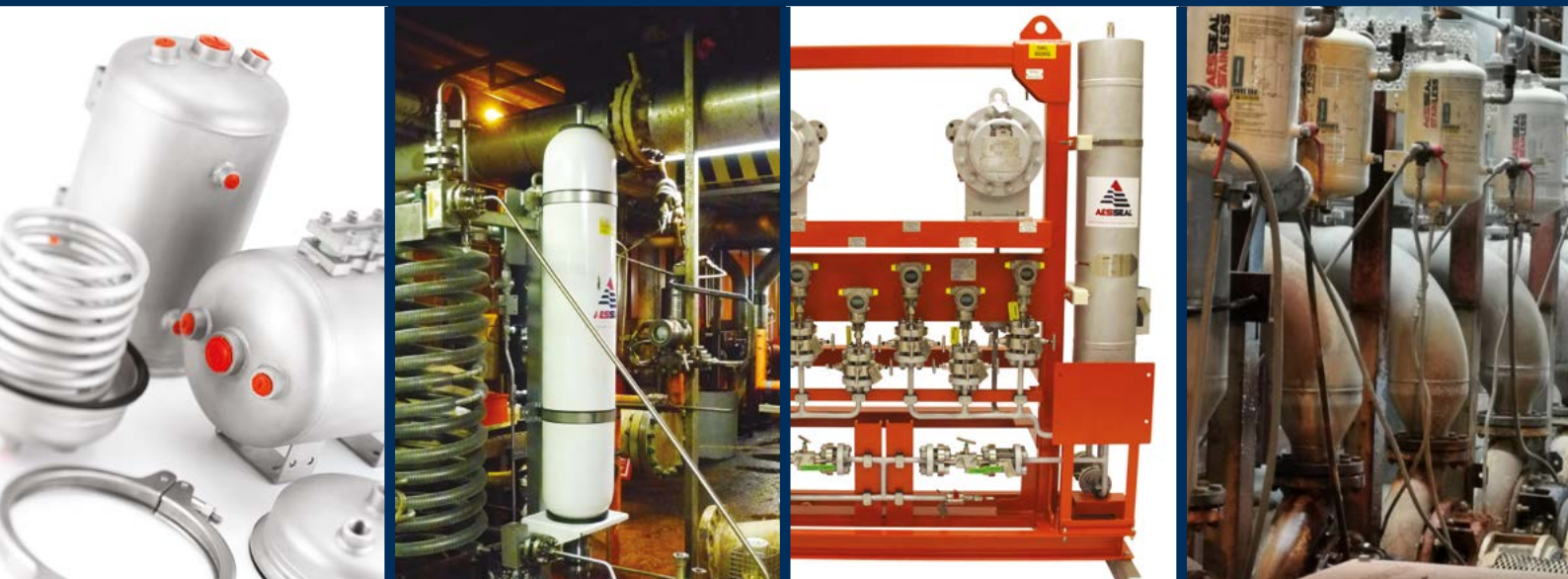


Seal Support Systems



the AESSEAL® group of companies

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



AES Engineering Ltd went beyond Net Zero in 2021, with its global business activities delivering CO₂e savings equivalent to the environmental impact of more than 18 million trees, according to figures verified by the leading standards organization BSI.

The target of getting beyond Net Zero by 2029 was delivered eight years ahead of schedule thanks to a group-wide effort and the #29by29 pledge to invest £29 million by 2029 in environmentally-friendly projects.



Contents



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 expectations.

Customer Focus

“We aim to deliver a customer experience that surpasses expectations and truly redefines what the world expects from its sealing specialist.”

Simplicity. Our modular technology means a streamlined ordering process.

4

Customer-centric. We 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

AESSEAL® offers a wide range of innovative and modular seal support systems to complement its mechanical seal designs. We have invested thousands of hours reviewing the latest legislation and design codes delivering clarity and assurance.

We are a manufacturer that supplies CE and UKCA certified assemblies without the use of third-party sources. The AESSEAL® Global Technology Centre is certified to Module D, B and H1 — H1 being the highest level of Pressure Equipment Directive PED 2014/68/EU certification.

Export quality packaging is standard — AESSEAL® understands the importance of secure and effective packaging and guarantees that all customers will receive a fully protected product to their sites

Industry Expertise

The AESSEAL® modular seal support systems have evolved from application experience in industry's most challenging environments, offering proven, reliable support systems for your equipment.

Please contact your local AESSEAL® representative to discover more about proven seal support solutions or visit: www.aesseal.com/en/industry



Water Management Systems

The AESSEAL® water management system range connects to the plant water line to feed the mechanical seal with a clean, cool and stable water barrier fluid.

Water management systems are self-replenishing and pressurizing, it's the most reliable cost-saving seal support system method for a number of reasons:

Increase plant uptime & Mean Time Between Failure (MTBF) - The water management system range reduces equipment downtime by increasing the MTBF of the mechanical seal.

Reduce water usage and costs - Traditional quench to drain and flush seal support methods waste huge quantities of water (up to 1.7 million gal (US) / 6.3 million litres of water per seal application per year). Water management systems reduce this water consumption to as little as 8.45 gal (US) / 32 litres per seal application per year.

Fast return on investment (ROI) - The reduction in downtime and water / energy / operator costs means that there is a typical ROI of approximately six to nine months when installing an AESSEAL® Water Management system and mechanical seal.

Environmentally friendly - The reduction in water consumption and energy means that water management systems will make the customer's manufacturing process more environmentally friendly, and reduce their carbon footprint.

Reduce operator costs - Water management systems are largely maintenance-free and can free up operator / maintenance resources for other areas of the plant.

Reduce energy usage and costs - Water management systems restrict the amount of water migrating across the seal faces into processes that require evaporation during the manufacturing process.



**AESSEAL® water
management
systems save
in excess of
25 billion US
gallons / 95
billion litres
of water for
customers
each year.**

Water Management Technology

AESSEAL® saves 6.3 Million Litres / 1.7 Million US Gallons of water per pump per year...

This is an enormous contribution to global water conservation and clearly displays the environmental focus of AESSEAL®. The company thanks its customers for contributing to this achievement and for their promotion and installation of water management systems. The water savings are a direct result of the support and dedication of customers in using reliability focused sealing solutions. AESSEAL® looks forward to continuing its work with customers to generate even greater water savings!



Before AESSEAL® solution



After installing AESSEAL® double seal and tank system

“Of all the world's water, 97.4% is salt water, 2% is solid in ice caps and only 0.6% is suitable for industrial use and human consumption.”





The Complex Made Simple

With its innovative approach to design, the AESSEAL® Complex Systems Division has introduced modularity and repeatability to what is, for some, an uncertain manufacturing process.

The Complex Systems Division's team encompasses design, fabrication, engineering and customer service to guarantee a seamless flow from inception through to specification and the delivery of truly exceptional quality products.

R&D

The division's research and development team has invested 5,000 hours in deciphering the finer details of API 682, ASME VIII Div 1 and PED 2014/68/EU. This dedication has resulted in the design of modular products that guarantees the delivery of high end systems with short lead times.

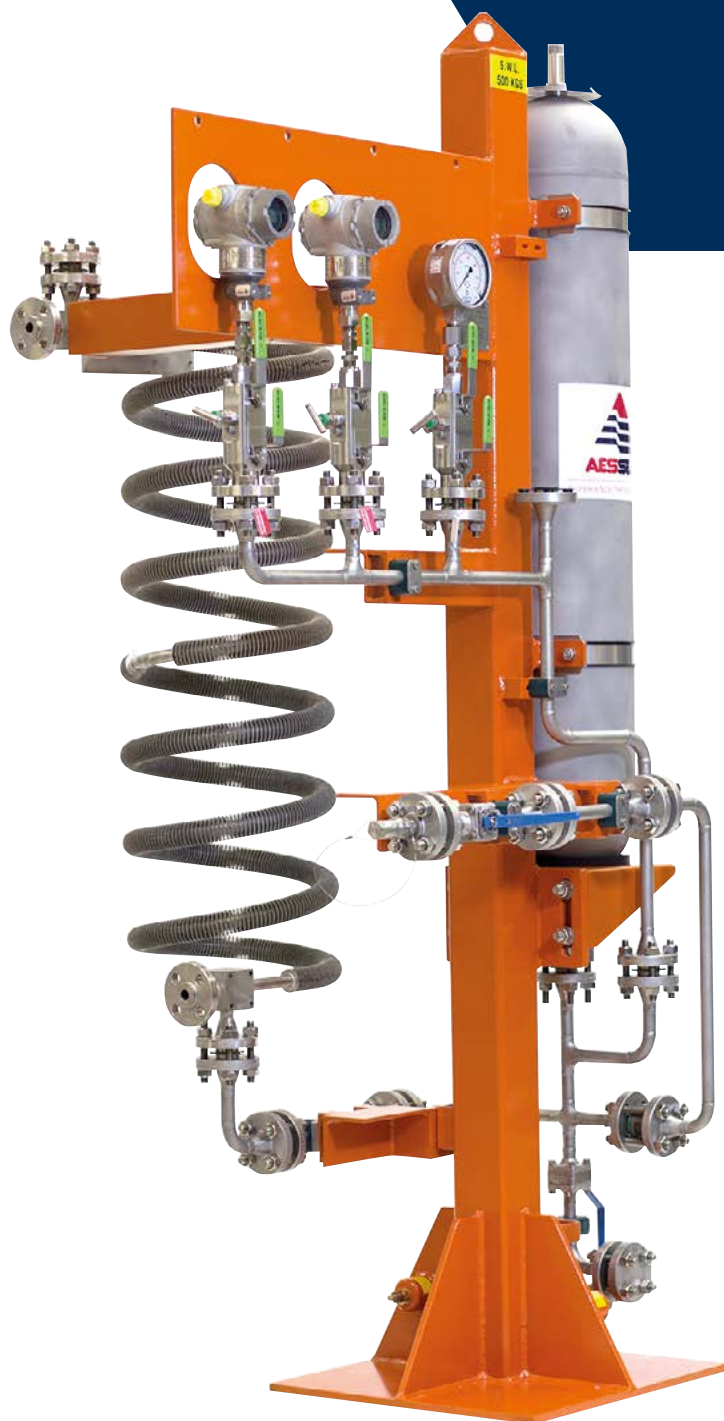
Global

Customer service is provided from 230 locations in 104 countries, including 9 manufacturing and 44 repair locations, with more than 300 customer service representatives who visit industrial plants every day.

The systems division at AESSEAL® supplies seal support systems to all global locations with the same focus on customer service.

ATEX Certified

ATEX certified instrumentation available for all seal support systems.



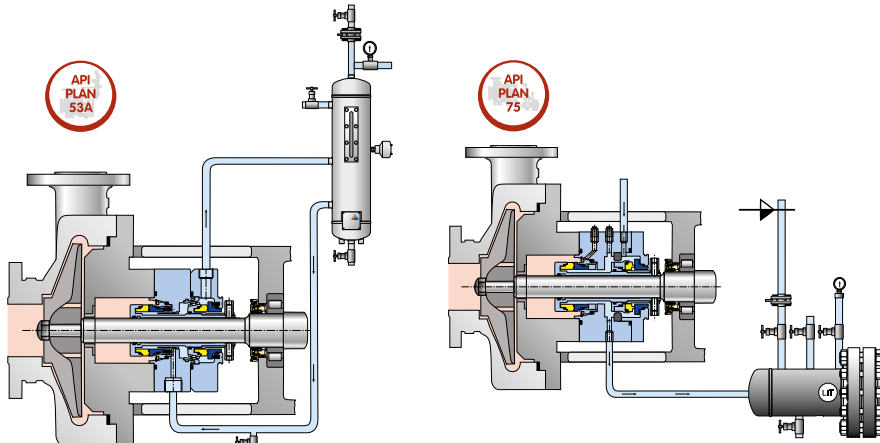
API Plan 53B system designed in accordance with API 682
(typically supplied in unpainted 316 Stainless Steel)

API Piping Plans and Certification Made Easy

To make the selection of a seal support system easier, AESSEAL® has designed a number of API icons so that a customer is able to link products to specific API Piping Plans.

The company has developed an API Piping Plan booklet as a guide.

