

PART OF A FAMILY
OF PRODUCTS
AWARDED THE
QUEENS AWARD FOR
ENTERPRIZE
INNOVATION 2004



THE QUEEN'S AWARDS
FOR ENTERPRIZE
INNOVATION
2004



ENVIRONMENTAL TECHNOLOGY

DMSF™ Double Monolithic Stationary Flow Cartridge Mechanical Seal



- IMPROVE PLANT UPTIME AND REDUCE MAINTENANCE COSTS
- WORLD LEADING BARRIER FLUID PUMPING AND SEAL FACE COOLING
- DESIGNED TO WITHSTAND BARRIER & PROCESS PRESSURE FLUCTUATIONS
- INTERNATIONALLY PATENTED DESIGN

DMSF™ - high performance sealing solution



AESSEAL® is one of the major specialists in the design and manufacture of mechanical seals and support systems.

Mechanical seals are used in pumps and rotating equipment to prevent liquids and gases from escaping into the environment.

Growth in excess of 22% per year has allowed AESSEAL® to become the only major international new entrant to the mechanical seal industry in the last twenty years.

The current range of products is also expanding to cover new markets and niches. Continued improvement of existing products and design excellence help us achieve superior product performance.

The DMSF™ is not a replacement for the highly successful CDSA™ range. The unique DMSF™ design features extend the range of applications that can be sealed by AESSEAL® products.



The AESSEAL® Global Technology Centre, Group Headquarters, Rotherham, UK.



Industry leading modular design is proven to decrease costs and increase equipment uptime.

The AESSEAL® DMSF™ range of double cartridge mechanical seals has been designed as a high performance sealing solution for arduous applications.

The current range of DMSF™ mechanical seals is the result of over 3 years extensive evaluation and development. AESSEAL® believe that the DMSF™ is the most technologically advanced mechanical seal in its class.



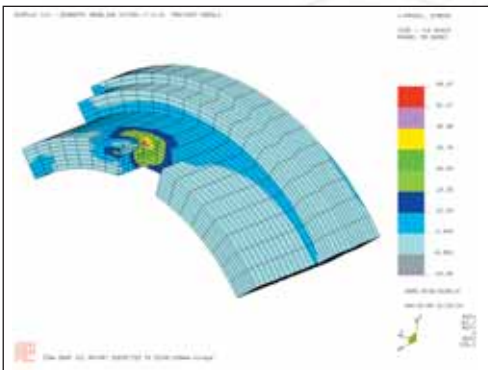
The AESSEAL® modular sealing system combined with unrivalled inventory levels ensure that ANY standard seal in any size or material combination is available for immediate despatch.

At the time of going to print AESSEAL® could supply 200,000 cartridge seal assemblies and 70,000 component seal assemblies from inventory. AESSEAL® do not believe in "just in time". Relative to sales, we believe that we hold the highest level of inventory in the industry and as a result, we can offer the best delivery performance to keep your plant running.

DMSF™ - design and development

The DMSF™ seal design was created as a result of a request from a major AESSEAL® customer who required a set of seal design features which was not satisfied by one existing AESSEAL® product.

The design evolved after a comprehensive market review of existing seal designs and best engineering practice. Inevitably, as with the majority of our designs, new and novel patented features were developed, helping to ensure that the final product would excel in some of the most difficult and arduous applications found on-site.

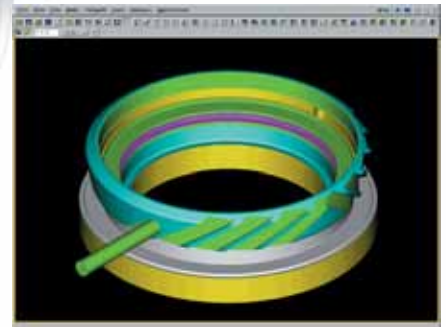


Thorough design simulation using Computer Aided Engineering (CAE) and Finite Element Analysis (FEA) was conducted prior to physical tests. This computer evaluation helped to increase the reliability of the prototypes and reduce the seal development time.



The DMSF™ commanded the most extensive test program that the company had ever undertaken. These tests included stop/start, cyclic temperature, flow and duration tests, at various seal sizes and seal face combinations.

Furthermore, the design was rigorously benchmarked against and outperformed similar products in its class in many sealing attributes.



This world class product is complemented with the use of state of the art manufacturing methods and equipment, ensuring that the technically sophisticated design is produced to exacting standards.



DMSF™ - design and technical features

Monolithic Seal Faces

ALL seal faces are of monolithic, one piece, construction and therefore are less likely to distort in high and low temperature applications.

