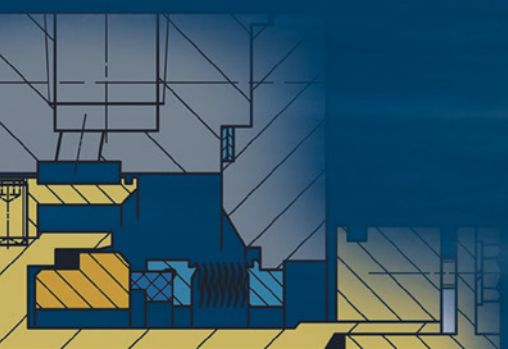


API 682 4th edition Application guide



Seal type	Material	Seal type	Material	Seal type	Material	Seal type	Material
Solid type A	3175AA LL800	3175AA-PIA LL800TU	3175AA-DSH LL800TK	3175AA-E-DS LL800TU	3175AA-PIA LL800TU	3175VAP-D LL800TU	
	LEK777 3N	LL800JU	LL800JE		LL800JU		LL800SU SNPV-D
Solid type B	LY95A	LY901SS		LY901SS	LY902SS		LL800SU SNPV-D
	MBS682	MBS682-PIA		MBS682-PIA	MBS682P-D		
Solid type C	LY97C	LY90ZTT		LY90ZTT	LY90STT		

Exceeds API specifications. EagleBurgmann offers a comprehensive range of engineered seals and systems, tailored to customers' specifications. Please inquire for more details.

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Categories, arrangements, configurations and seal types

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Seal coding system

API seal code and example 9

Product locator

EagleBurgmann mechanical seals and seal supply systems, referring to the seal classification parameters and piping plans of the standard 10/11



EagleBurgmann mechanical seal type H75A4-T (API seal type A, rotating).



EagleBurgmann mechanical seal type LL9DTUU (API seal type A, rotating).

API 682 4th edition

This brochure provides basic information about API 682 4th edition. It contains a set of charts and summaries that give a brief overview and represent a step-by-step method to specify and select suitable EagleBurgmann sealing systems.

API 682 is a standard of the American Petroleum Institute. The charts, summaries and piping plans in this brochure are based on that standard. For further and more detailed information, please refer to the commercially available documents of API 682.

Defaults and options for several design details are specified by API. Options are only permitted with the approval of the customer. The standard does not intend to prevent a vendor from offering or the customer from requesting alternative equipment or engineered products for special applications. This may be particularly appropriate where there are innovative or developing designs and materials. Further information shall be provided by the vendor if an option or any variations to this standard are offered.

Important note

All the technical specifications are based on extensive tests and our many years of experience. However, the diversity of possible applications means that they can serve as guide values only. It should be noted that the extremal values of each operating parameter cannot be applied at the same time because of their interaction. Furthermore, the operating range of each specific product depends on the respective shaft diameter, materials used, mode of operation and on the medium to be sealed. A guarantee can only be given in the individual case if the exact conditions of application are known and these are confirmed in a special agreement. When critical conditions of operation are involved, we recommend consulting with our specialist engineers. Subject to change. All imperial temperature and pressure values in this brochure are results of an exact conversion.