Examples of how the API Plans are displayed in this booklet are shown below:



API Piping Plan Booklet



European & UK Legislation PED 2014/68/EU and Pressure Systems (Safety) Regulations

The EU Pressure Equipment Directive was adopted on the 29th May 1997 and came into force on the 29th November 1999, and transposed into the UK Pressure Systems (Safety) Regulations (PESR).

The legislation covers pressure equipment and assemblies with a maximum allowable pressure greater than 0.5 bar. Pressure equipment means vessels, piping, safety and pressure accessories. Assemblies mean several pieces of pressure equipment assembled to form an integrated, functional whole.

General requirements are as follows:

- They are safe
- The essential safety requirements covering design, manufacture and testing are met
- They satisfy appropriate conformity assessment procedures
- They carry the CE and UKCA mark

Equipment is classified either as SEP i.e. Sound Engineering Practice or classified in categories 1 to 4. The higher the category the greater the hazard and the requirements more demanding. Products in categories 2, 3 or 4 require approval from a third party notified / approved body appointed by the EU / UK.

Failure to comply with the PED / PESR can result in the following:

- Such equipment cannot legally be placed on the market or put into service in the UK or the European Union
- Could result in prosecution and penalties on conviction of a fine, imprisonment or both

Notified body approval - All AESSEAL® pressure vessels and assemblies are examined and certified (Module B design examination certificate, see Figure 1) by a third party notified / approved body.

The quality management system for manufacture is also examined and certified by a third party notified / approved body.

ASME VIII Div.1 - The American Society of Mechanical Engineers is an internationally recognized organization. The International Boiler and Pressure Vessel Code sets out the rules of safety governing the design, fabrication and inspection of boilers and pressure vessels during construction.

All AESSEAL® vessels are designed and manufactured to the latest standard which is updated every three years. All of the company's welders are dual coded to ISO 9606-1:2017 and ASME IX:2021.



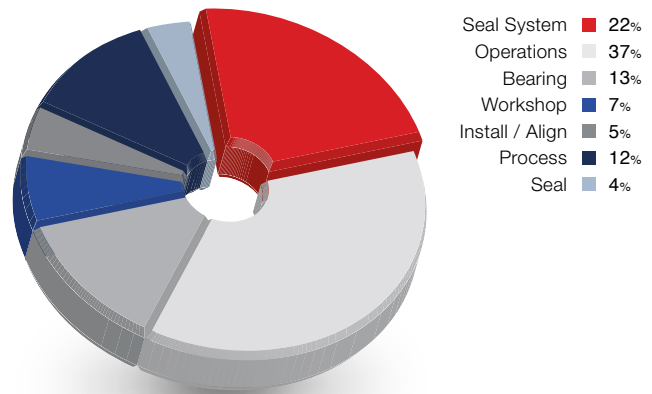
Figure 1

Reliability Enhancement

Research has proven that the biggest mechanical preventative of mechanical seal failure is the use of effective Seal Support Systems.

This means that no matter how well designed your mechanical seal or bearing systems are, without a reliable Seal Support System there is still the possibility of your mechanical seal failing. The innovative and reliable Seal Support System Range at AESSEAL® gives customers the confidence to remove this root cause of mechanical seal failure.

It is essential that the barrier fluid support system provides the correct lubrication and controls the temperature and pressure within the seal, enabling optimum operating conditions in the equipment.



Source: Stephen Flood, Performance Plus Ltd - "Mechanical Seal Reliability - What Realistically can Be Achieved?" presented at The Mechanical Sealing Technology Seminar, IMechE, London, April 07

Barrier Fluid Choice

Water Barrier Fluid — We have designed a wide range of water management systems that provide a reliable constant supply to the seal. Water will thermosyphon or convect, the hot low density water will rise, and be replaced by the colder water from the system, and the heat will radiate through the system vessel, allowing the colder water to flow to the bottom of the vessel (Figure 2).

These environmentally friendly water management systems increase Mean Time Between Failure (MTBF) of the mechanical seal, increase seal life, and reduce the annual water consumption massively from **1.7 Million US (Gal) / 6.3 Million Litres, to ONLY 8.5 US (Gal) / 32 Litres**, significantly reducing water consumption costs.

Oil Barrier Fluid — We also offer a wide range of oil support systems that can supply a reliable oil barrier fluid to the mechanical seal to give greater seal life and improve reliability. If the application prohibits the use of a water-based barrier fluid, then an oil-based barrier fluid is often used instead of water. Oil-based barrier fluids are less inclined to circulate, (indeed some will not circulate at all). If the oil is not circulating, it could overheat at the mechanical seal and 'coke' the faces. If this occurs, a number of options are available:

- **A pumping ring** — (e.g. the AESSEAL® DMSF™ double mechanical seal) can be used to circulate the oil through the seal more effectively when utilizing a seal support system
- **An in-line circulation pump** — used to circulate the oil barrier fluid to and from the seal
- **An API Plan 54 arrangement** — such as an Oil PUMPPAC™ system that forces the fluid into the seal and back to the Pumpppac system, circulating the oil

An external on-site compressed gas source may be required to pressurize the oil barrier fluid to the necessary 2 Bar/30psi above seal chamber pressure. (Figure 3)

Gas Barrier — As an alternative to water or oil-based barrier fluids, an inert gas can be used instead. A pressurized gas supply is forced between the faces of the mechanical seal to provide a clean barrier. Once the gas has passed between the seal faces it is absorbed by the process.

A Gas Panel seal support system (Figure 4), is designed to supply the gas, (normally Nitrogen), to create the barrier for the seal. The Gas Panel, used in conjunction with the AESSEAL® UDGS™, Mixmaster™ or Clip™ seal range, forms an efficient, environmentally friendly and reliable seal support system for gas barrier applications. These applications are particularly common in the Chemical and Pharmaceutical markets where water/oil barrier fluid contamination of the process is unacceptable.



Figure 2



Figure 3

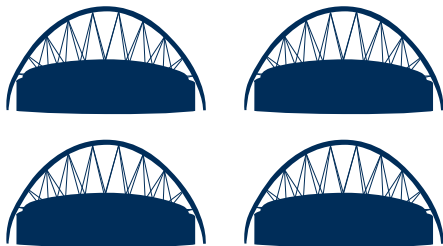


Figure 4

4.5 billion litres
of water saved in six years

4

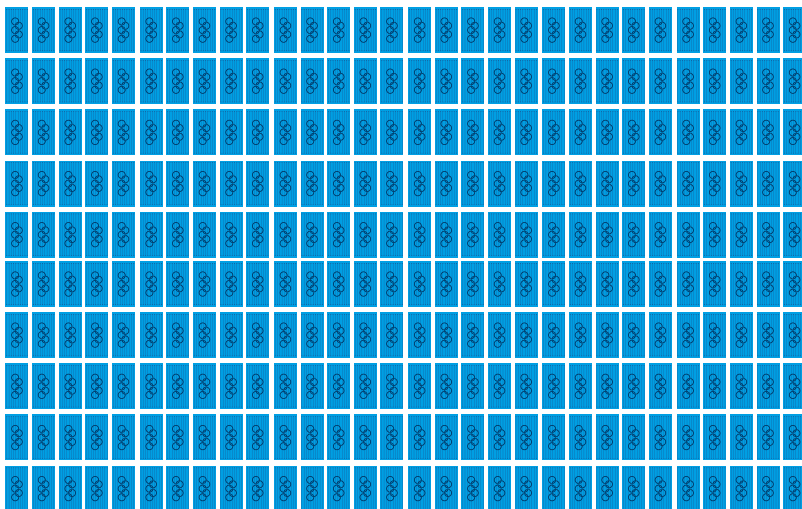
Enough water to fill
4 Wembley stadiums



10

300

Enough water to fill **300**
Olympic swimming
pools EVERY YEAR



Reducing water usage

and increasing MTBF

An international packaging and paper group in South Africa replaced 167 competitor cooling and lubrication systems that were consuming more than 63 million litres of water every month. The new AESSEAL® systems helped save over 4.5 billion litres of water in six years, helping to conserve scarce water resources in northern KwaZulu Natal.

The AESSEAL® SW2™ and SW3™ water management systems use recycled water to cool, lubricate and flush mechanical seals in the plant. Return on investment was achieved in less than one year.



1185

If the water was
in oil tankers the
tankers would
stretch **1185**
miles from
London to
Rome or from
Chicago to
Orlando!

Saving
£568,890
(> \$683k / €640k)

Not including effluent
treatment savings

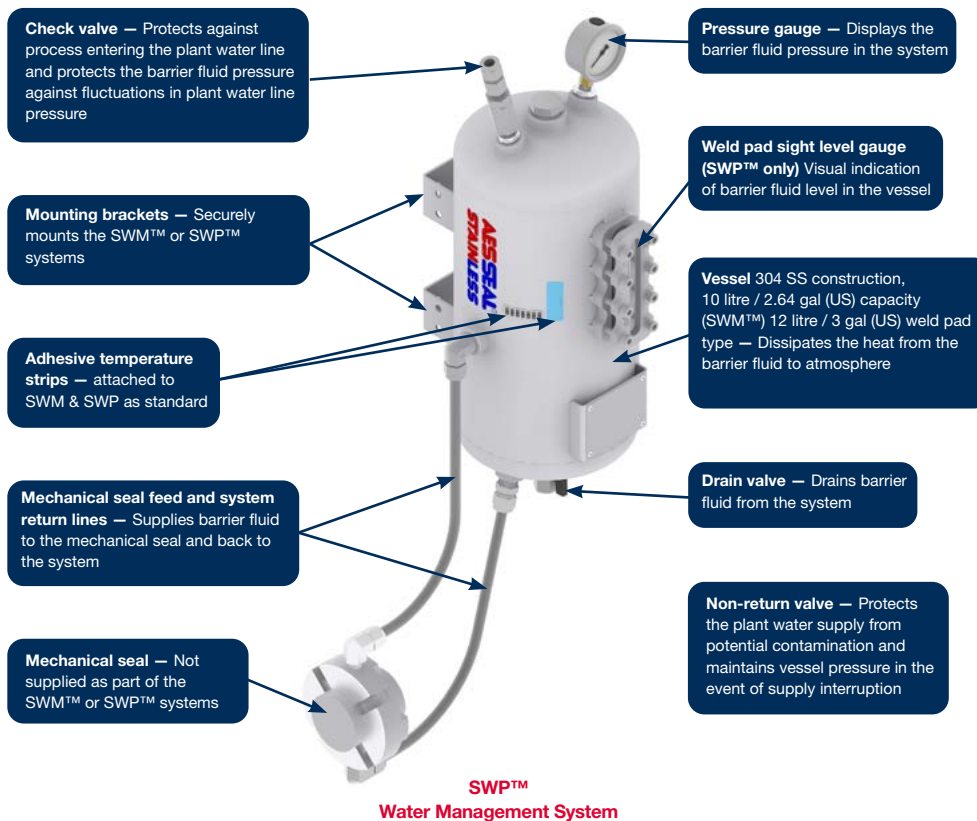


SWM™ & SWP™

The SWM™ (System Water Management) & SWP™ (System Weld Pad) are closed loop water management systems.

These systems are supplied and pressurized directly from the plant water supply line and operate at the maximum pressure available in the line. Pressure within the vessel remains constant, unaffected by any fluctuations in water supply pressure. A check-valve is supplied as part of the system to prevent the plant water line from becoming contaminated with any process fluid. It also ensures that the barrier fluid pressure remains at the maximum available even in the event of any fluctuations in the plant water supply line. Barrier fluid is circulated from the system to the seal, and back to the system via the Thermosyphon effect. The SWP™ vessel incorporates a robust weld pad sight level gauge that allows visual indication of barrier fluid level.

- **Cost efficient** — Low cost entry level water management system
- **Lightweight but robust 304SS system** — Suitable for a wide range of challenging environments
- **Easy to install** — Twin pre-drilled mounting brackets enable secure simple installation



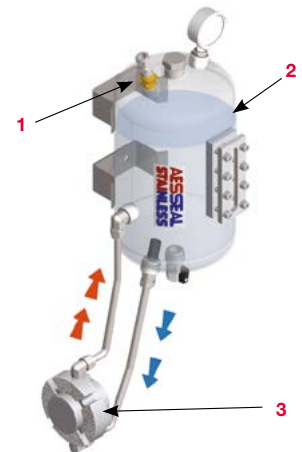
SWM
Water Management System

Maximum Design Pressure:
8 barg / 116 psig

Maximum Temperature:
80°C / 176°F
with suitably rated
piping / hosing

(Pressures and temperatures
will be reduced to meet the lowest
rated component on the system)

Operating Principle



1. Water from the plant water line enters the system.
2. Barrier fluid pressure will be at the maximum pressure available from the plant water line.
3. The barrier fluid is circulated to the seal and back to the system by the thermosyphon effect.