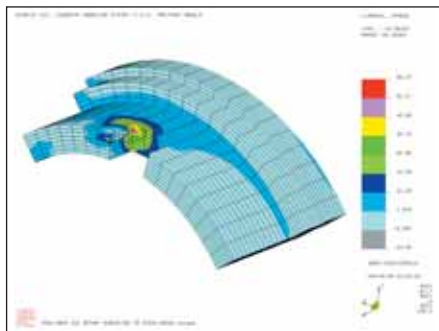
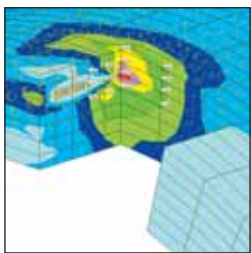
Double Hydraulically Balanced Seal Faces

Inboard seal faces are DOUBLE BALANCED helping to ensure excellent sealing at high or low barrier to process pressure differentials.

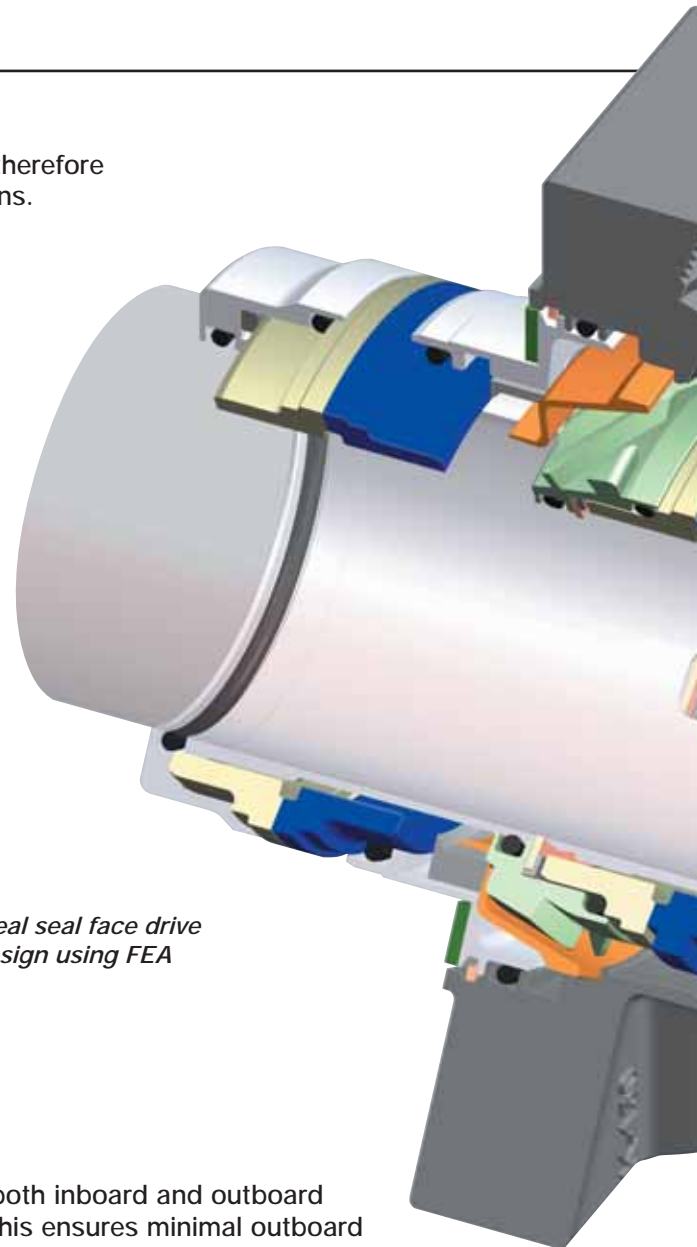
Double pressure balanced inboard seal faces minimize seal face distortion and help to ensure stable fluid film conditions between the seal faces.

Reliable Face Drive Mechanism

Finite Element Analysis has been used to optimize seal face drive. Precise, solid machined drive lugs/pins reduce drive slop between the drive ring and seal face. This is beneficial on equipment start-up/shut-down when using monolithic brittle face materials such as Silicon Carbide or Carbon.



