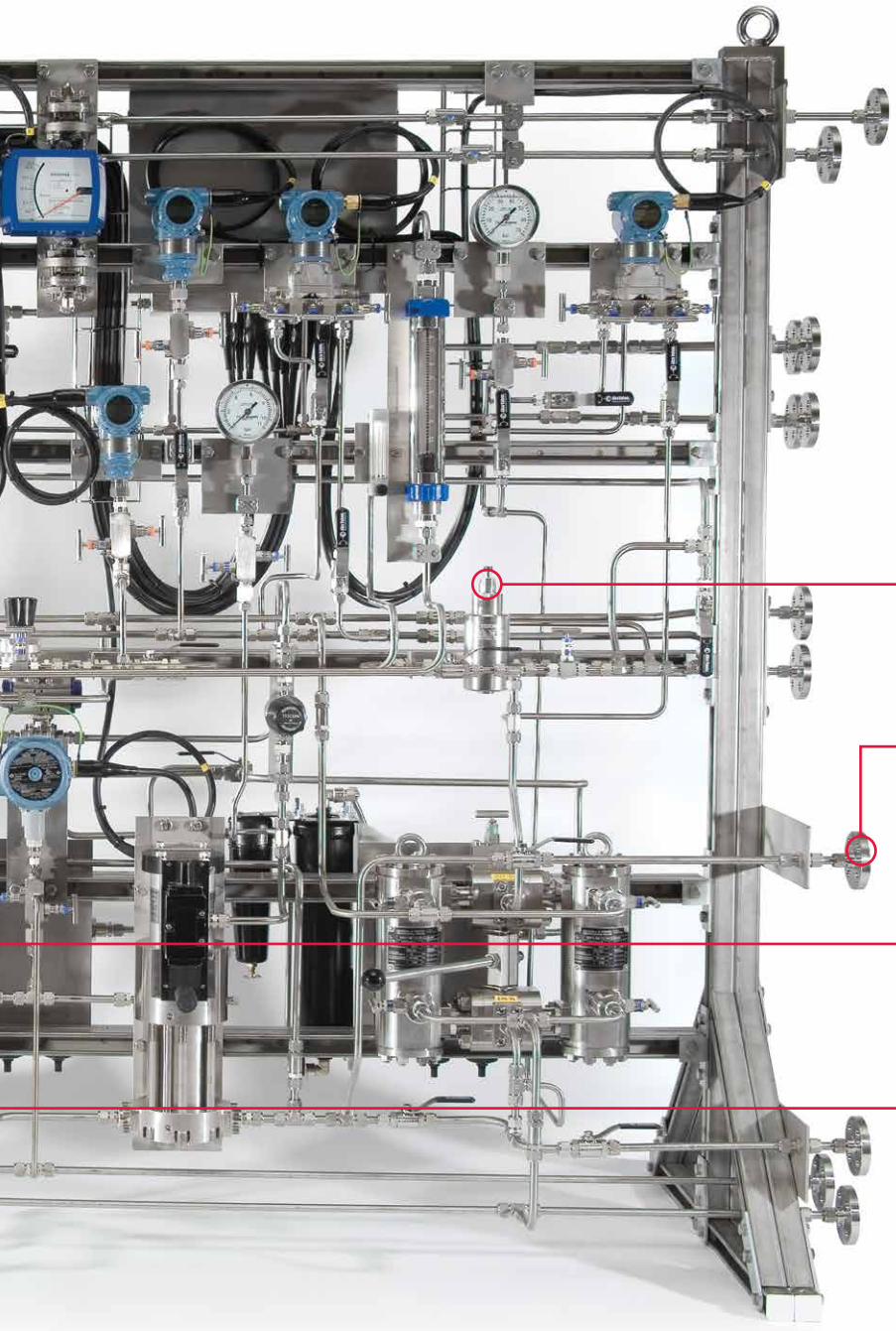
High quality compressor dry gas seal support systems engineered to customer requirements for all seal configurations and applications.

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.