SW Range

The SW Range consists of the SW2™ and SW3™ water management systems.

The environmentally friendly SW Range systems connect directly to the plant water line. The plant water line pressure can be regulated by using the system pressure regulator to enable accurate and stable control of the water supply.* A flow indicator allows visual indication if there is a mechanical seal upset or failure. Barrier fluid is circulated to and from the mechanical seal via the Thermosyphon effect. The SW3™ is supplied with finned tubing as standard so that it can be used on high heat applications.

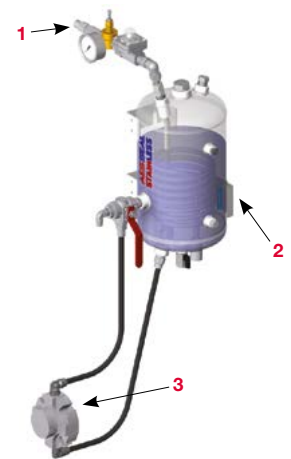
- **Environmentally friendly** — Utilizes water as barrier fluid and connects directly to plant water supply (or AESSEAL® FDU auto top up)
- **Provides huge water savings** — AESSEAL® Water Management Technology can save 6.3 Million litres / 1.7 Million US gallons of water per pump per year!
- **Regulates the plant water line pressure** — Can be set at 1 bar / 15psi above stuffing box pressure and automatically replenishes lost water and re-sets barrier fluid pressure if there is a mechanical seal upset

Maximum Outlet Pressure:
8 barg / 116 psig*

Design Temperature:
**-20°C to 100°C
(-4°F to 212°F)**

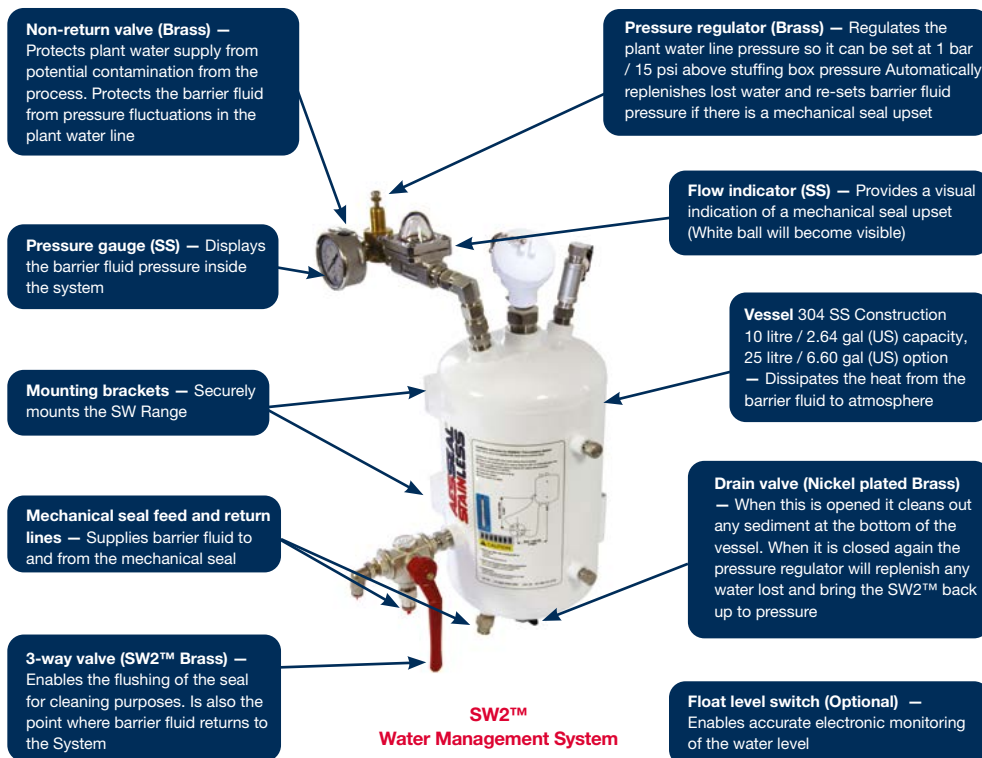
(Pressures and temperatures
will be reduced to meet the lowest
rated component on the system)

Operating Principle



1. Water from the plant water line enters the system.
2. The pressure of the barrier fluid in the vessel can be regulated via the pressure regulator
3. The barrier fluid is circulated to the seal and back to the system by the thermosyphon effect.

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SW3™
Water Management System

*For higher pressures see the AES15™ SW2



**For further information on Standard Plus
and Special systems click here**

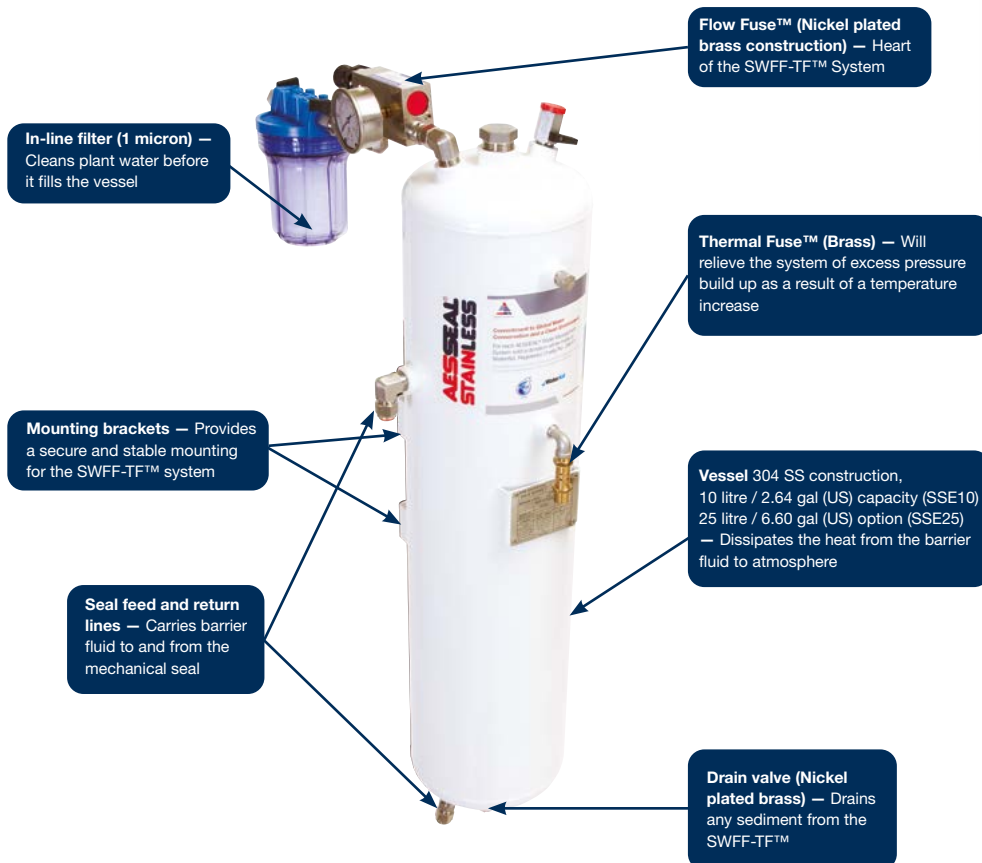


SWFF-TF™

The intelligent SWFF-TF™ system incorporates the Flow Fuse™ and Thermal Fuse™ products.

The SWFF-TF™ restricts barrier fluid contamination of the process upon momentary or permanent seal failure with the Flow Fuse™. It does this by isolating the seal support system from the plant water supply when it detects an abnormally high flow of water. The SWFF-TF™ has a 10 litre or 25 litre capacity and incorporates the Thermal Fuse™ pressure relief valve to relieve the system of pressure build-up as a result of a temperature increase, making it ideal for all industries.

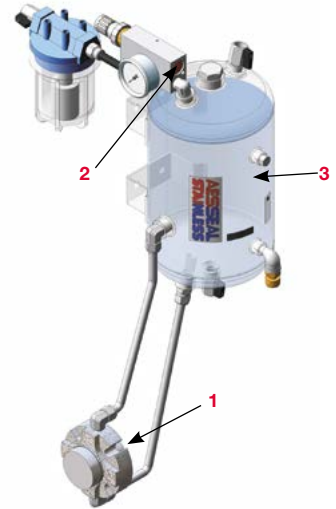
- **Flow sensing shut off valve** — Protects the process from barrier fluid contamination upon seal upset or failure
- **Water regulator** — Maintains water level and pressure which reduces due to normal seal operation
- **Automatic reset facility** — Protects the mechanical seal from running dry during process upsets
- **Thermal relief valve** — Maintains system operating pressure by automatically relieving in the event of thermal expansion



Maximum Outlet Pressure:
8 barg / 116 psig*

Design Temperature:
-20°C to 100°C
(-4°F to 212°F)

(Pressures and temperatures will be reduced to meet the lowest rated component on the system)



1. The seal fails
2. Flow Fuse™ valve triggers, isolating plant water supply
3. Minimal barrier fluid loss, ensuring your process is protected

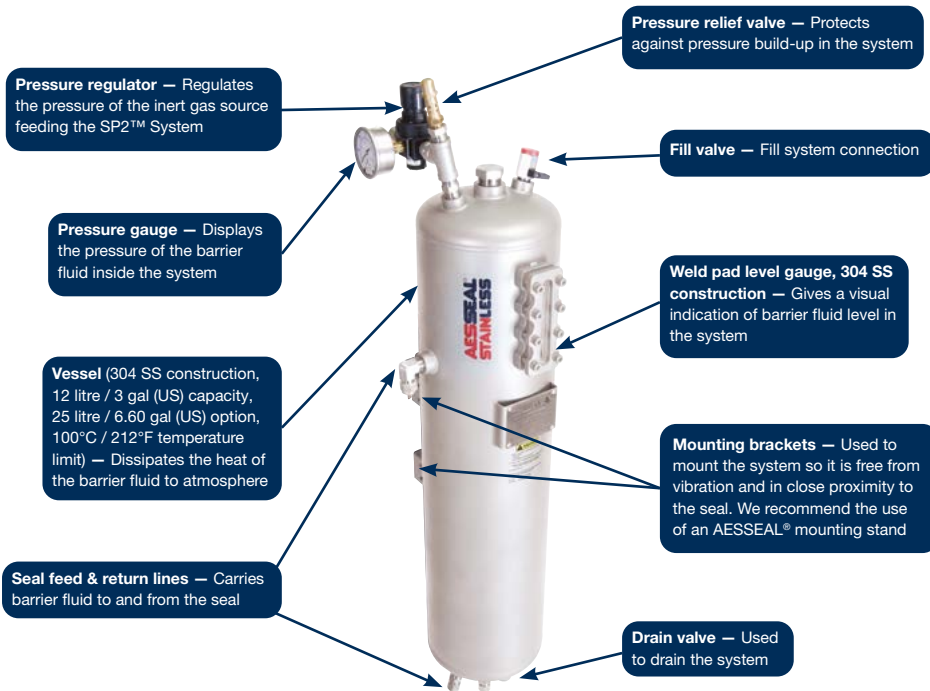


SP Range

The SP Range consists of the SP1™, SP2™ and SP3™ systems. The SP1™ is a non-pressurized buffer system modelled on the API Plan 52 Piping Plan. The SP2™ and SP3™ systems are modelled on the API 53A Piping Plan.