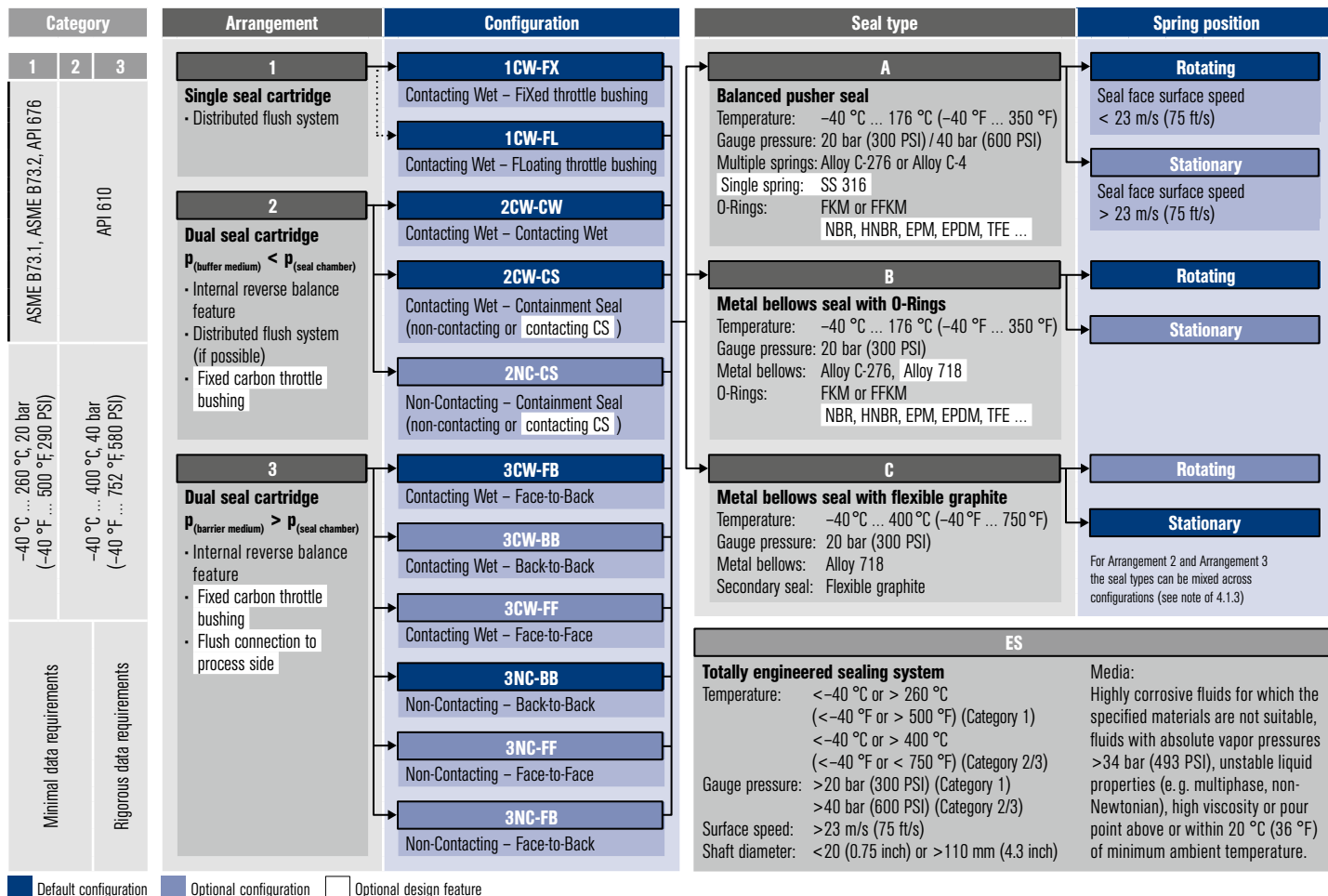
One of the test rigs for running seal qualification tests according to API at EagleBurgmann.

Objectives and category details

API 682 4th edition		Category 1	Category 2	Category 3
Objectives (4.2)	Operation of seal cartridge	Continuously for 25,000 h without need for replacement		
	Operation of Arrangement 2 outer seal (e.g., containment seal)	At least 25,000 h without need for replacement at any containment seal chamber or buffer fluid pressure equal to or less than the seal leakage pressure setting (not to exceed a gauge pressure of 0.7 bar (10 PSI) and for at least 8 h at the seal chamber conditions).		
	Emissions	Complying with local emissions regulations or exhibiting a maximum screening value of 1,000 ml/m ³ (1,000 ppm vol.) as measured by the EPA Method 21, whichever is more stringent.		
Scope and basic design features	Pump shaft sizes (1)	20 ... 110 mm (0.75" ... 4.3")		
	Seal design (4.1.3, 6.1.1.1)	Balanced, internally-mounted, cartridge design, no hook sleeves allowed.		
Materials	Seal faces (6.1.6.2.2/4, 6.1.6.2.3)	One ring premium grade, blister-resistant carbon graphite (unless service requires two hard materials). One ring reaction-bonded or self-sintered silicon carbide.		
	Seal sleeves (6.1.6.3)	Austenitic stainless steel type 316, 316L, 316TI or equivalent (unless otherwise specified).		
	Gland plates (6.1.6.7)	For alloy pumps in corrosive services same or better alloy as used for the pump casing.		
Seal flush	Flush connection for Arrangement 3	If specified (7.3.2.2)		
	Distributed flush system for Arrangement 1 and 2	If specified (6.2.1.2.1) or required by 6.1.2.14	Required (6.2.2.2.1, 6.2.3.2.1) except when piping plan 13 or 23 are specified.	
Dimensions	Standard seal sizes	None	To fit shafts in even 10 mm increments (6.2.2.3.1)	
	Seal chambers (4.1.2)	ASME B73.1 and ASME B73.2	API 610	
Operation limits (4.1.2)	Temperature	-40 °C ... 260 °C (-40 °F ... 500 °F)	-40 °C ... 400 °C (-40 °F ... 750 °F)	
	Max. gauge pressure	20 bar (300 PSI)	40 bar (600 PSI)	
Bushings	Arrangement 1 (7.1.2.1, 7.1.2.2)	Fixed carbon bushing Option: floating carbon bushing	Floating carbon bushing Option: segmented carbon bushing (only if required)	
	Arrangement 2 and 3 (7.2.2.1, 7.3.2.1)	Option: fixed carbon bushing, if additional length is available		
Seal qualification test (1.3.5)	Category 1 seal	Required	-	-
	Category 2 seal	Applicable for same seal design	Required	-
	Category 3 seal	Applicable for same seal design	-	Required
Data requirements (Annex J) (7.1.2.9)	Proposal	Minimal		Rigorous
	Contract	Minimal		Rigorous
	Performance curve of internal circulation device	If specified		Required