Patent pending TriStage™ prefiltration system

EXPERIENCE THE EXCEPTIONAL



- Compliance with pressure equipment directive PED 97/23 EC
- Modular technology means a streamlined ordering process
- Zero clearance fittings on all control valves
- Connections available for additional gas conditioning
- Nitrogen generation system can be engineered for any application
- Patent pending TriStage™ prefiltration system

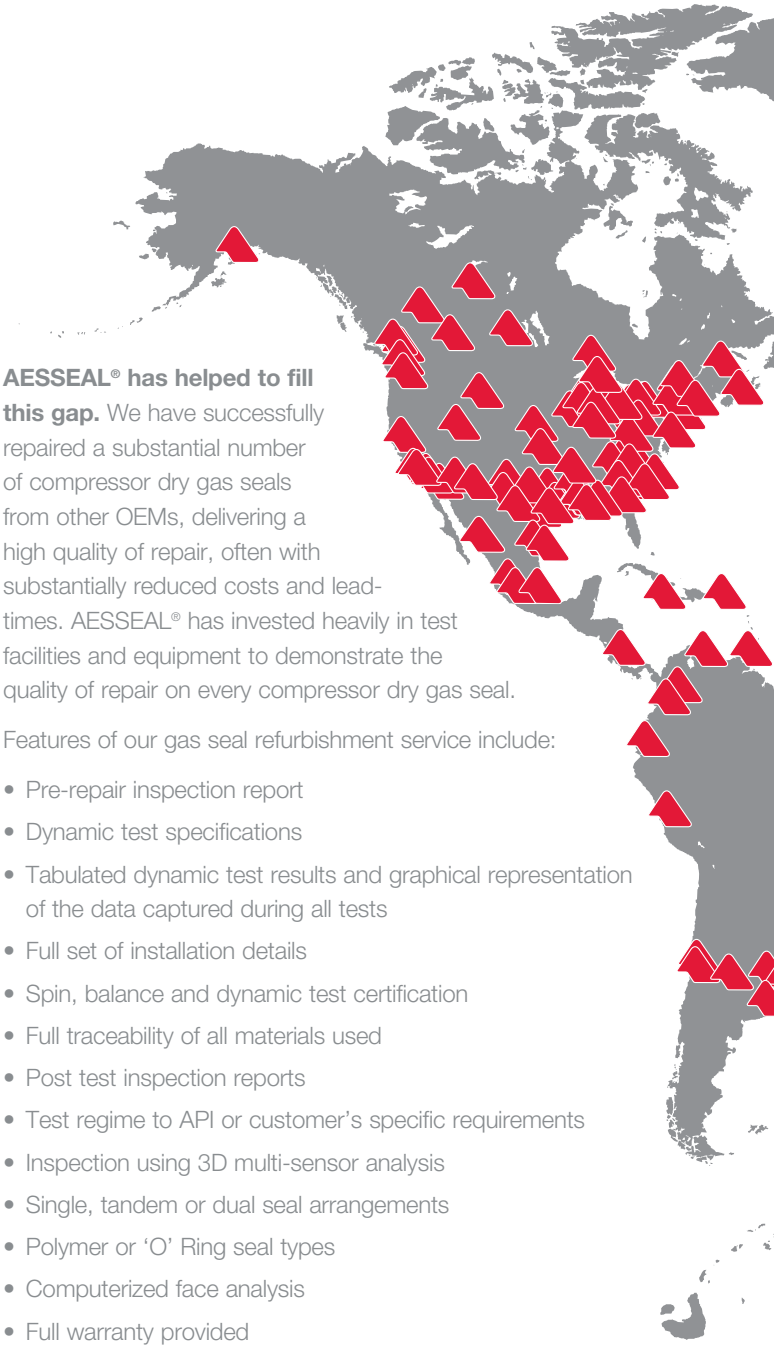
Typical features of AESSEAL® compressor dry gas seal support systems include:

- NACE compliance
- Patent pending TriStage™ prefiltration — removes bulk liquids up to 20 times more effectively than most coalescent filters
- Superior gas filtration — more stringent than API requirements
- Pressure booster — ensures continuity of seal gas under all transient conditions
- High purity nitrogen generation — removes reliance on plant nitrogen
- Heater system — provides dew point control
- Designed by engineers with extensive field experience — ergonomic, coherent layout with easy maintenance of all key components without taking the system off-line

www.aesseal.com/gas-systems.aspx

Dry Gas Seal Refurbishment

In recent years, the global demand for engineered compressor dry gas seal repair has outstripped supply. This has led to a rapid rise in both costs and lead-times for repairs.