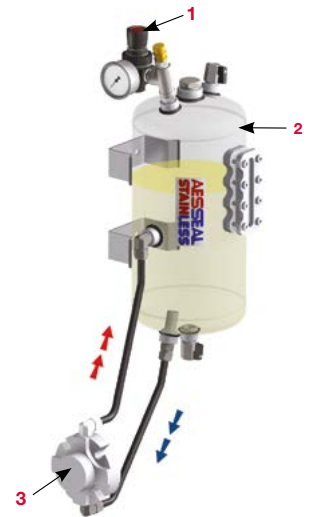
The SP3™ has the addition of finned tubing, extending surfaces for air cooling and increasing the rate of heat transfer from the system by increasing convection for use on high heat applications. All vessels are designed and manufactured in accordance with ASME VIII Div.1 and certified by TÜV to cover PED requirements.

- **304 SS vessel construction** — Bead blast finish, suitable for a wide range of arduous environments
- **Integral weld pad level gauge** — Gives a visual indication of the system barrier fluid
- **Available with cooling coil** — Enables greater cooling capabilities



Max Assembly:
10 barg (145psig)*

Max Temperature:
80°C / 176°F



Operating Principle

- 1.** Gas enters the SP system through the pressure regulator.
- 2.** Gas pressurizes the barrier fluid (Oil or Water can be used with SP Range) to 1 bar / 15 psi above seal chamber pressure.
- 3.** Barrier fluid is circulated to the seal and back to the system by the thermosyphon effect or by a bi-directional pumping ring.



Cupro-nickel fin tubing on SP3™ System for hot applications



*For higher pressures see the AES15™ SP2

For further information on Standard Plus and Special systems click here



EasyClean™ Pressure Systems

Pressure Systems designed for the Pharmaceutical, Food & Beverage sectors. EasyClean™ can be used as part of an API Plan 52 or 53A arrangement.

Designed for industries where it is important to ensure that all machinery is maintained to a high standard of cleanliness, preventing any potential issues with existing mechanical seal support systems using sealed vessels that have the potential to harbour and breed bacteria.

EasyClean™ Advantages

- Quick release clamp enables instant internal vessel inspection without the need to remove from point of installation, simply clean and flush out the vessel to remove any build-up of dirt or debris
- Avoids expensive time-consuming internal system inspection and extended plant process downtime, eliminating the need for use of specialized endoscopic equipment
- Easy to maintain, inspect and service in restricted or confined spaces
- Any wear, tear and potential deterioration can be assessed, minimizing the risk of pressure vessel failure and improving safety
- Coloured level weld pad plate for easy determination when fluid level top-up is required
- SW 10 & 25L vessel ranges, SP 12 & 25L vessels with sight glass
- On fully adjustable X-Y stand with seal to/from braided hose*

*Supplied on request

SSE10 Easyclean system

Maximum Design Pressure:

8 barg / 116 psig

Maximum Temperature:

80°C / 176°F

(with suitably rated
piping / hosing)

Minimum Temperature:

0°C / 32°F

SSE12 Easyclean system

(With sightglass)

Maximum Design Pressure:

10 barg / 145 psig

Maximum Temperature:

80°C / 176°F

(with suitably rated
piping / hosing)

Minimum Temperature:

-20°C / -4°F



Typical Easyclean system on Y-Stand with SS braided hose

For further information on Standard Plus and Special systems [click here](#)



AES15™

The AES15™ vessel forms the core of a robust, low maintenance and highly reliable seal support system with a weld pad level gauge and integral cooling coil as standard.

The 15 Litre (4 US Gal) vessel is constructed from 316 stainless steel and is designed to meet the high end needs of the Chemical, Pharmaceutical and Petrochemical industries. Both oil and water can be used as barrier fluids with the AES15™ ensuring its compatibility with a wide range of industrial pump applications.

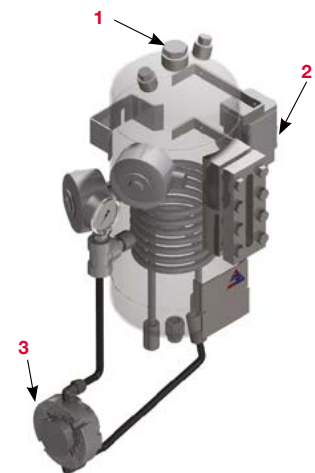
- 316 SS vessels are designed and manufactured in accordance with ASME VIII Div.1 and PED 2014/68/EU — Suitable for a wide range of arduous environments
- Cooling coil as standard — Additional cooling available for high heat applications
- Vessel options — Enhanced modular designs available with screwed vessel connections

AES15™ SP2 and SW2 Range

The AES15™ SP2 and SW2 range has been adapted to cover a wide range of low and high pressure / temperature applications to suit customer needs. Options include electrical instrumentation which is supplied as intrinsically safe or flameproof.

Max Assembly:
30 bar (435psi)

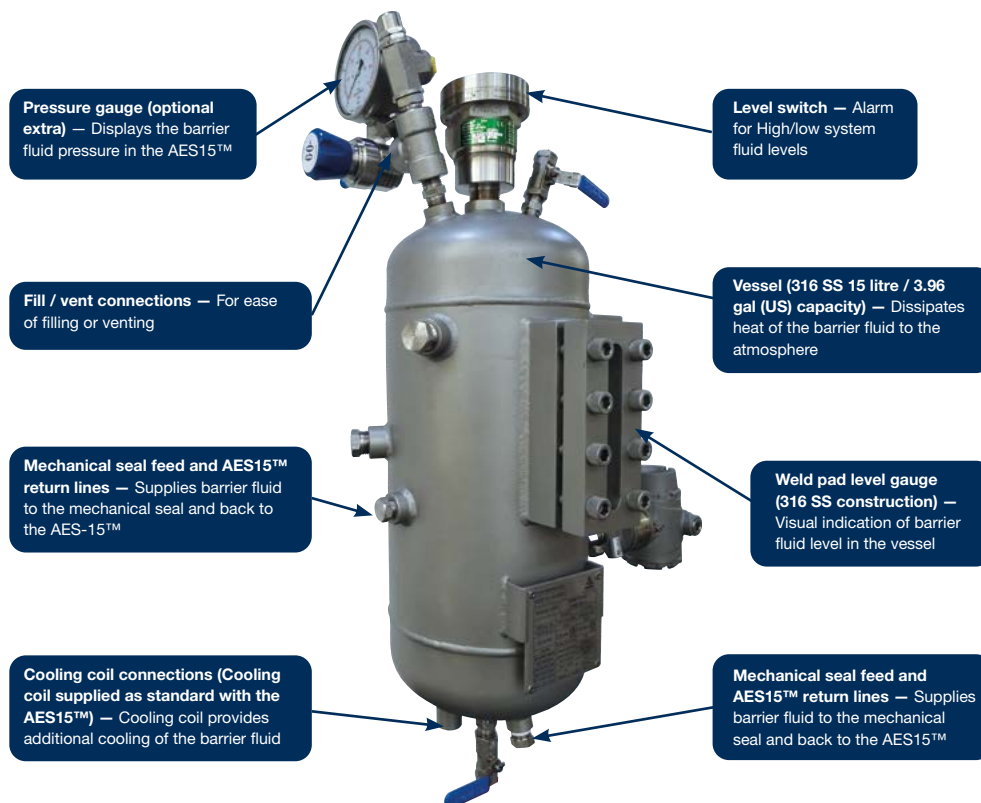
Design Temperature:
-50°C to 100°C
(-58°F to 212°F)



Operating Principle (Under API Plan 53A conditions)

1. Gas enters the pressure system through the pressure regulator.
2. Gas pressurizes the barrier fluid to 2 bar / 30 psi above the seal chamber pressure.
3. Barrier fluid is circulated from the vessel through the mechanical seal and back to the vessel by the thermosyphon effect or by a bi-directional pump ring if a DMSF™ seal is used in conjunction with oil.

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AES15-8EX
typical arrangement



AES15-SP2
typical arrangement

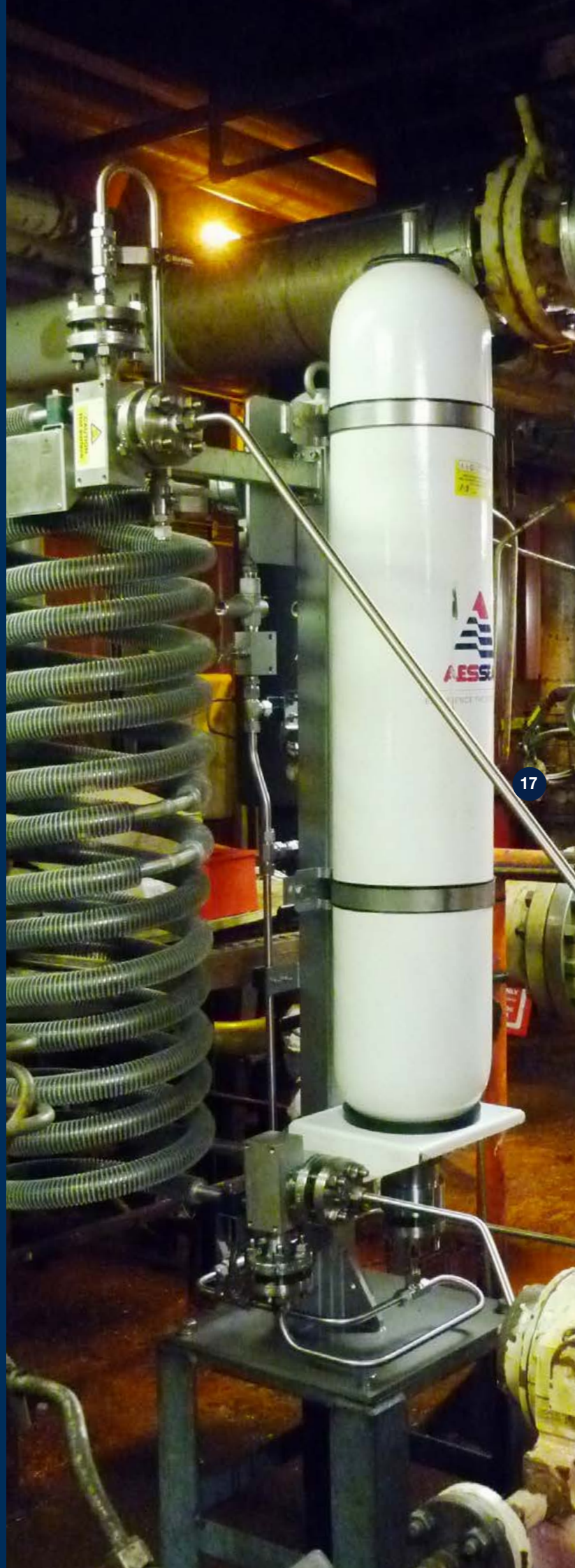


AES15-SW2
typical arrangement

For further information on Standard Plus
and Special systems [click here](#)

Complex Systems

In addition to our extensive range of standard products, AESSEAL® has a dedicated complex systems division which, in conjunction with our technical department and product development team, works with and reviews any customer enquiries regarding non-standard systems, examples of which are shown on the following pages. ATEX systems are also available.





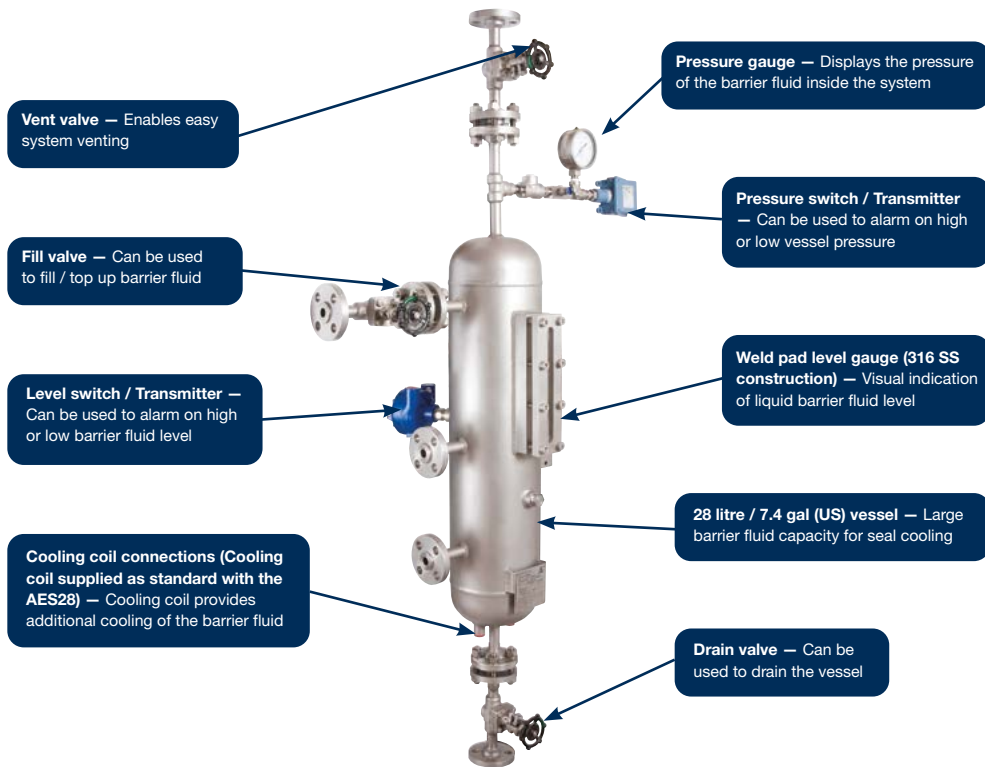
AES28™

API compliant, low maintenance and highly reliable oil or water seal support system with a weld pad level gauge and integral cooling coil as standard.