Ideal seal face drive design using FEA



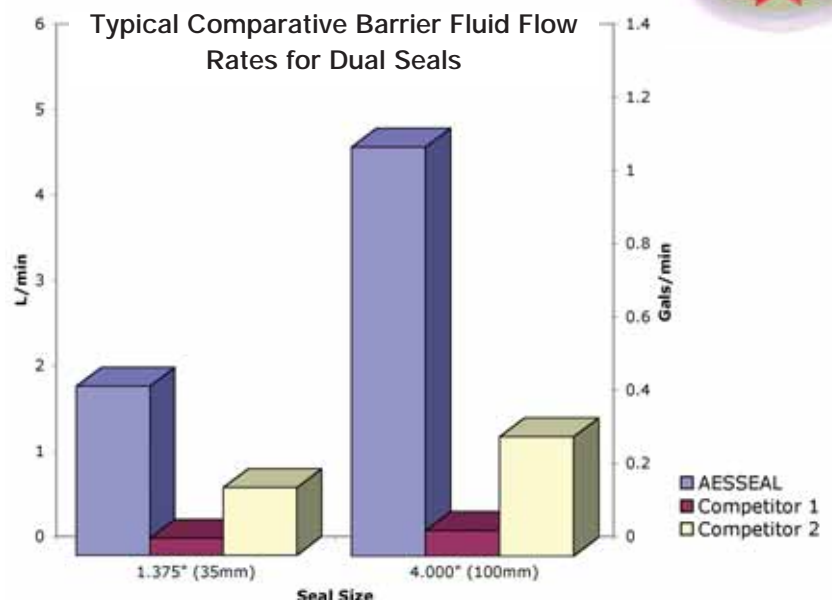
Seal Face Heat Generation

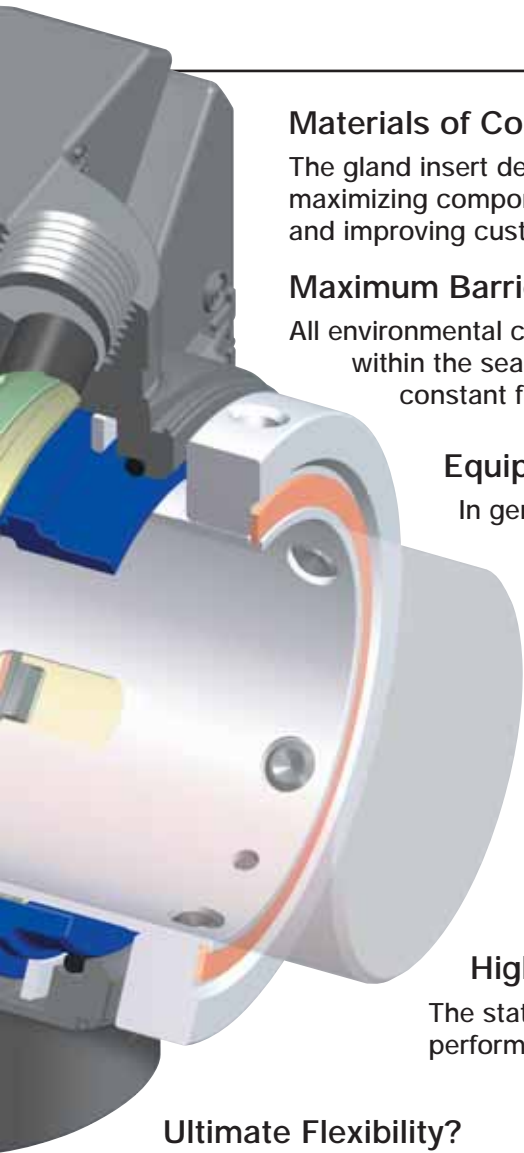
Some seal designs use a modular "wide" running seal face in both inboard and outboard positions. ALL outboard DMSF™ seal faces are "thin faced". This ensures minimal outboard heat generation, which minimizes the "heat dump" requirements of the seal support system.

DMSF™ - a unique >bi-directional< pumping ring

Unique Barrier Pumping Design

The unique, patented, bi-directional, integral pumping design delivers high volumes of barrier fluid to the inboard and outboard seal faces.





Materials of Construction Flexibility

The gland insert design enables cost effective alternative wetted materials to be offered, whilst maximizing component modularization, reducing on-site inventory levels, reducing repair costs and improving customer service.

Maximum Barrier Fluid Flow

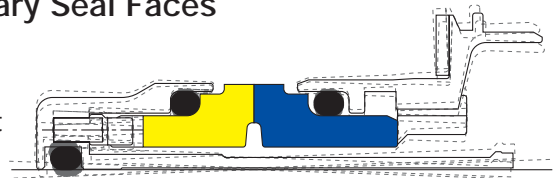
All environmental control ports are 3/8" NPT, helping to maximize the internal cooling affects within the seal. The outlet port is positioned directly over the outboard seal faces ensuring constant fluid replacement where it counts.

Equipment Eccentricity & Shaft Growth

In general the larger the equipment, the higher the probability that the equipment shaft will be eccentric to the equipment housing. The range of large DMSF™ seals accommodate axial thermal shaft growth of +/- 0.040" (+/-1.0mm) and radial shaft movement of +/-0.030" (+/-0.75mm) (speed dependent).

Self Aligning Stationary Seal Faces

Both stationary seal faces are spring loaded and compensate for mis-alignment between the shaft and the housing.