*API paragraphs in brackets

Categories, arrangements, configurations, seal types and spring positions

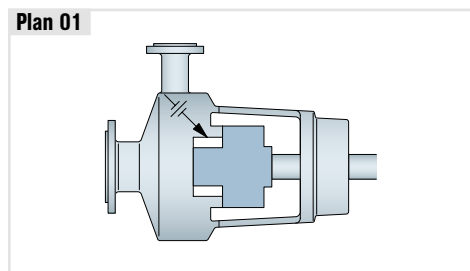


Default configuration Optional configuration Optional design feature

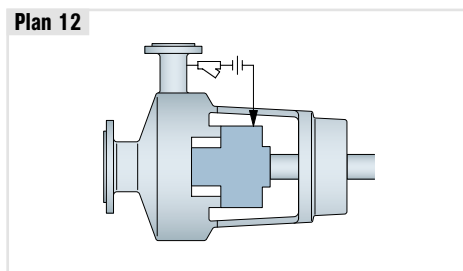
API piping plans

Instrument symbols		Equipment symbols	
FO Flow orifice	TI Temperature indicator	 Bladder accumulator	 Valve, normally open
LI Level indicator	TIT Temperature transmitter with local indicator	 Cyclone separator	 Valve, normally closed
LIT Level transmitter with local indicator	HLA High level alarm set point	 Filter, coalescing	 Valve, check
PDI Differential pressure transmitter with local indicator	LLA Low level alarm set point	 Flow orifice	 Valve, needle
PI Pressure indicator	NLL Normal liquid level	 Seal cooler	 Valve, pressure control
PIT Pressure transmitter with local indicator		 Strainer, Y	 Valve, pressure relief

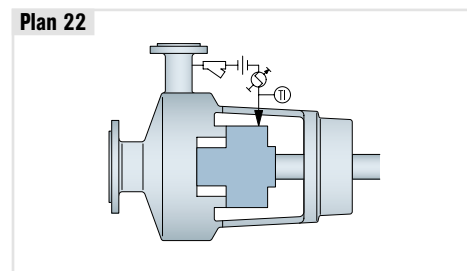
Process side



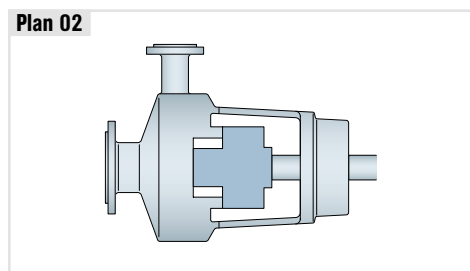
Integral (internal) recirculation from the pump discharge to the seal chamber.



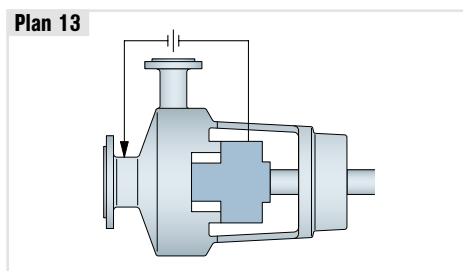
Recirculation from the pump discharge through a strainer and a flow control orifice into the seal chamber.