The larger volume fully API compliant AES28™ range is also available with a choice of three vessel options - screwed connection, socket welded, or butt-welded. A variety of component options are available to adapt the vessel to specific pump applications including electrical instrumentation, which is supplied as intrinsically safe or flameproof.

- **316 SS vessels** — Suitable for a wide range of arduous environments
- **API 682 compliant** — Designed in accordance with ASME VIII Div. 1 & PED 2014/68/EU standards and carry the UKCA & CE markings
- **Cooling coil as standard** — Additional cooling available for high heat applications
- **Modular design** — A number of intrinsically safe and EEXD flame proof instrumentation option can be fitted

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AES28™ Vessel Options



AES28™ Vessel with Butt Welded Flanges



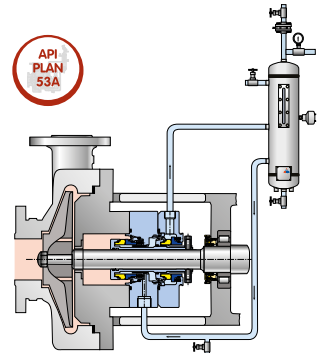
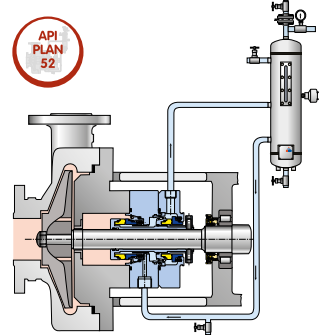
AES28™ Vessel with Screwed Connections



AES28™ Vessel with Socket Welded Flanges

Design Rating:
45 bar @ 100°C
652.7 psi @ 212°F

API Piping Plans examples



AES12™

The AES12™ vessel has been developed to meet the requirements of API 682 with a 12L barrier / buffer reservoir for shaft sizes 60mm (2.5") and below. The vessel can be used for Plan 52 (un-pressurized) or 53A (pressurized) support systems.

For further information on Standard Plus and Special systems click here



API Plan 53B Compression Fitting

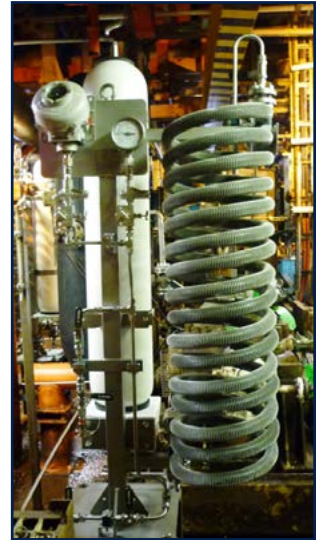
Smaller than the traditional welded Plan 53B, but offering all the same advantages, the Compression Fitting system is a more compact precision engineered system designed to fit in areas where space is limited.

Designed with a modular concept, facilitating efficient stock control, enabling rapid manufacturing times. Being a stand-alone system, it doesn't rely upon a central pressure source, making it much more reliable than a Plan 53A, and in no case will media leak to atmosphere. An inert gas pressurized bladder accumulator keeps the pressure media separate from the barrier fluid. Provides fault-tolerant containment in the event of seal failure so no loss of process fluid. Heat is removed from the circulation system by an air-cooled python cooler or water-cooled heat exchanger. Simply connect to mechanical seal, requires no other connections. It provides simultaneous condition monitoring for both the inner and outer seal and has a capacity / size available of 20/35L as standard, 50L on request.

- **Modular design** — A wide range of assembly options available covering all required instrumentation and cooling options, capable of operating in any hazardous environments
- **Quick turnaround** — Utilizes high quality compression fittings for exacting manufacturing repeatability
- **User friendly** — Simple quick replacement and interchangeability of all parts. Instrumentation can be maintained or replaced without the need to stop production, reducing any enforced downtime costs. No welding required
- **Economical** — Attractive cost savings available against traditional welded design

Design Temperature:
-40°C to 200°C
(-40°F to 392°F)

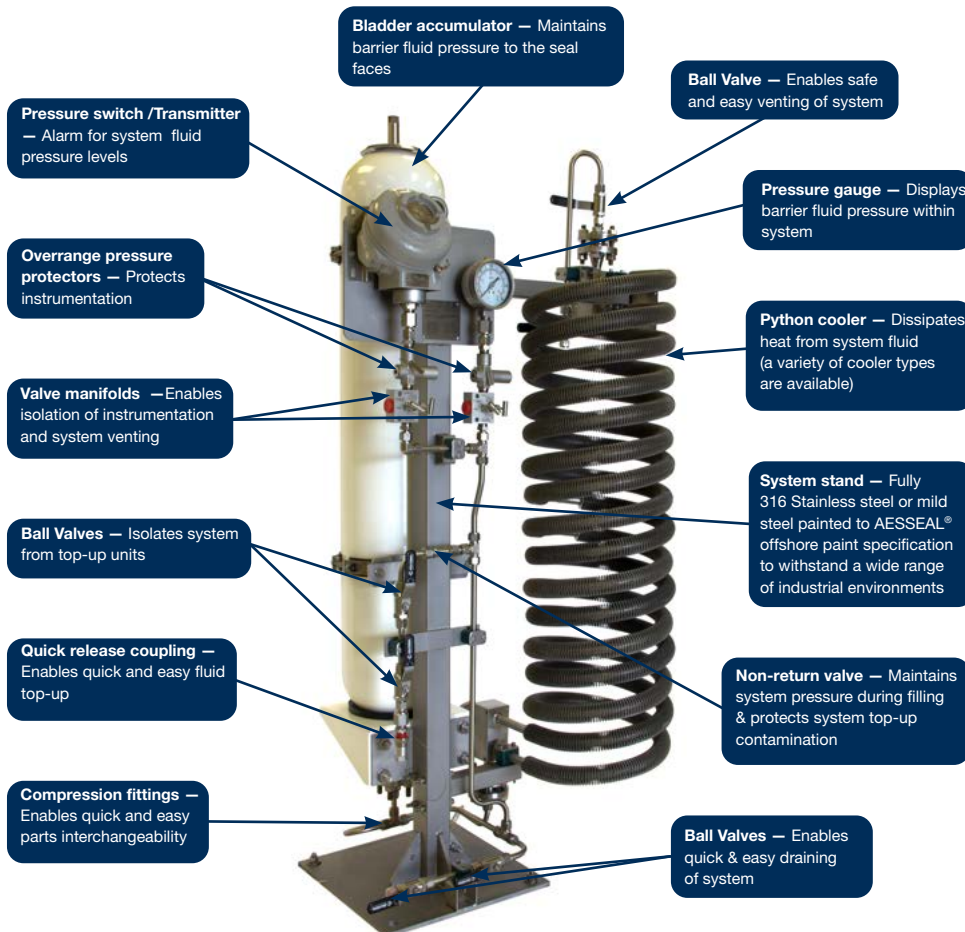
Max Design Pressure:
149 BarG (2161psiG)



Boxed compressed fitting systems



System Sentry® is an all-in-one solution employing pressure and temperature monitoring to allow the user to monitor the health of a 53B system using API 682 4th edition methods, quickly, simply, and without the need for additional cabling.



For further information on Standard Plus and Special systems click here



API Plan 53B Welded System

This highly versatile more robust design concept enables bespoke 53B butt weld or socket welded systems to be produced, tailored to customer specific needs.

The system pipework is constructed from 316 stainless steel, offering resistance to a range of arduous environments, and is fully API 682 compliant. It is available with a variety of component options including electrical equipment supplied as intrinsically safe or flameproof.

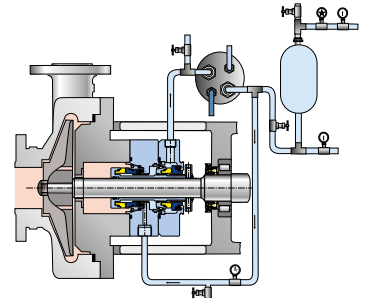
- **Robust and sturdy design** — With earthing boss for safe electrical earthing of the system
- **Paintwork suitable for on & offshore** — Grit blasted, four layered epoxy paint protection suitable for most environments

Design Temperature:

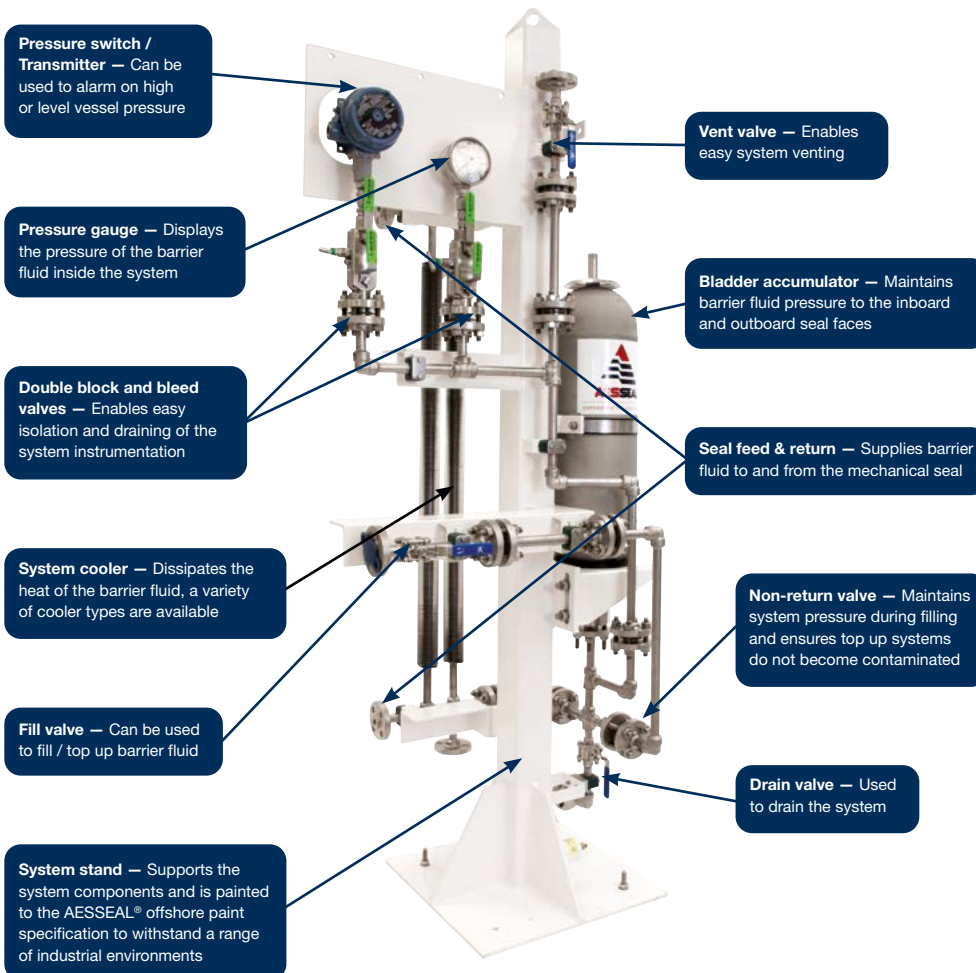
-40°C to 200°C
(-40°F to 392°F)