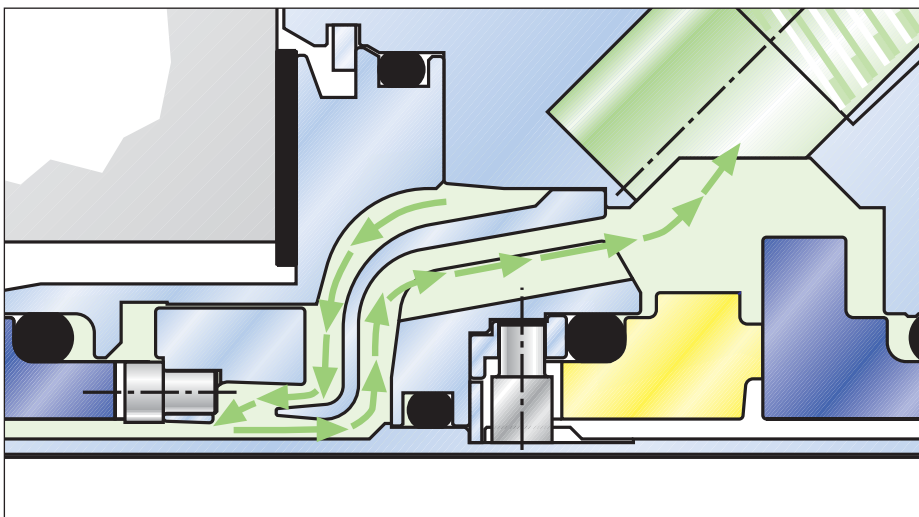
High Shaft Speed Applications

The stationary seal construction helps to minimize spring fatigue for optimum performance on high shaft speed applications.

Ultimate Flexibility?

The range of large DMSF™ inboard and outboard rotary seal faces are dimensionally inter-changeable. This allows the seal to be offered in a multitude of configurations in addition to the standard product offering. Processes which require the use of unbalanced inboard seal face technology may be supplied from inventoried components, without component modification.

DMSF™ - unique >directed< barrier fluid



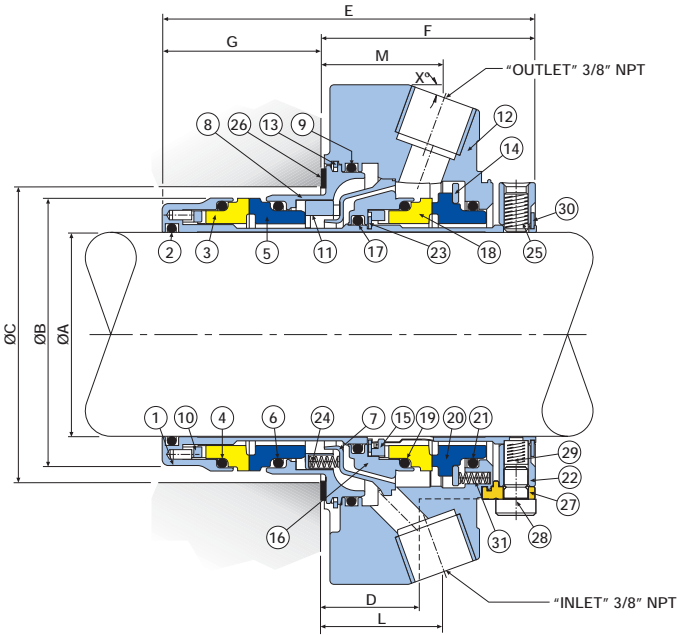
Inboard Seal Face Cooling

The majority of Flow Induced mechanical seal designs create a churning action with little or no barrier fluid flow. This has a limited effect on seal face cooling.

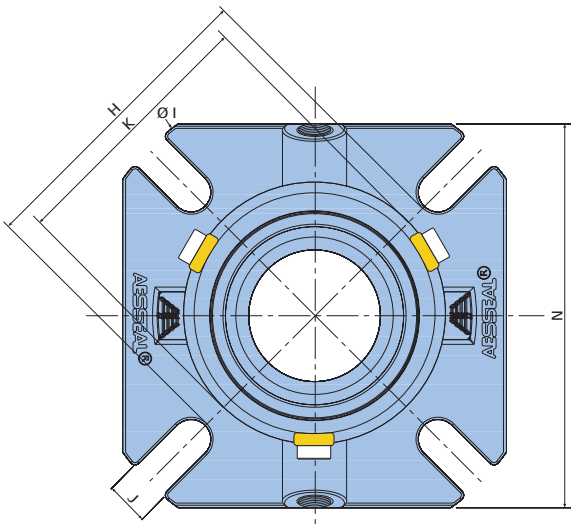
The DMSF™ has a stationary deflector which directs barrier fluid underneath the inboard faces ensuring constant barrier fluid replacement at the hottest and most important point on all mechanical seal designs.