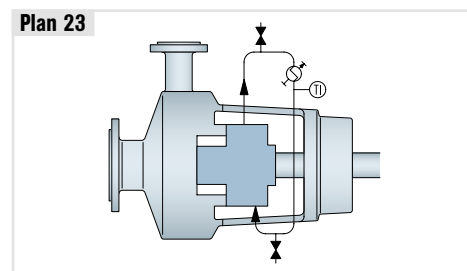
Recirculation from pump discharge through a strainer, a flow control orifice and a cooler into the seal chamber.



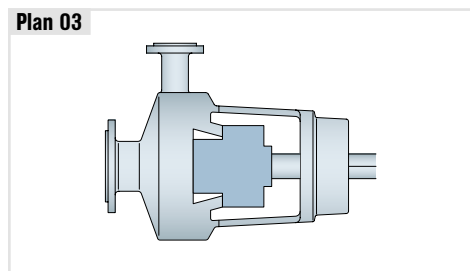
Dead-ended seal chamber with no recirculation of flushed fluid. Flush connections plugged.



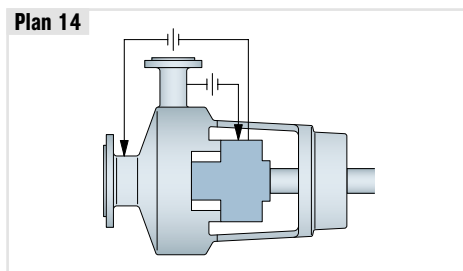
Recirculation from the seal chamber through a flow control orifice and back to the pump suction or pump suction piping.



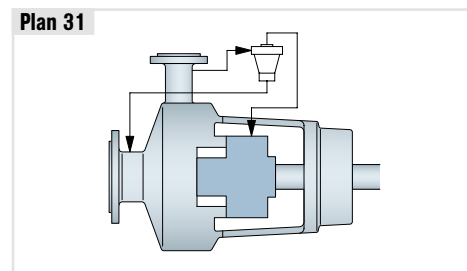
Recirculation from a circulation device in the seal chamber through a cooler and back into the seal chamber.



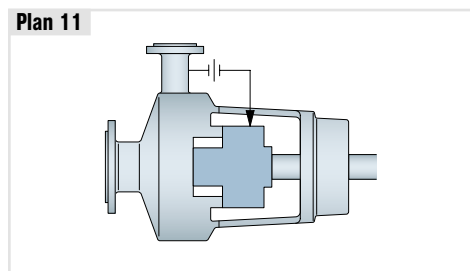
Circulation between the seal chamber and the pump created by the design of the seal chamber. Flush connections plugged.



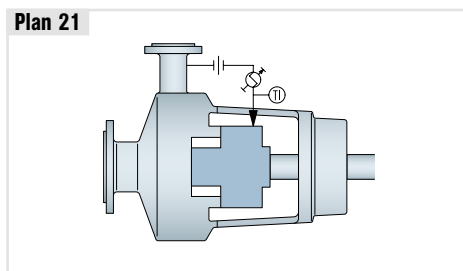
Recirculation from pump discharge through a flow control orifice to the seal and simultaneously from the seal chamber through a flow control orifice to pump suction.



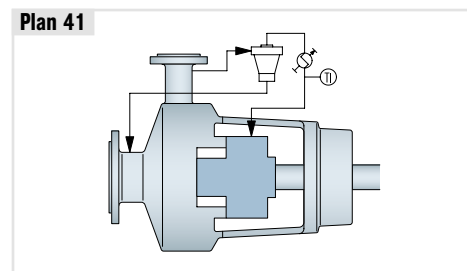
Recirculation from the pump discharge through a cyclone separator delivering the clean fluid to the seal chamber. The solids are delivered to the pump suction line.



Recirculation from the pump discharge through a flow control orifice into the seal chamber.



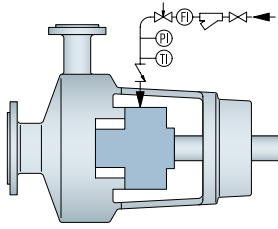
Recirculation from pump discharge through a flow control orifice and cooler into the seal chamber.



Recirculation from the pump discharge through a cyclone separator delivering the clean fluid to a cooler and then to the seal chamber. The solids are delivered to the pump suction line.

Process side

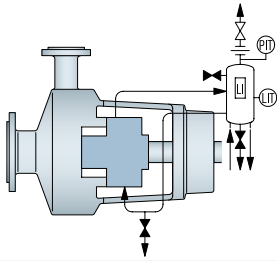
Plan 32



Injection of clean fluid into the seal chamber from an external source.