Max Design Pressure:

84 Bar (1218psi)



20



For further information on Standard Plus and Special systems click here

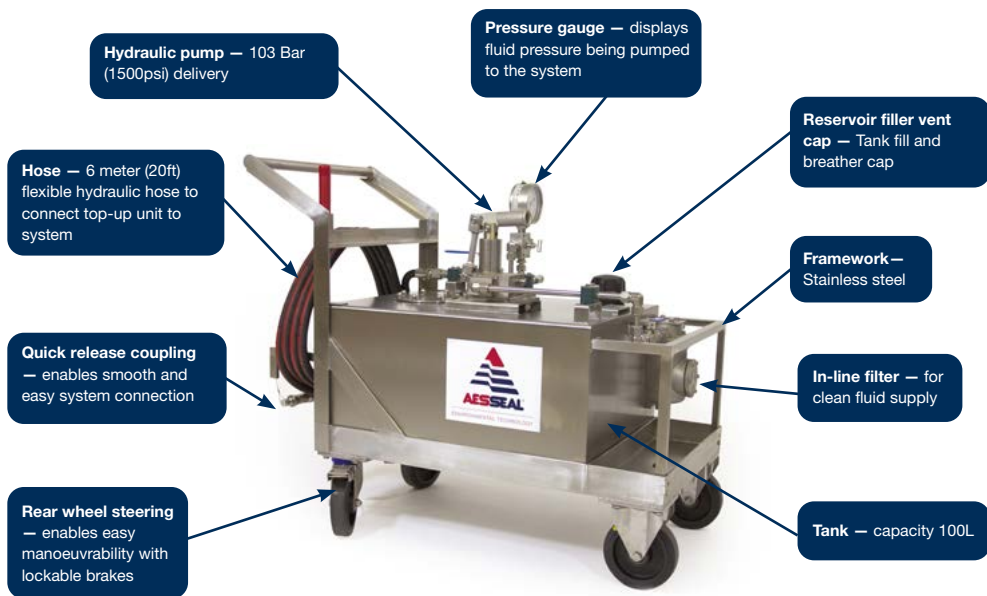


Top-Up Trolley

The Top-up trolley is a mobile fluid delivery unit designed for API 682 seal support systems.

The standard trolley has a 100 Litre (26 US Gal) tank capacity. Originally designed for re-pressurizing API Plan 53B systems, it can be used to transport practically all non-hazardous liquids to any system that requires external system fluid top-up, enabling a quick safe transfer of fluid to system. Made fully in stainless steel, it can be used in a vast majority of industrial applications and comes with a 6m (20ft) hydraulic flexible hose that includes a hand pump rated to 103 bar (1500 psi).

- **Full stainless steel construction** — Modular system for practically all commonly used barrier fluid media
- **Hand pump** — Quick reliable fluid delivery. Also available with air-driven pump** upon technical review
- **Mobile unit with integral braking system** — Operator friendly and easy to manoeuvre



100L Top-up trolley



The TUP100™ supporting the AESSEAL® Plan 53B system

System Rating:
0-20 bar (0-290 psi)*
(*depending on pressure gauge selection)



PLAN 53B multi-seal system
Top-up trolley



The complete seal support system includes a PLAN 53B multi-seal system with separate Python cooler & Top-up trolley



**Special Top-up trolley with air-driven pump



Special Top-Up Trailers available upon request and review



PP/01™

The AESSEAL® Oil PUMPPAC™ (PP/01™) is an efficient high performance forced oil circulation system.

The product was developed to meet the requirements of the API Plan 54 Piping Plan, which maximizes heat dump potential for the more arduous pump applications.

A fully certified ATEX version of the PP/01™ is now available with a range of optional extras to suit all applications. AESSEAL® also offers a high-flow pump option that can generate 12 litres / 3.17 gal (US) per minute.

- **API Plan 54 forced circulation system** — Maximizes barrier fluid heat dump potential
- **Enhanced modular design enabling use on multiple high end applications** — The PUMPPAC™ can be installed in a variety of ATEX 'zoned' environments utilizing specific ATEX instrumentation
- **Various cooling options available** — Integral water cooler / air blast cooler, mounted as one interconnected unit

PUMPPAC™ Options

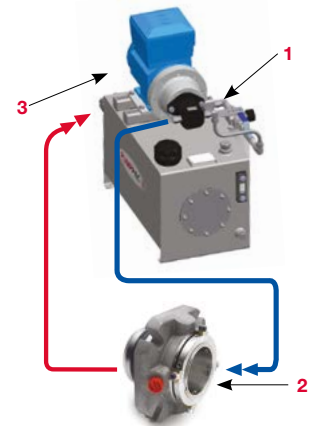
- **ATEX certified oil PUMPPAC™** — Covers all ATEX environments
- **Explosion proof motor** — Cast iron construction and ATEX certified
- **Top entry low level switch** — Safe area, intrinsically safe and explosion proof options
- **High / Low pressure switch** — Safe area, intrinsically safe and explosion proof options
- **Flow divider** — Splits the flow to feed multiple mechanical seals

Standard PP/01™

Max Operating Pressure:
70 bar (1016psi)

High Flow PP/01™

Max Pressure:
35 bar (508psi)



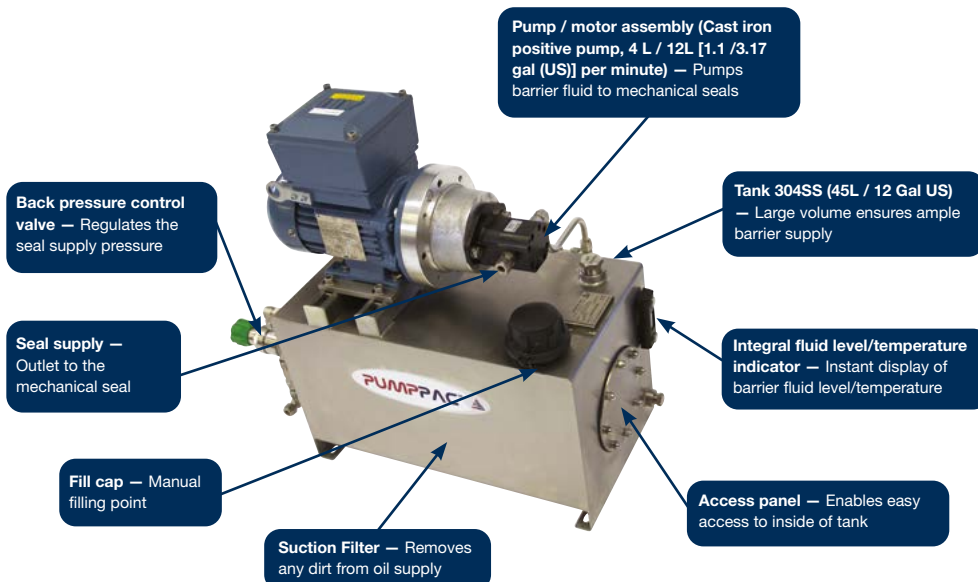
Operating Principle

- 1.** Cool barrier fluid is pumped from the PUMPPAC™ to the mechanical seal.
- 2.** Barrier fluid passes through the mechanical seal and back to the PUMPPAC™ where it is cooled.
- 3.** The back control valve controls the pressure in the line.



PP/SOU™

The PP/SOU™ is an entry level alternative to the standard AESSEAL® PUMPPAC™ range suitable for many industries. This is a high specification but low-cost solution to forced circulation seal support systems. Not suitable for ATEX environments.



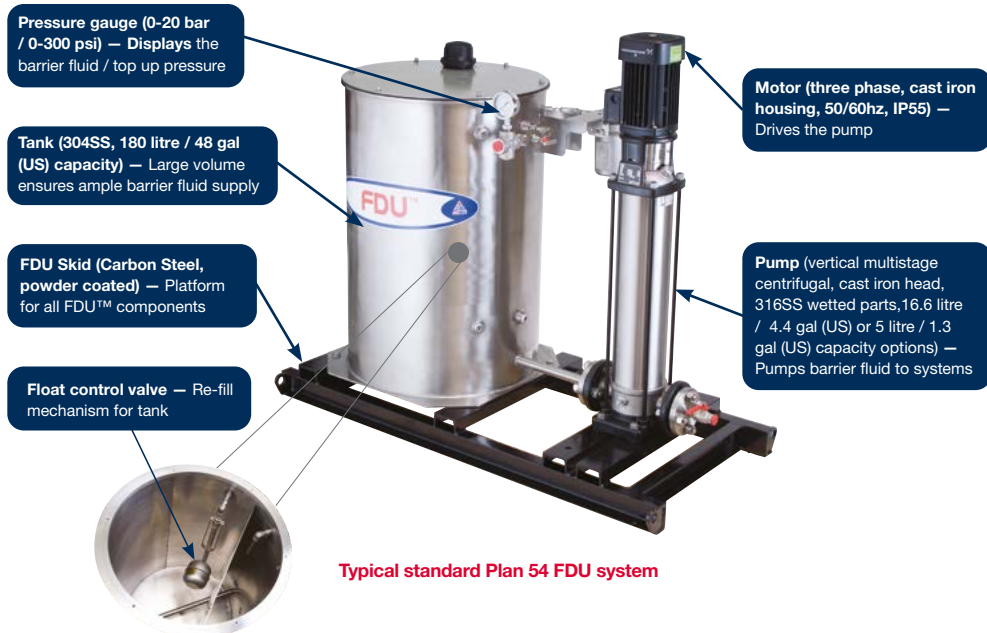


FDU™ Auto Top Up & Plan 54

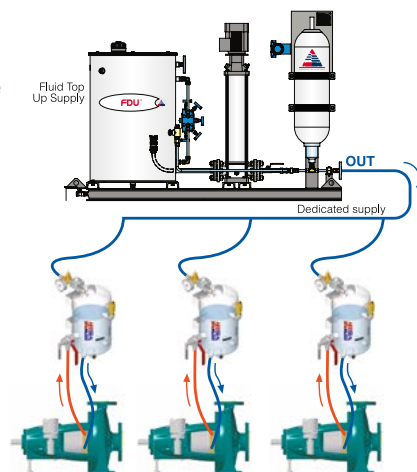
The AESSEAL® FDU™ (Fluid Distribution Unit) is an efficient high performance forced circulation PUMPPAC™ system.

The FDU was developed to meet the requirements of the API Plan 54 Piping Plan, which maximizes heat dump potential for more arduous pump applications. The FDU™ is a robust and efficient unit, adaptable to a wide range of industry applications. The addition of electronic or mechanical monitoring equipment makes it a formidable system. With a large 180 Litre tank, it can support many applications at one time, delivering fast cool clean pressurized barrier fluid at a regulated high flow rate. It can support water applications for all industries: Oil & Gas, Petrochemical, Food & Beverage, Chemical etc. and in most environments.

- **Independent pressurized fluid supply system** — Removes the expense of piping a pressurized clean water supply to a new area of the plant
- **Reduced energy consumption** — The system can be operated intermittently to reduce energy costs via dead-ended piping
- **Optional extras include level switch, pressure switch & accumulator** — Enables greater control of water level, ring main pressure. (FDU ATU Top-up Arrangement incorporates a pressure switch & accumulator as standard, with the option for an alternative transmitter.)



FDU™ Operating Principle



FDU™ in a seal support system auto top up arrangement (the FDU™ can supply multiple seal support systems)

Maximum standard assembly pressure:
20 bar (290 psig)

Design Temperature:
**-20°C to 100°C
(-4°F to 212°F)**



FDU™ with Forced Draft Seal Cooler (FDSC™)



Plan 54 FDU™ ATU Engineered system to suit the specific requirements of the customer, providing flushing, cooling barrier fluid delivery or lubrication



Plan 54 FDU™ double pump with air blast & water cooler

Additional Piping Plans

Below are more examples of the various API Plans that are available. Contact the AESSEAL® complex systems division for quotes and more information.



API Plan 65

Leakage from seal faces is directed to a liquid collection system. A vessel with a high level alarm is provided for detection of excess leakage.