AESSEAL® has helped to fill this gap. We have successfully repaired a substantial number of compressor dry gas seals from other OEMs, delivering a high quality of repair, often with substantially reduced costs and lead-times. AESSEAL® has invested heavily in test facilities and equipment to demonstrate the quality of repair on every compressor dry gas seal.

Features of our gas seal refurbishment service include:

- Pre-repair inspection report
- Dynamic test specifications
- Tabulated dynamic test results and graphical representation of the data captured during all tests
- Full set of installation details
- Spin, balance and dynamic test certification
- Full traceability of all materials used
- Post test inspection reports
- Test regime to API or customer's specific requirements
- Inspection using 3D multi-sensor analysis
- Single, tandem or dual seal arrangements
- Polymer or 'O' Ring seal types
- Computerized face analysis
- Full warranty provided

Reference lists and competitive quotes provided on request. Please contact gascom@aesseal.com

Dry Gas Seal Research and Development Test Facilities

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

- Shaft Speeds up to 45,000 rpm
- Pressures up to 5,000 psig (350 barg)
- Dedicated test equipment for every seal
- Witness tests can be viewed via weblink

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.

A full list of services are available on request from gascom@aesseal.com

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

AESSEAL plc, Rotherham, UK	Tel: +44 (0) 1709 369966	rotherham@aesseal.com
AESSEAL plc, Derby, UK	Tel: +44 (0) 1332 366738	derby@aesseal.co.uk
AESSEAL plc, Middlesbrough, UK	Tel: +44 (0) 1642 245744	northops@aesseal.co.uk
AESSEAL plc, Upminster, UK	Tel: +44 (0) 1708 256600	se@aesseal.co.uk
AESSEAL plc, Pontypridd, UK	Tel: +44 (0) 1443 844330	ponty@aesseal.co.uk
AESSEAL (MCK) Ltd, Lisburn, UK	Tel: +44 (0) 28 9266 9966	salesmck@aesseal.co.uk
AESSEAL Ireland Ltd, Lisburn, UK	Tel: +44 (0) 28 9266 9966	sales.ireland@aesseal.co.uk
AESSEAL Ireland Ltd, Co Cork, Eire	Tel: +353 (0) 214 633477	sales.ireland@aesseal.com
AESSEAL Inc. Rockford, TN, USA	Tel: +1 865 531 0192	usa@aesseal.com
AESSEAL Inc. Kingsport, TN, USA	Tel: +1 423 224 7682	kportadmin@aesseal.com
AESSEAL Inc. Marion, IA, USA	Tel: +1 319 377 0170	midwest@aesseal.com
AESSEAL Inc. Fairfield, ME, USA	Tel: +1 207 453 6915	neadmin@aesseal.com
AESSEAL Inc. Longview, WA, USA	Tel: +1 360 414 0118	nwadmin@aesseal.com
AESSEAL ALAA, Jubail, Saudi Arabia	Tel: +966 3 361 7461	info@aesseal.com.sa
AESSEAL COJ sarl, Alger, Algeria	Tel: +213 (0)555 033247	contact@aescoj-dz.com
AESSEAL Argentina SA, Buenos Aires, Argentina	Tel: +54 11 4721 0875	aesseal@aesseal.com.ar
AESSEAL Australia Pty Ltd, Seventeen Mile Rocks, Australia	Tel: +61 7 32791144	customer.service@aesseal.net.au
AESSEAL Benelux BV, Breda, Holland	Tel: +31 (0) 76 564 9292	seals@aesseal.nl