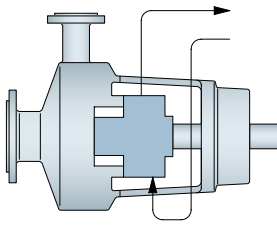
Between seals

Plan 52



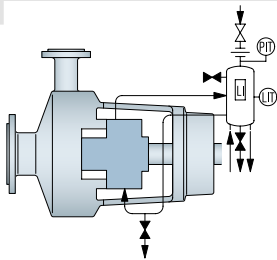
Reservoir providing buffer liquid for the outer seal of an arrangement 2 unpressurized dual seal. The buffer liquid shall be maintained at a pressure less than seal chamber pressure and less than 2.8 bar (40 PSI).

Plan 55



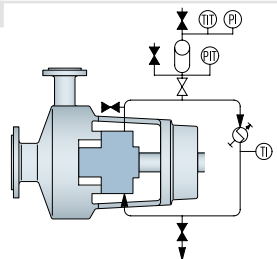
Unpressurized external buffer fluid system supplying clean buffer liquid for the outer seal of an arrangement 2 unpressurized dual seal. Buffer liquid is circulated by an external pump or pressure system.

Plan 53A



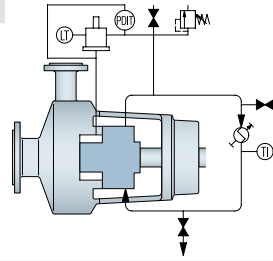
Pressurized barrier fluid reservoir supplying clean fluid for an arrangement 3 pressurized dual seal.

Plan 53B



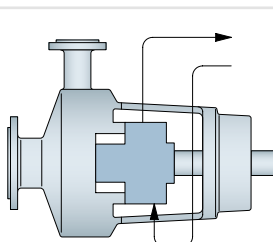
Barrier fluid system pressurized by a bladder accumulator supplying clean liquid for an arrangement 3 pressurized dual seal.

Plan 53C



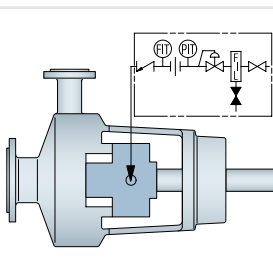
Barrier fluid system pressurized by a piston accumulator supplying clean liquid for an arrangement 3 pressurized dual seal. The barrier pressure is generated from the seal chamber pressure. The system is self-energizing and reacts to fluctuations in the seal chamber fluid pressure.

Plan 54



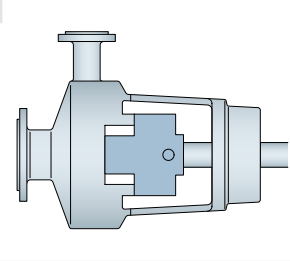
Pressurized external barrier fluid system supplying clean liquid for an arrangement 3 pressurized dual seal. The barrier liquid is maintained at a pressure greater than seal chamber pressure and is circulated by an external pump or pressure system.

Plan 72



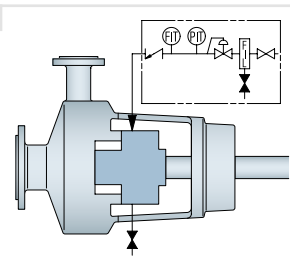
Externally supplied buffer gas for arrangement 2 unpressurized seals with a dry running containment seal (2CW-CS and 2NC-CS). Buffer gas is maintained at a pressure less than seal chamber pressure. The buffer gas pressure should not exceed 0.7 bar (10 PSI).

Plan 71



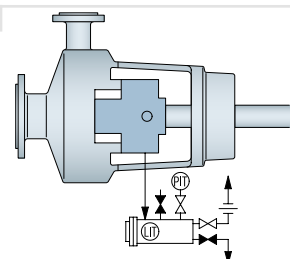
Tapped connections for the purchaser's use e.g., for future use of buffer gas.

Plan 74



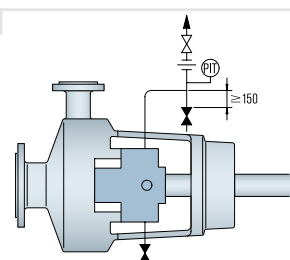
Externally supplied barrier gas for arrangement 3 dual pressurized non-contacting gas seals (3NC-FB, 3NC-BB, 3NC-FF).

Plan 75



A containment seal chamber leakage collection system for condensing or mixed phase leakage on arrangement 2 unpressurized seals with containment seals (2CW-CS and 2NC-CS).