DMSF™ - technical information

Standard 24.0 - 70.0mm (1.000" - 2.750") design

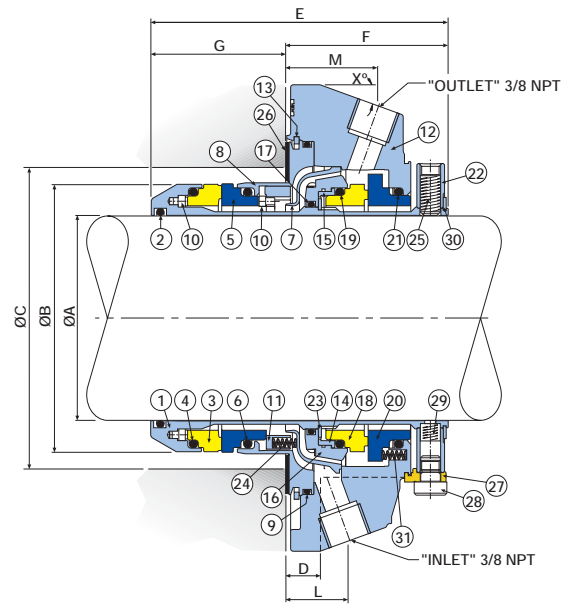


Standard ISO/ANSI Box Bore Gland Format

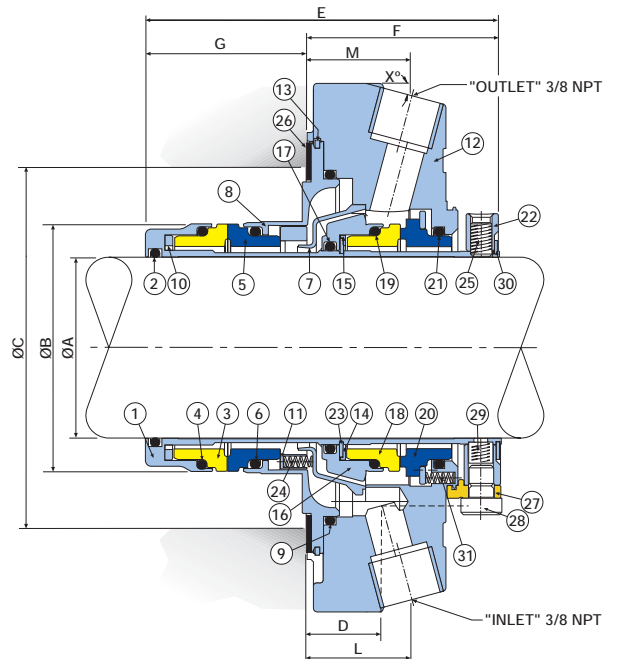


Item	Description	Material
1	Sleeve	316L SS
2	Sleeve O Ring	Viton® / EPR / Kalrez® / Aflas®
3	Internal Rotary Face	Carbon / SiC / TC
4	Internal Rotary Face O Ring	Viton® / EPR / Kalrez® / Aflas®
5	Internal Stationary Face	Carbon / SiC / TC
6	Internal Stationary Face O Ring	Viton® / EPR / Kalrez® / Aflas®
7	Deflector	316L SS
8	Gland Insert	316L SS
9	Gland Insert O Ring	Viton® / EPR / Kalrez® / Aflas®
10	Internal Drive Ring/Pin	Stainless Steel
11	Internal Spring Plate	316L SS
12	Gland	316 SS
13	Gland Insert Snap Ring	Stainless Steel
14	External Drive Ring/Spring Plate	316L SS
15	External Drive Ring/Pin	Stainless Steel
16	External Rotary Holder	316L SS
17	External Rotary Holder O Ring	Viton® / EPR / Kalrez® / Aflas®
18	External Rotary Face	Carbon / SiC / TC
19	External Rotary Face O Ring	Viton® / EPR / Kalrez® / Aflas®
20	External Stationary Face	Carbon / SiC / TC
21	External Stationary Face O Ring	Viton® / EPR / Kalrez® / Aflas®
22	Clamp Ring	316L SS
23	Circlip	Stainless Steel
24	Springs	Alloy 276
25	Drive Screws	Stainless Steel
26	Gasket	AF1 / GFT
27	Setting Clips	Brass
28	Setting Clip Screws	Stainless Steel
29	Anti-tamper Screws	Stainless Steel
30	Circlip	Stainless Steel
31	Springs	Alloy 276

Standard 75.0 - 125.0mm (2.875" - 5.000") design



ANSI Plus Box Bore (1.125" - 2.625")



EXOTIC ALLOY SEALS
Contact AESSEAL® for availability of Exotic Alloy options.

Important - some glands are manufactured from castings and therefore the angle and position of the port should be checked. If in doubt, please contact the AESSEAL® Technical Department.