- Normally used with single seals where the leakage is expected to be mostly liquid
- Piping is connected to the drain connection of the gland plate
- Excessive flow rates are restricted by the orifice downstream of the vessel, causing leakage to accumulate in the vessel, activating level alarm
- Vessel overflow prevents vessel pressurization in event of seal failure



API Plan 75

Leakage of condensate from inboard seal of a dual containment seal is directed to a liquid collector.

- Can be used with Plan 72 with buffer gas or with Plan 71 without buffer gas
- Collection can be redirected to process fluid by using separate pumping device
- Can also be used with a single containment seal
- Test connection is provided to check the inner seal by closing the block isolation valve while pump is in operation and noting the time / pressure build-up relationship in the collector



API Plan 76

Vapour leakages from inboard seal of dual containment seal are directed to a vapour recovery system via a vent connection.

- Can be used with Plan 72 with buffer gas or with Plan 71 without buffer gas system
- Vapour leakage collection ensures zero to very low process emissions from outboard containment seal.



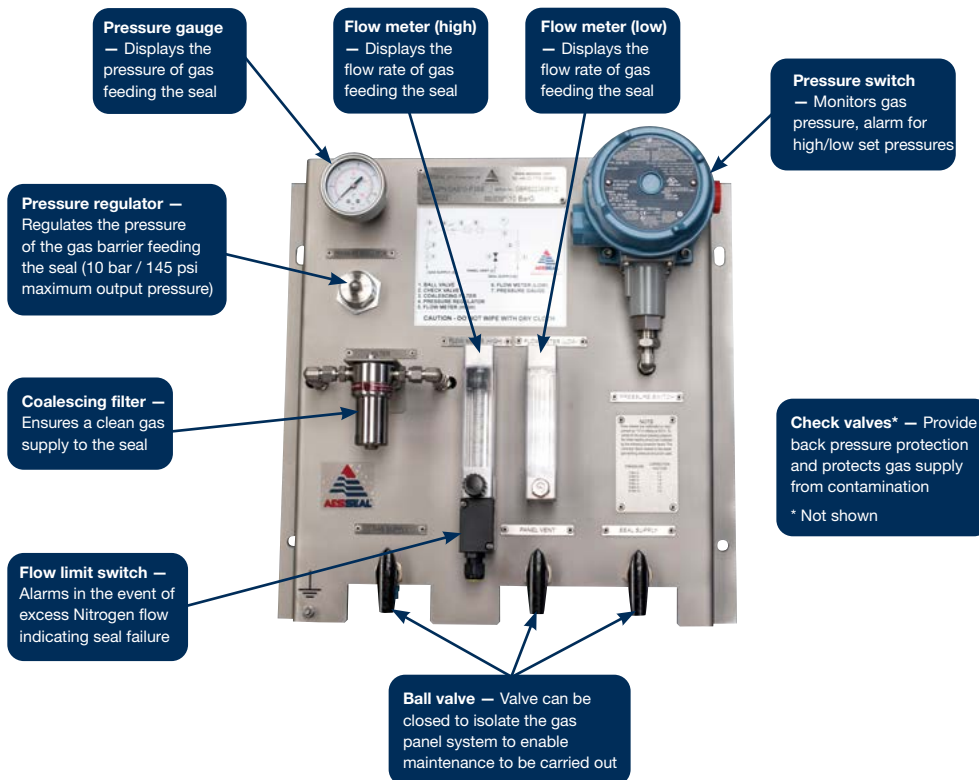


Gas Panel

The Gas Panel system is designed to supply inert gas (e.g. Nitrogen) to mechanical seals on processes that cannot tolerate contamination by water or oil barrier fluids.

The self-contained systems (standard and stainless) have a maximum inlet pressure of 14 bar/203 psi, and a maximum outlet pressure of 10 bar/145 psi enabling it to be used on a wide range of applications. A high pressure instrumented 21 bar version is also available.

- **Gas panel enclosures** — Components are enclosed in a secure cabinet providing protection from the industrial environment
- **Non-return valve** — Prevents product contamination of the gas panel during upset conditions
- **Dual flow indicators** — Allows primary flow indication and secondary alarm condition



Max Inlet Pressure:
14 bar (203psi)

Max Outlet Pressure:
10 bar (145psi)



Gas Panel Enclosure



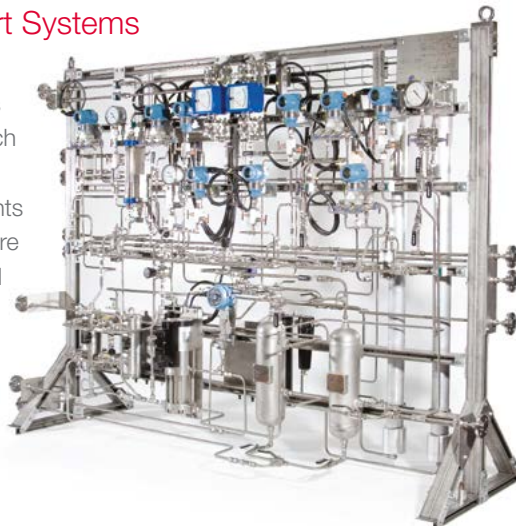
Stainless Steel Gas Panel

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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.





SMART TRACK®

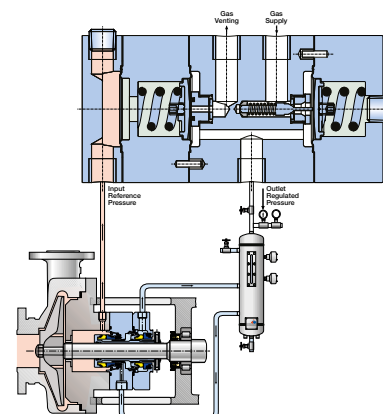
Designed to track and maintain a constant differential with fluctuations in process pressure.

Patented isolating pressure tracking valve that maintains a positive differential pressure between a reference input pressure (seal chamber / vessel pressure) and an output pressure (typically API Plan 53A), with the connection of a suitable supply (typically Nitrogen at a pressure greater than maximum operating barrier pressure). The device has an integrated isolation unit that will provide a physical barrier between product (seal chamber / vessel fluid) and the device.

- **Self regulating** — Tracks pressure to maintain an optimum double seal environment
- **Quick response** — Relieves transient and upset conditions quickly and efficiently
- **Simplicity** — A compact alternative to complex seals & system condition monitoring
- **Factory set** — No operator intervention required as Smart Track® is supplied pre-set

Seal Chamber Pressure:
-1 to 42 barg
(-14.5 to 415 psig)

Operating Pressure:
2 to 4 bar (30 to 60 psi)
above seal chamber



SMART TRACK II™

Patented variable back pressure valve. A unique & simple pressure tracking solution designed to track and maintain a constant differential with fluctuations in process pressure. A pressure tracking valve that will maintain a positive pressure differential between a reference input pressure (seal chamber) and a regulated barrier system pressure (typically API Plan 54).

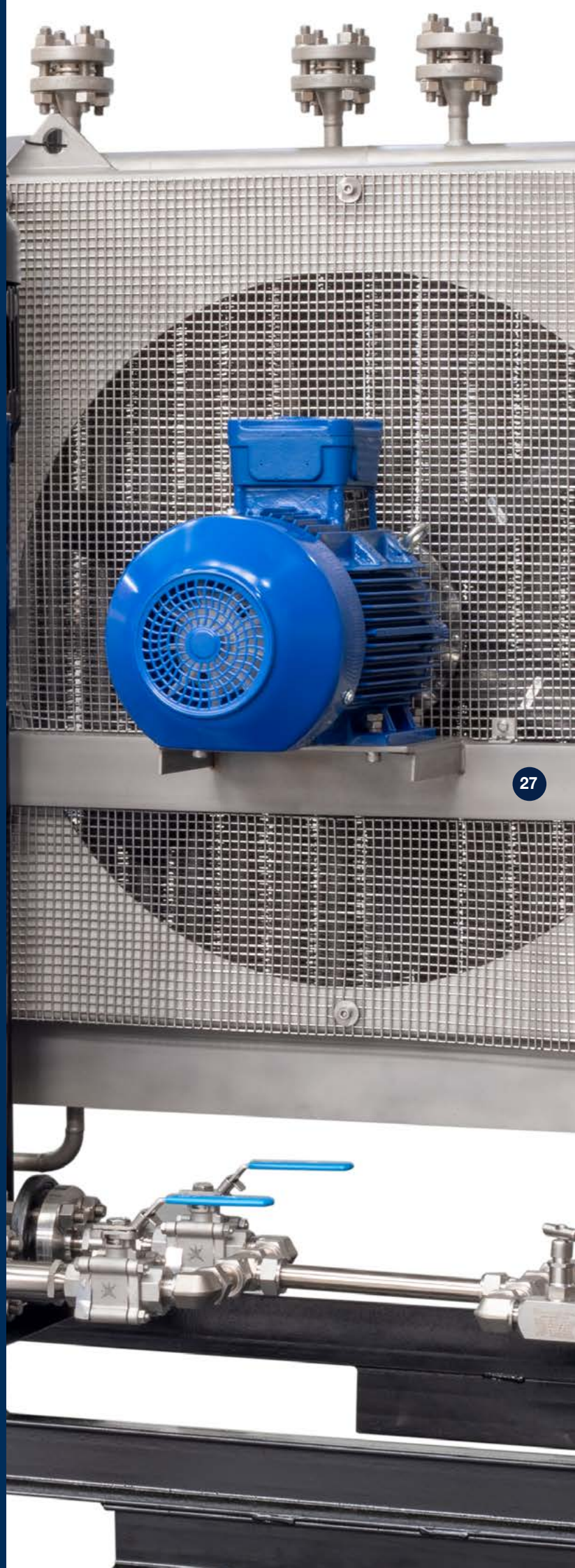
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**For further information on Standard Plus
and Special systems click here**

Cooler Options

In conjunction with our extensive range of standard seal support systems, AESSEAL® offers an additional range of cooling options. The air and water cooling solutions are adaptive to a broad range of industrial applications, providing sufficient cooling solutions for the end user's application.





FDSC™ — Forced Draft Seal Cooler

High performance cooling at a low cost, ideal for high heat generating applications.

The FDSC™ uses a combination of high performance cooling elements and high capacity, AC electrically powered fans to give long trouble-free operation in arduous applications. The FDSC™ design provides the highest cooling performance in heat dissipation whilst minimizing the space required. It has a high cooling capacity making it suitable for applications requiring a high level of heat dissipation. This product also offers a low cost, environmentally friendly cooling solution.

Air blast coolers are used for process cooling. Ambient air is forced over a finned tubing heat exchanger to remove unwanted heat from a closed circuit containing process fluids or intermediate coolant. Coolant return temperatures can be reduced to as low as 10°C above ambient air temperature.

Coolers are available with 300lb, 600lb or 1500lb flanged connections on a standard 10 or 20 bank unit, depending on capacity of the fluid requiring to be cooled and the extent of the temperature reduction. (Other combinations are available on request) Small footprint enables it to fit in areas where space is at a premium with simple flanged inlet/outlet cooler connections. Fully API compliant, ATEX certification available.

- **High Cooling Capacity** — Suitable for applications requiring a high level of heat dissipation
- **Versatile** — Can be used with a variety of different API systems
- **Water saving** — No requirement for an on-site water supply, environmentally friendly

Maximum
Working Pressure:
80 barg (1160 psig)
@120°C (248°F)



**FDSC™ cooling unit
supporting Plan 53B**



**Installation of FDSC™ attached
to an FDU™ system**



**Special 28 Fin tube Twin bank
FDSC™**

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Additional Cooler Options

AES-CIC Cooler

The AES-CIC Cooler is an efficient yet simple product that provides cost effective seal cooling utilizing a coiled 316L stainless steel pipe within pipe arrangement. It can be mounted horizontally or vertically, enabling ease of installation. The cooler is suitable for API Piping Plan 21, 22 and 23 arrangements, and in conjunction with all products in the AESSEAL® systems range to provide additional cooling on high heat applications.



Stand mounted Coil in coil coolers are available upon request

AES682C™

The AES682C™ is a robust high efficiency cooler comprising a full stainless steel shell & tube heat exchanger, with an innovative dual concentric tube coil for cooling mechanical seal barrier/buffer/flush fluids. Using plant cooling water on the shell side, and hot barrier/buffer/flush/fluids on the tube side. Removable flange enables easy cleaning and maintenance. Suitable for a wide range of arduous environments.