Plan 76

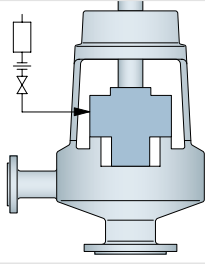


A containment seal chamber drain for non-condensing leakage on arrangement 2 unpressurized seals with containment seals (2CW-CS and 2NC-CS). Used if the pumped fluid does not condense at ambient temperatures.

API piping plans

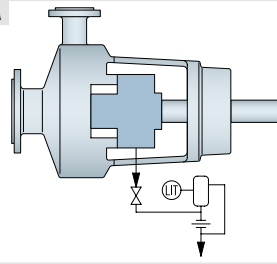
Atmospheric side

Plan 51



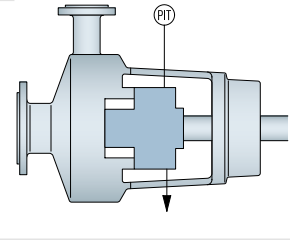
Reservoir providing a dead-ended blanket for fluid to the quench connection of the gland plate. Only recommended for vertical pumps.

Plan 65A



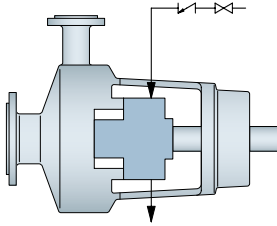
Atmospheric leakage collection and alarm system for condensing leakage. Failure of the seal will be detected by an excessive flow rate into the leakage collection system.

Plan 66B



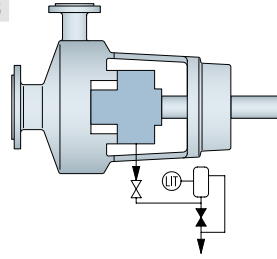
An orifice plug in the drain port minimizes the seal leakage leaving the seal gland and allows for detection of a seal failure by an alarm of the monitoring pressure transmitter.

Plan 62



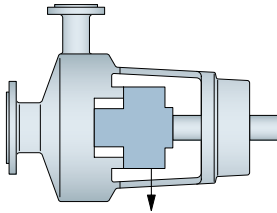
Quench stream from an external source to the atmospheric side of the seal faces. The quench stream can be low pressure steam, nitrogen or clean water.

Plan 65B



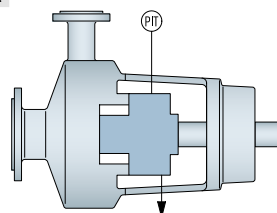
Atmospheric leakage collection and detection system for condensing leakage. Failure of the seal will be detected by a cumulative leakage into the system.

Plan 61



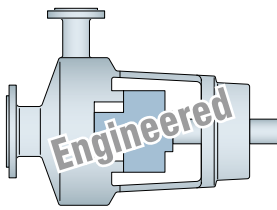
Tapped and plugged atmospheric-side connections for purchaser's use.

Plan 66A



Throttle bushings in the seal gland minimize the seal leakage leaving the seal gland and allow for detection of a seal failure by an alarm of the monitoring pressure transmitter.

Plan 99



Engineered piping plan not defined by other existing plans.

Selection of barrier/buffer media

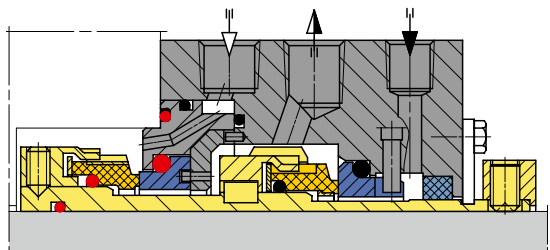
Sealed fluid	Barrier/buffer fluid	Special demands	General demands
Not specified	Hydrocarbon fluid	Most desirable viscosity between 2 and 10 mm ² /s (cSt) at operating temperature	<ul style="list-style-type: none"> Three years continuous operation without adverse deterioration Consider local regulations regarding exposure limits and hazard classifications (see safety data sheet) Compatibility with the sealed medium Compatibility with the materials of the sealing system Initial boiling point 28 °C (82 °F) above exposed temperature If oxygen is present: flash point > service temperature Compatibility with max./min. process temperature Freezing temperature < min. ambient temperature at site Viscosity < 500 mm²/s at the minimum temperature to which it is exposed (before start-up) Check viscosity over the entire operating temperature range Consider limited gas solubility of viscous fluids (> 10 bar (145 PSI)), released gas may cause foaming and loss of lubrication
		Hydrocarbon fluids for high operating temperatures sometimes have a much higher viscosity at ambient temperatures and require special caution during start-up	
		For hydrocarbon streams, mineral oil may degrade at temperatures above 70 °C (158 °F)	
Aqueous streams	Mixture of water and ethylene glycol	Ethylene glycol can be considered a hazardous material and/or waste	
	Mixture of water and propylene glycol	Do not use commercially available automotive antifreeze (plating of additives at seal parts)	
Hydrocarbon streams	Paraffin-based high purity oils	With little or no additive for wear/oxidation resistance (plating of additives at seal parts)	
	Synthetic-based oils	-	