Standard ISO / ANSI Box Bore 24.0mm - 70mm (1.000" - 2.750")

Seal Size	ØA	ØB	ØC		D	E	F	G	H	ØI	J	K	L	M	N	X°
			Min	Max												
24.0	24.0	40.8	43.0	48.0	19.2	92.0	53.1	38.9	57.7	105.0	14.0	50.4	28.2	29.2	99.0	20°
25.0	25.0	41.8	44.0	51.0	19.2	92.0	53.1	38.9	62.0	105.0	14.0	51.0	27.8	29.2	99.0	20°
28.0	28.0	45.4	47.0	54.0	19.2	92.0	53.1	38.9	65.0	111.0	14.0	55.5	27.5	29.4	101.6	20°
30.0	30.0	46.8	49.0	54.0	19.2	92.0	53.1	38.9	64.6	105.0	14.0	56.4	27.4	29.7	97.8	20°
32.0	32.0	49.8	51.0	57.0	21.5	92.0	53.1	38.9	66.5	105.0	14.0	59.4	28.4	30.9	99.0	25°
33.0	33.0	49.8	51.0	57.0	21.5	92.0	53.1	38.9	66.5	105.0	14.0	59.4	28.4	30.9	99.0	25°
35.0	35.0	51.8	53.0	59.0	20.7	92.0	53.1	38.9	68.5	120.0	14.0	61.4	29.3	29.3	104.1	15°
38.0	38.0	55.7	57.0	69.9	21.3	92.0	53.1	38.9	80.7	135.0	14.0	70.8	30.1	30.1	114.3	20°
40.0	40.0	57.6	59.0	70.5	21.3	93.2	53.1	40.1	80.7	135.0	14.0	70.8	30.1	30.1	114.3	20°
43.0	43.0	58.6	61.0	70.5	21.3	93.2	53.1	40.1	80.7	135.0	14.0	70.8	26.7	29.8	114.3	15°
45.0	45.0	62.0	64.0	75.0	21.9	93.2	53.1	40.1	84.6	139.0	14.0	73.8	30.5	30.5	117.5	20°
48.0	48.0	65.2	66.6	74.6	21.3	93.2	53.1	40.1	83.7	139.0	14.0	75.7	29.3	29.9	117.5	20°
50.0	50.0	68.0	70.0	78.0	21.6	93.2	53.1	40.1	87.6	150.0	17.5	78.9	30.5	30.5	124.5	20°
53.0	53.0	71.6	73.0	87.0	21.3	93.2	53.1	40.1	97.0	150.0	17.5	85.0	25.7	29.5	136.5	15°
55.0	55.0	71.6	73.0	87.0	21.3	93.2	53.1	40.1	97.0	150.0	17.5	85.0	25.7	29.5	136.5	15°
58.0	58.0	74.7	76.2	92.0	21.3	93.2	53.1	40.1	102.4	150.0	17.5	88.0	30.1	30.1	139.7	20°
60.0	60.0	77.9	80.0	92.0	21.6	93.2	53.1	40.1	102.4	164.5	17.5	88.0	30.5	30.5	139.7	20°
63.0	63.0	81.1	83.0	98.5	21.6	93.2	53.1	40.1	108.7	171.0	17.5	94.4	29.8	29.8	147.3	15°
65.0	65.0	84.3	86.0	98.5	21.3	93.2	53.1	40.1	108.7	171.0	17.5	94.4	29.4	29.4	147.3	15°
70.0	70.0	87.4	89.0	100.0	21.3	93.2	53.1	40.1	112.0	180.5	17.5	98.3	29.7	29.7	152.4	20°
1.000	1.000	1.646	1.750	2.000	0.755	3.622	2.091	1.531	2.441	4.134	0.551	2.008	1.093	1.150	3.900	20°
1.125	1.125	1.786	1.875	2.125	0.755	3.622	2.091	1.531	2.559	4.375	0.551	2.183	1.084	1.159	4.000	20°
1.250	1.250	1.961	2.000	2.250	0.847	3.622	2.091	1.531	2.618	4.134	0.551	2.340	1.120	1.215	3.900	25°
1.375	1.375	2.040	2.125	2.312	0.815	3.622	2.091	1.531	2.697	4.725	0.551	2.418	1.154	1.154	4.100	15°
1.500	1.500	2.192	2.250	2.750	0.837	3.622	2.091	1.531	3.177	5.315	0.551	2.786	1.185	1.185	4.500	20°
1.625	1.625	2.317	2.375	2.750	0.841	3.671	2.091	1.580	3.177	5.315	0.551	2.786	1.052	1.173	4.500	15°
1.750	1.750	2.442	2.500	2.937	0.862	3.671	2.091	1.580	3.337	5.475	0.551	2.907	1.200	1.200	4.625	20°
1.875	1.875	2.567	2.625	2.937	0.837	3.671	2.091	1.580	3.297	5.475	0.551	2.982	1.152	1.175	4.625	20°
2.000	2.000	2.677	2.750	3.062	0.852	3.671	2.091	1.580	3.450	5.906	0.689	3.108	1.200	1.200	4.900	20°
2.125	2.125	2.817	2.875	3.437	0.840	3.671	2.091	1.580	3.819	5.906	0.689	3.346	1.013	1.163	5.375	15°
2.250	2.250	2.942	3.000	3.625	0.837	3.671	2.091	1.580	4.030	6.475	0.689	3.466	1.185	1.185	5.500	20°
2.375	2.375	3.067	3.125	3.625	0.852	3.671	2.091	1.580	4.030	6.475	0.689	3.466	1.200	1.200	5.500	20°
2.500	2.500	3.192	3.250	3.875	0.852	3.671	2.091	1.580	4.280	6.725	0.689	3.716	1.173	1.173	5.800	15°
2.625	2.625	3.317	3.375	3.875	0.837	3.671	2.091	1.580	4.280	6.725	0.689	3.716	1.158	1.158	5.800	15°
2.750	2.750	3.442	3.500	3.937	0.837	3.671	2.091	1.580	4.405	7.100	0.689	3.871	1.171	1.171	6.000	20°