AESSEAL Brasil Ltda, São Paulo, Brazil	Tel: +55 11 5891 5878	aessealbrasil@aesseal.com.br
AESSEAL Canada Inc, Surrey, B.C., Canada	Tel: +1 604 535 7512	canada@aesseal.com
AESSEAL Caribbean Ltd, Trinidad W.I	Tel: +1 868 483 7881	caribbean@aesseal.com
AESSEAL Chile SA, Providencia Santiago, Chile	Tel: +56 2 2343022	aesseal@aesseal.cl
AESSEAL China Ltd, Ningbo, China	Tel: +86 (0) 574 8823 2888	service@aesseal.com.cn
AESSEAL China Ltd. Shanghai, China	Tel: +86 (0) 21 60761081	service@aesseal.com.cn
AESSEAL China Ltd. Nanjing, China	Tel: +86 (0) 25 68139838	service@aesseal.com.cn
AESSEAL China Ltd. Dalian, China	Tel: +86 (0) 411 83729851	service@aesseal.com.cn
AESSEAL Colombia S.A., Bogota, Colombia	Tel: +57 (1) 634 9095	info@aesseal.com.co
AESSEAL Czech sro, Brno, Czech Republic	Tel: +420 543 212 489	aesseal@aesseal.cz
AESSEAL Danmark, A/S, Køge, Denmark	Tel: +45 56 64 14 00	mail@aesseal.dk
AESSEAL Deutschland AG, Kronau, Germany	Tel: +49 (0) 7253 8090	info@aesseal.de
AESSEAL Deutschland AG, Sauerlach, Germany	Tel: +49 (0) 8104 639607	info@aesseal.de
AESSEAL Finland OY, Muurame, Finland	Tel: +358 1433 84500	aesseal@aesseal.fi
AESSEAL France SAS, Nieppe, France	Tel: +33 320 172850	contact@aesseal.fr
AESSEAL India Pvt. Ltd, Pune, India	Tel: +91 2113 302222	aesseal@aesseal.in
AESSEAL India Pvt. Ltd, Chennai, India	Tel: +91 44 2481 7786	chennai@aesseal.in
AESSEAL Coldweld Pvt. Ltd, Vasai (East), Thane, India	Tel: +91 250 645 6884	mail@aescoldweld.com
AESSEAL Italia Srl, Gallarate, Italy	Tel: +39 0331 799 952	info@aesseal.it
AESSEAL Malaysia, SDN BHD, Selangor, Malaysia	Tel: +603 806 21233	aesseal@tm.net.my
AESSEAL Malaysia, SDN BHD, Pahang, Malaysia	Tel: +609 583 6133	aesseal@tm.net.my
AESSEAL Malaysia, SDN BHD, Johor, Malaysia	Tel: +607 388 8323	aesseal@tm.net.my
AESSEAL Mexico, S de RL de CV, Mexico City, Mexico	Tel: +52 5553845070	info@aessealmx.com
AESSEAL Middle East FZE, Dubai, U.A.E.	Tel: +9714 884 9301	sales@aesseal.ae
AESSEAL Norway AS, Oslo, Norway	Tel: +47 2273 6849	info@aesseal.no
AESSEAL Polska Sp. z O.O. Bielsko-Biała, Poland	Tel: +48 33 818 4135	aesseal@aesseal.com.pl
AESSEAL Univeda LDA, Lisbon, Portugal	Tel: +351 217 969212	geral@aesseal.pt
AESSEAL Russia, Koroliov City, Moscow, Russia	Tel: +7 495 777 4011	info@aesseal.ru
AESSEAL Pty Ltd, Durban, South Africa	Tel: +27 (0) 31 903 5438	durban@aesseal.co.za
AESSEAL Pty Ltd, Johannesburg, South Africa	Tel: +27 (0) 11 466 6500	admin@aesseal.co.za
AESSEAL Ibérica SL, Tarragona, Spain	Tel: +34 977 55 43 30	info@aesseal.es
AESSEAL Sweden AB, Stockholm, Sweden	Tel: +46 (0) 8 55602870	kundservice@aesseal.se
AESSEAL Vo Lee Ltd, Kaohsiung County, Taiwan	Tel: +886 7 371 3990	aesseal.volee@msa.hinet.net
AESSEAL Turkiye, Istanbul, Turkey	Tel: +90 (0) 216 304 0237	info@aesseal.com.tr
AESSEAL Uruguay, Montevideo, Uruguay	Tel: +598 2 924 7252	sealtecplc@aesseal.com.uy

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

www.aesseal.com