Seal coding system

Mechanical seal			Design options			Size	Plans																																																				
Category	Arrangement	Type	Containment device	Secondary seal material	Face material	Shaft size	Piping plan																																																				
1 2 3	1 2 3	A B C	P: Plain gland for Arrangement 2 and 3 L: Floating throttle bushing for Arrangement 1, Category 1, 2, 3 F: Fixed throttle bushing for Arrangement 1, Category 1 C: Containment seal for 2CW-CS, 2NC-CS S: Floating, segmented carbon bushing X: Unspecified	F: FKM G: PTFE H: Nitrile I: FFKM R: Flexible graphite X: Unspecified	M: Carbon/Nickel bounded tungsten N: Carbon/RBSiC O: RBSiC/Nickel bounded tungsten P: RBSiC/RBSiC Q: SSiC/SSiC R: Carbon/SSiC S: Graphite loaded RBSiC/RBSiC T: Graphite loaded RBSiC/SSiC X: Unspecified	Three digits, rounded up to the next whole millimeter Examples: 25.00 mm: 025 25.25 mm: 026 25.90 mm: 026 XXX: Unspecified	Listed in numerical order, separated by a forward slash <table border="1"> <tr><td>01</td><td>51</td><td>61</td><td>99</td></tr> <tr><td>02</td><td>52</td><td>62</td><td></td></tr> <tr><td>03</td><td>53A</td><td>65A</td><td></td></tr> <tr><td>11</td><td>53B</td><td>65B</td><td></td></tr> <tr><td>12</td><td>53C</td><td>66A</td><td></td></tr> <tr><td>13</td><td>54</td><td>66B</td><td></td></tr> <tr><td>14</td><td>55</td><td></td><td></td></tr> <tr><td>21</td><td>71</td><td></td><td></td></tr> <tr><td>22</td><td>72</td><td></td><td></td></tr> <tr><td>23</td><td>74</td><td></td><td></td></tr> <tr><td>31</td><td>75</td><td></td><td></td></tr> <tr><td>32</td><td>76</td><td></td><td></td></tr> <tr><td>41</td><td></td><td></td><td></td></tr> </table>	01	51	61	99	02	52	62		03	53A	65A		11	53B	65B		12	53C	66A		13	54	66B		14	55			21	71			22	72			23	74			31	75			32	76			41			
01	51	61	99																																																								
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22	72																																																										
23	74																																																										
31	75																																																										
32	76																																																										
41																																																											
		Dual seal with different seal types in the inner and outer position: Inner type / Outer type e.g. C/B		Dual seal with different secondary seal materials at the inner and outer position: Inner material/Outer material e.g. I/F	Dual seal with different face materials at the inner and outer position: Inner material/Outer material e.g. P/N																																																						

Example

Mechanical seal			Design options			Size	Plans
Category	Arrangement	Type	Containment device	Secondary seal material	Face material	Shaft size	Piping plan
2	2	A	P: Plain gland	I: FFKM (Inner position) F: FKM (Outer position)	N: Carbon/RBSiC	080	11/52



Seal designation: **22A-P1/FN-080-11/52/62**

API 682 4th edition solutions at a glance: EagleBurgmann product locator for mechanical seals and seal supply systems.