Standard ISO / ANSI Box Bore 75.0mm - 125mm (2.875" - 5.000")

Seal Size	ØA	ØB	ØC		D	E	F	G	H	ØI	J	K	L	M	N	X°
			Min	Max												
75.0	75.0	98.0	101.6	117.5	25.8	115.9	63.5	52.4	131.4	189.3	17.5	116.5	25.0	36.3	169.4	20°
80.0	80.0	104.4	108.0	127.0	25.8	115.9	63.5	52.4	142.5	201.9	21.0	126.0	25.0	36.3	169.4	20°
85.0	85.0	107.6	111.1	127.0	25.8	115.9	63.5	52.4	142.5	201.9	21.0	126.0	25.0	36.3	182.1	20°
90.0	90.0	113.9	117.5	136.5	25.8	115.9	63.5	52.4	152.0	214.6	21.0	135.5	26.2	36.3	194.8	20°
95.0	95.0	117.1	120.0	136.5	25.8	115.9	63.5	52.4	152.0	214.6	21.0	135.5	26.2	36.3	194.8	20°
100.0	100.0	123.4	127.0	139.7	25.8	115.9	63.5	52.4	155.2	227.3	21.0	138.7	26.2	36.3	207.5	20°
105.0	105.0	129.8	133.4	152.4	23.8	115.9	63.5	52.4	167.9	240.0	21.0	151.4	36.0	40.1	-	45°
110.0	110.0	136.1	139.7	152.4	23.8	115.9	63.5	52.4	167.9	240.0	21.0	151.4	36.0	40.1	-	45°
115.0	115.0	142.5	146.1	165.1	23.8	115.9	63.5	52.4	180.6	252.7	24.0	164.1	36.0	40.1	-	45°
120.0	120.0	142.5	146.1	165.1	23.8	115.9	63.5	52.4	180.6	252.7	24.0	164.1	36.0	40.1	-	45°
125.0	125.0	148.8	152.4	165.1	23.8	115.9	63.5	52.4	180.6	252.7	24.0	164.1	36.0	40.1	-	45°
2.875	2.875	3.735	3.875	4.625	1.014	4.562	2.500	2.062	5.173	7.450	0.689	4.585	0.986	1.429	6.670	20°
3.000	3.000	3.860	4.000	4.625	1.014	4.562	2.500	2.062	5.173	7.450	0.689	4.585	0.986	1.429	6.670	20°
3.125	3.125	3.985	4.125	4.625	1.014	4.562	2.500	2.062	5.173	7.450	0.689	4.585	0.986	1.429	6.670	20°
3.250	3.250	4.110	4.250	5.000	1.014	4.562	2.500	2.062	5.610	7.950	0.827	4.960	0.986	1.429	7.170	20°
3.375	3.375	4.235	4.375	5.000	1.014	4.562	2.500	2.062	5.610	7.950	0.827	4.960	0.986	1.429	7.170	20°
3.500	3.500	4.360	4.500	5.000	1.014	4.562	2.500	2.062	5.610	7.950	0.827	4.960	0.986	1.429	7.170	20°
3.625	3.625	4.485	4.625	5.375	1.014	4.562	2.500	2.062	5.985	8.450	0.827	5.335	1.033	1.429	7.670	20°
3.750	3.750	4.610	4.750	5.375	1.014	4.562	2.500	2.062	5.985	8.450	0.827	5.335	1.033	1.429	7.670	20°
3.875	3.875	4.860	5.000	5.500	1.014	4.562	2.500	2.062	6.110	8.950	0.827	5.460	1.033	1.429	8.170	20°
4.000	4.000	4.860	5.000	5.500	1.014	4.562	2.500	2.062	6.110	8.950	0.827	5.460	1.033	1.429	8.170	20°
4.125	4.125	5.110	5.250	6.000	0.937	4.562	2.500	2.062	6.610	9.450	0.827	5.960	1.418	1.578	-	45°
4.250	4.250	5.110	5.250	6.000	0.937	4.562	2.500	2.062	6.610	9.450	0.827	5.960	1.418	1.578	-	45°
4.375	4.375	5.360	5.500	6.000	0.937	4.562	2.500	2.062	6.610	9.450	0.827	5.960	1.418	1.578	-	45°
4.500	4.500	5.360	5.500	6.000	0.937	4.562	2.500	2.062	6.610	9.450	0.827	5.960	1.418	1.578	-	45°
4.625	4.625	5.610	5.750	6.500	0.937	4.562	2.500	2.062	7.110	9.950	0.945	6.460	1.418	1.578	-	45°
4.750	4.750	5.610	5.750	6.500	0.937	4.562	2.500	2.062	7.110	9.950	0.945	6.460	1.418	1.578	-	45°
4.875	4.875	5.860	6.000	6.500	0.937	4.562	2.500	2.062	7.110	9.950	0.945	6.460	1.418	1.578	-	45°
5.000	5.000	5.860	6.000	6.500	0.937	4.562	2.500	2.062	7.110	9.950	0.945	6.460	1.418	1.578	-	45°