AES682C™
Internal



AES682C™
Shell

Air Blast Cooler

The Air Blast Cooler uses a combination of high heat dissipation cooling elements, and a high capacity compact AC electrically powered fan to give long trouble-free operation in arduous applications. This compact design provides the highest cooling performance in barrier fluid heat removal whilst minimizing the space required.



Liquid - Helicoil Cooler

The Helicoil Cooler is constructed using 316 stainless steel tube inside a cast iron casing (cast steel & cast 316 steel casting options available). This robust product is a very efficient seal cooler used on API Piping Plan 21, 22 and 23 arrangements. The product can also be used in conjunction with other products in the AESSEAL® systems range to provide additional cooling on high heat applications.



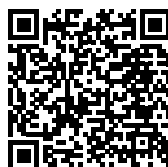
Python™ Cooler

The AESSEAL® Python™ Cooler is an advanced air-cooled heat exchanger for cooling mechanical seal barrier/buffer/flush fluids. Air cooling is achieved through natural convection without the need for cooling water. The unit consists of a tube formed into a coil, terminated with inlet and outlet manifolds. The Python Coolers are available in 4m and 8m single coils and 16m dual coil arrangements.



Single Coil
arrangement

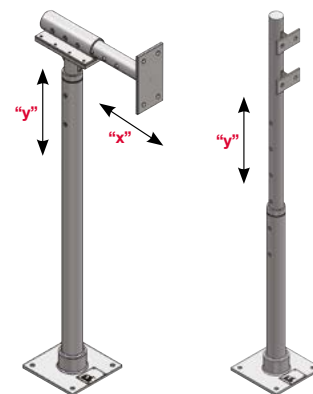
Dual Coil
arrangement



Optional Extras

Vessel Options

- Mounting stand - Standard and telescopic options
- Level switch - Safe area, intrinsically safe and explosion proof options
- Pressure switch - Safe area, intrinsically safe and explosion proof options
- PTFE lined braided flexible hose kit - SS construction
- Hard pipe kit - SS construction
- Finned tubing kit - Includes all necessary connections
- In-line water filter kit - Includes all necessary connections
- Cooling coil - 316 SS construction
- Hand pumps - Water and oil options
- Air/Nitrogen supply regulator - Options:
Zinc alloy/NBR Elastomers - Die cast Aluminium/Nitrile seals also SS option
- Vessel kits - Consists of a vessel and decals only
- TOP-UP Trolley - Portable unit used to transfer liquid to system
- Pressure gauge - All SS option



XY and Y Telescopic System Stands



Regulator



Level Switch

Plan 53B Insulation Jacket

The Plan 53B Insulation Jacket reduces the temperature fluctuations of 53B systems often caused by sunlight and natural seasonal temperature changes.

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By reducing these fluctuations it provides two key advantages:

- Allows for more accurate pressure readings to be recorded and fill level monitoring
- Reduces the differential pressure between the product and system pressures, increasing seal longevity



ICEGUARD™

The AESSEAL® ICEGUARD™ is ideal for commercial and industrial applications where water is prone to freeze in and around the seal support system.

The ICEGUARD™ continually senses the temperature of the water inside the seal support system. When the water temperature approaches freezing, and freeze damage is imminent, the thermal actuator opens the valve. When the makeup water temperature returns to the safe range, the valve then closes, minimizing water loss. The flow generated prevents the liquid inside the system from freezing.

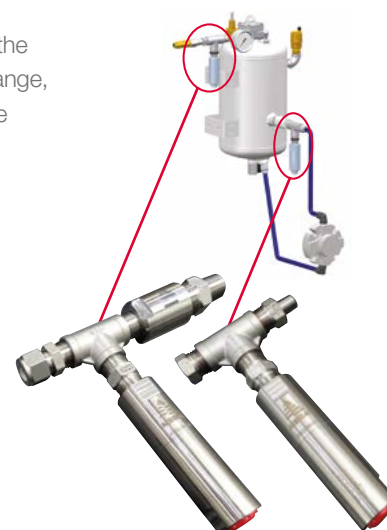
The ICEGUARD™ is designed to be:

- Self automated
- Installed on the system and ignored
- Free from electronics
- Provide 24/7 freeze protection 365 days per year

The ICEGUARD™ comes as a 2 piece product:

- The first protects the closed loop system to and from the mechanical seal from freezing
- The second protects the water feed line into the vessel from freezing

With both installed correctly, the ICEGUARD™ will offer effective freeze protection to the entire seal support system.



AES-FV™

The AES-FV™ (Flanged Vessel) has a removable flange to enable quick and easy cleaning inside the vessel.



AES-FV™ closed



AES-FV™ open for internal cleaning



AES-FV™ System

Heat Guard

Industrial applications are hazardous places for personnel to work especially when hot oil seal support vessels are in use. Health and Safety Regulations stipulate that protective clothing and guarding should be provided where objects with surface temperatures greater than 50°C (122°F) are present.

The heat guard can be used on a variety of different 12 & 15L vessels in high temperature applications, it remains 40°C (104°F) cooler than the vessel surface, eliminating any potential burns due to unforeseen contact to personnel working in the area.

Retrofittable design allows it to be installed onto vessels currently in operation.



Cyclone Separator

The CYCL™ (Cyclone Separator) is designed as a reliable low-cost method to separate solids from fluids using centrifugal force. The separation process depends on the size and density of the particles. Depending on the fluid velocity, the cyclone separator can be used to separate all types of particles. It is also possible to allow fine particles to be carried by the fluid. The clean fluid can then be used as a flush liquid.



FLOWTRUE®

The AESSEAL® FLOWTRUE® is a robust and adjustable flow meter that controls the amount of water flowing to the mechanical seal for cooling purposes.

The unique and advanced FLOWTRUE® design means that of all the flow meters available, it is the least likely to clog which is due to large internal clearances within the design. There are three models of the FLOWTRUE® available, which enables the product to be used on packing applications, and on single and double mechanical seals.

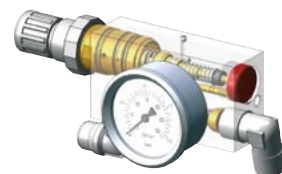


Flow Fuse™

The Flow Fuse™ is designed to restrict barrier fluid contamination of the process on momentary or permanent seal failure. The Flow Fuse™ does this by isolating the seal support system from the plant water supply when it detects an abnormally high flow of water.

It can be used in manual-reset and auto-reset modes. In manual-reset the Flow Fuse™ will completely isolate the plant water supply upon the detection of seal failure, then manually reset. This mode is most suited to applications where barrier fluid contamination of the process cannot be tolerated.

In auto-reset, it will shut off the plant water supply on seal failure, but allow a small volume of water to continue to pass through if the seal failure is momentary (e.g. temporary parting of the seal faces), and will automatically reset itself to the original operating pressure once the problem has been resolved.



Thermal Fuse™

The Thermal Fuse™ is a pressure relief valve designed to relieve the system of pressure build-up as a result of a temperature increase.



ENVIRONMENTAL TECHNOLOGY

Here is a simple reference guide for system selection when a single or dual seal from AESSEAL® requires a secondary support system.



Product Codes Guide

AESSEAL® utilizes one of the world's leading enterprise resource planning software solutions ensuring exceptional customer service.

SAP is used by our customer service team to simplify order processing. For any repeat orders from the old process, the Systems Division has established stock code configurations to simplify the repeat order process of ordering a standard seal support system. SAP codes ensure that customers order the exact product they require, and remove the need for developing special system codes when ordering products with optional extras. The seal support systems standard coding is intended as a quick look-up reference for common/popular standard system arrangements and the associated options.

To confirm which specific options are possible and for other options not shown please contact your appropriate administrator. An example of how a typical stock code could be formulated is shown below. This is for guidance only.



Code Breakdown

Below demonstrates a breakdown and example of SAP Legacy Codes for MCK standard Seal Systems;

Category Field:	Vessel System Type	System Arrangement	Size	Cooling	Component Materials	Instrument Protection	Level Inst.	Pressure Inst.	Hand Pump Option	Hose Option	Stand Option
Max No. Characters:	4	2	2	2	2	1	1	1	1	1	1
Example:	VSE/	P2	12	CC	SA	E	A	A	B	A	B
Description:	SSE Vessel System	P2	12L	Cooling Coil	Standard	Explosion Proof	Safe Area Low Level Switch	Safe Area High/Low Pressure Switch	Water Hand Pump	Nylon Hose Kit (12mm) w/ seal fittings	Telescopic Y Stand

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Standard MCK Seal Systems Options

Vessel System Type	
Options	Code
SSE Type Vessel	VSE/
VAP Type Vessel	VAP/
EASYCLEAN	EAS/
AES15 - Low Press	15L/
AES15 - Med Press	15M/
AES15 - High Press	15H/
EASYCLEAN + ICEGUARD	EAI/
SSE Type + ICEGUARD	VSI/

Instrument Protection	
Options	Code
Ex nA	S
Ex d	E
Ex i	I
N/A	-

Cooling	
Options	Code
Coiling Coil	CC
N/A	-

System Arrangement	
Options	Code
P1	P1
P2	P2
P3	P3
W2	W2
W3	W3
WM	WM
WP	WP
WC	WC

Level Instrument	
Options	Code
Low Switch (Ex nA)	A
High/Low Switch (Ex nA)	B
Low Switch (Ex d)	C
High/Low Switch (Ex i)	D
N/A	-

Vessel Size	
Options	Code
10 Litre	10
12 Litre	12
15 Litre	15
25 Litre	25

Pressure Instrument	
Options	Code
High/Low Switch (Ex nA)	A
High/Low Switch (Ex d)	B
High/Low Switch (Ex i)	C
N/A	-

Stand	
Options	Code
Standard (304 SS)	A
Telescopic Y (C.Steel)	B
Telescopic XY (C.Steel)	C
Telescopic Y (304 SS)	D
Telescopic Y (304 SS)	E
N/A	-

Component Materials	
Options	Code
Standard 304 SS	SA
316 SS	SS

Hose	
Options	Code
Nylon Hose Kit 12mm	A
Nylon Hose Kit 1/2"	B
SS Hard Pipe Kit 12mm	C
SS Hard Pipe Kit 1/2"	D
SS Braided Hose Kit 12mm	E
SS Braided Hose Kit 1/2"	F
Finned Tube Kit 12mm	G
Finned Tube Kit 1/2"	H
N/A	-

Hand Pump	
Options	Code
Oil	A
Water	B
N/A	-

An AESSEAL® seal and system fitted to an existing pump without the need for any modifications, increased reliability and saved the customer over \$200,000.

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\$200k

£166,000 / €187,000

A system installed at a US refinery has helped to eliminate a risk to personnel caused by the periodic release of hydrogen sulfide (H_2S). The AESSEAL® CAPI-TXS™ API 682 cartridge seal was fitted to the legacy pump without modifications, and the 53B was sufficiently compact that it could be installed even in the limited space around the pump. The AESSEAL® system has not only eliminated the risk to personnel from the release of H_2S associated with the previous arrangement, but has also saved the company upwards of \$200,000 (>£166k / €187k) in seal repairs in the four years since its installation.



To read the full case study, scan the QR code

Industry Expertise

The AESSEAL® modular seal support system range has evolved from application experience in industry's most challenging environments. This means we have a proven, reliable system for your equipment.

Please contact your local AESSEAL® representative to discover more about proven seal support solutions.



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aes seal.com/oil-gas



aes seal.com/power



aes seal.com/mining



aes seal.com/paper



aes seal.com/chemical



aes seal.com/food



aes seal.com/water



aes seal.com/bio-ethanol



aes seal.com/metal

AESSEAL® Keeping you moving day & night,
let us take the pressure - systems you can trust



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For further information and safe operating limits contact our technical specialists at the locations below.



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ISO/TS 29001, ISO 37001, ISO 45001 & ISO 50001



Net Zero champions globally



INVESTOR
IN PEOPLE

Use double mechanical
seals with hazardous
products.

Always take safety
precautions:

- Guard your equipment
- Wear protective clothing



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