Category		Category 2 and 3										
Configuration		1CW-FL	2CW-CW	2CW-CS	2NC-CS	3CW-FB	3CW-BB	3CW-FF	3NC-FB	3NC-BB	3NC-FF	
Mechanical Seals	Seal type A	ROTATING	H75VA4-S LL9UC	H75A4-T LL9DTUU	H75A4-C LL9DTUE	H75LG4-C	H75A4-T LL9DTUU	H75A4-B LL9DKUU		CGSH-KD		
		STATIONARY	LEK777 SH	LL9DJUU	LL9DJUE		LL9DJUU		LL9DSUU SH-D	HRGS-DD LNF992		RGS-D
	Seal type B	ROTATING	LY9SA	LY9DTSS			LY9DTSS	LY9DZSS				
		STATIONARY	LY9TC	LY9DZTT			LY9DZTT		LY9DSTT			
	Seal type C	ROTATING	MBS682	MBS682-PTA			MBS682-PTA	MBS682P-D				
		STATIONARY	LY9TC	LY9DZTT			LY9DZTT		LY9DSTT			
Engineered seals		Beyond API specifications, EagleBurgmann offers a comprehensive range of engineered seals and systems, tailored to customers specifications. Please inquire.										
API piping plans	Plan 01		■	■	■	■	■	■	▲	▲	▲	
	Plan 02		■	■	■	■	■	■	■	■	■	
	Plan 03		■	■	■	■	■	■	■	■	■	
	Plan 11 (12)	PROCESS SIDE	■	■	■	■	■	▲	▲	▲	▲	
	Plan 13		■	■	■	■	■	▲	▲	▲		
	Plan 14		■	■	■	■	■	▲	▲	▲		
	Plan 21 (22)		■	■	■	■	■	▲	▲	▲	▲	
	Plan 23		■	■	■	■	■	■	■	▲	▲	
	Plan 31		■	■	■	■	■	■	■	▲	▲	▲
	Plan 41		■	■	■	■	■	■	■	▲	▲	▲
	Plan 32		■	■	■	■	■	■	■	▲	▲	▲
	Plan 52				■							
	Plan 55			■								
	Plan 53A	BETWEEN SEALS					■	■	■			
	Plan 53B						■	■	■			
	Plan 53C						■	■	■			
	Plan 54						■	■	■			
Plan 72 (71)					■	■						
Plan 74									■	■	■	
Plan 75												
Plan 76												
Plan 51	ATMOSPHERIC SIDE	■										
Plan 62 (61)		■	▲				▲	▲	▲			
Plan 65A		■	▲				▲	▲	▲			
Plan 65B		■	▲				▲	▲	▲			
Plan 66A		■										
Plan 66B		■										
Plan 99		■	■	■	■	■	■	■	■	■	■	

■ Recommended ▲ Possible

Category 1				
1CW-FX	2CW-CW	2NC-CS	3CW-FB	3NC-BB
APItex-S	APItex-T	H75LG4-C	APItex-T	CGSH-KD

Seal supply systems and components

- WEF6, WEL6, SPT6
- WEF6, WEL6, SPT6
- ZYA6
- WEF6, WEL6, SPT6, ZYA6
- SPX6
- TSA6, TSB6
- Engineered
- TSA6, TSB6
- SPB6
- SPC6
- Engineered
- GSS6000
- GSS6001
- LSC6
- SPP6
- QFT6
- Engineered
- LSA6
- LSB6
- SPP6
- SPP6
- Engineered

EagleBurgmann – your system provider

EagleBurgmann offers the right product portfolio for each logical and practical API configuration in accordance with current API specifications.

How to read the table

Select a category and a configuration. In vertical order, first the EagleBurgmann seal solutions sorted by seal type, then the API piping plan applicable for that configuration can be found. Once you have selected a piping plan, you will find the fitting EagleBurgmann seal supply systems and components on the right side of the table.

For detailed information, we recommend consulting our special line of API brochures: Our API 682 4th edition Application guide helps to make you familiar with API basics, such as objectives, categories, arrangement configurations and seal types, all API 682 piping plans, new seal coding system and how to select the proper mechanical seal according to media groups.

The line of our 15 Configuration Brochures lead within a certain API configuration to tried and tested mechanical seal solutions, show applicable API piping plans and give a survey on the appropriate seal supply systems.

For the latest product data on our API range of seals and systems, contact your local EagleBurgmann representative, or visit us at eagleburgmann.com/api682.



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EagleBurgmann is one of the internationally leading companies for industrial sealing technology. Our products are used everywhere where safety and reliability are important: in the oil and gas industry, refining technology, the petrochemical, chemical and pharmaceutical industries, food processing, power, water, mining, pulp & paper, aerospace and many other spheres. Every day, more than 6,000 employees contribute their ideas, solutions and commitment towards ensuring that customers all over the world can rely on our seals. Our modular TotalSealCare service underlines our strong customer orientation and offers tailor-made services for every application.

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