With the exception of 5.500", seal sizes from 130mm - 150mm (5.125" - 6.000") are designed to suit specific equipment using modular components. Contact AESSEAL® technical department for dimensional information and availability.

Medium Box Bore

Seal Size	ØA	ØB	ØC		D	E	F	G	H	ØI	J	K	L	M	N	X°
			Min	Max												
35.0-M	35.0	51.8	53.0	65.0	20.6	92.0	53.1	38.9	87.6	136.5	14.0	64.7	18.9	27.3	108.0	15°
1.125-M	1.125	1.786	1.875	2.250	0.800	3.622	2.091	1.531	3.199	5.000	0.551	2.323	0.926	1.141	3.990	15°
1.375-M	1.375	2.040	2.125	2.500	0.750	3.622	2.091	1.531	3.449	5.375	0.551	2.549	0.950	1.141	4.250	15°
1.750-M	1.750	2.567	2.625	3.125	0.900	3.671	2.091	1.580	4.449	6.750	0.551	3.500	1.178			

DMSF™ - environmental support systems

AESSEAL® High Performance Barrier Fluid Systems help to increase plant uptime even further by enhancing the environment in which mechanical seals operate. Many of these Barrier Fluid Systems are Patented, which means that the technology is exclusive to AESSEAL®.

SW2™ Water Management System



Features Benefits

- 304 SS Vessel Construction:** Suitable for a range of challenging environments
- Water Regulator:** Maintains vessel water level and pressure
- Flow Indicator:** Visually alerts the user of an inboard seal failure
- Non Return Valve:** Protects plant water supply from contamination, and maintains vessel pressure in the event of supply interruption



SWFF-TF™ Water Management System



Features Benefits

- Flow Sensing Shut-off Valve:** Protects the process from barrier fluid contamination upon catastrophic seal failure
- Water Regulator:** Maintains water level and pressure
- Automatic Re-Set Facility:** Protects the mechanical seal from running dry during process up-sets
- Thermal Relief Valve:** Maintains System pre-set pressure by accommodating any thermal expansion



AES-15™ Systems



Features Benefits

- Higher Pressure:** Suitable for a wide range of arduous environments. Design rating 30 barg @ 200°C (435 psig @ 392°F)
- 316 SS Vessel Construction:** Suitable for challenging plant environments
- Enhanced Modular Design:** Suitable for both American and European site applications
- Cooling Coil as Standard:** Increases the surface area available for barrier fluid cooling



PUMPPAC™ Systems

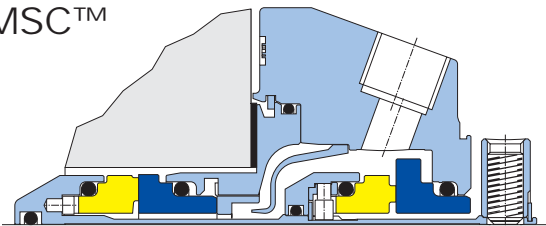


Features Benefits

- Forced Circulation:** Maximises heat dump potential for the more arduous applications
- Back Pressure Control Valve:** Ensures a positive barrier fluid pressure at the seal faces
- Modular Design:** Allows the PUMPPAC™ to be installed in a variety of zoned environments by interchanging the instrumentation options. There are both oil and water versions of the PUMPPAC™ available



DMSC™



DMSC™ - Double Monolithic Stationary Convection

As the name suggests, the DMSC™ mechanical seal is supplied without an integral pumping scroll, making it ideal for applications that demand an external forced circulation device. Such devices include the AESSEAL® PUMPPAC™ and SD SYSTEM™, versions of which are available for both aqueous and oil based barrier fluid mediums.

THIS DOCUMENT IS DESIGNED TO PROVIDE DIMENSIONAL INFORMATION AND AN INDICATION OF AVAILABILITY. FOR FURTHER INFORMATION AND SAFE OPERATING LIMITS CONTACT OUR TECHNICAL SPECIALISTS AT THE LOCATIONS BELOW.



USE DOUBLE MECHANICAL SEALS WITH HAZARDOUS PRODUCTS. ALWAYS TAKE SAFETY PRECAUTIONS:

- GUARD YOUR EQUIPMENT
- WEAR PROTECTIVE CLOTHING



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