

## API 682 4th edition Application guide



## Content

**Objectives and category details** 

objectives and category details
A comprehensive overview on the basic features
Categories, arrangements,
configurations and seal types
Basic seal classification parameters,
their defaults, options and relations
Seal selection by media
Seal classification parameters and typical
service conditions of Non-Hydrocarbons,
Non-flashing and Flashing Hydrocarbons
API piping plans
with short specifications of all piping plans,
symbol library
c)
Selection of barrier/buffer media
for contacting wet dual seals
Seal coding system
···· ··· · · · · · · · · · · · · · · ·
Product locator
EagleBurgmann mechanical seals and
seal supply systems, referring to the seal
EagleBurgmann mechanical seals and



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

#### API 682 4th edition

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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.



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

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

of the standard

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 runnning seal qualification tests according to API at EagleBurgmann.

## **Objectives and category details**

	API 682 4th edition	Category 1	Category 2	Category 3
	Operation of seal cartridge	Continuously for 25,000 h without need for rep	olacement	
Objectives (4.2)	Operation of Arrangement 2 outer seal (e.g., containment seal)		nt at any containment seal chamber or buffer fluid ge pressure of 0.7 bar (10 PSI) and for at least &	
	Emissions	Complying with local emissions regulations or (1,000 ppm vol.) as measured by the EPA Met	exhibiting a maximum screening value of 1,000 r thod 21, whichever is more stringent.	nl/m³
Scope and basic	Pump shaft sizes (1)	20 110 mm (0.75" 4.3")		
design features	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 carbo One ring reaction-bonded or self-sintered silico	on graphite (unless service requires two hard main n carbide.	terials).
	Seal sleeves (6.1.6.3) Gland plates (6.1.6.7)	Austenitic stainless steel type 316, 316L, 316 For alloy pumps in corrosive services same or		
	Flush connection for Arrangement 3	If specified (7.3.2.2)		
Seal flush	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 pi	ping plan 13 or 23 are specified.
Dimensions	Standard seal sizes	None	To fit shafts in even 10 mm increments (6.2.2.	3.1)
DIIIICIISIOIIS	Seal chambers (4.1.2)	ASME B73.1 and ASME B73.2	API 610	
<b>Operation limits</b>	Temperature	-40 °C 260 °C (-40 °F 500 °F)	-40 °C 400 °C (-40 °F 750 °F)	
(4.1.2)	Max. gauge pressure	20 bar (300 PSI)	40 bar (600 PSI)	
	Arrangement 1 (7.1.2.1, 7.1.2.2)	Fixed carbon bushing	Floating carbon bushing	
Bushings	Arrangement (7.1.2.1, 7.1.2.2)	Option: floating carbon bushing	Option: segmented carbon bushing (only if req	uired)
	Arrangement 2 and 3 (7.2.2.1, 7.3.2.1)	Option: fixed carbon bushing, if additional lengt	th is available	
Cool muslification tool	Category 1 seal	Required	-	
Seal qualification test (1.3.5)	Category 2 seal	Applicable for same seal design	Required	-
	Category 3 seal	Applicable for same seal design		Required
Data and in the	Proposal	Minimal		Rigorous
Data requirements (Annex J)	Contract			11901000
(7.1.2.9)	Performance curve of internal circulation device	If specified		Required

\* API paragraphs in brackets

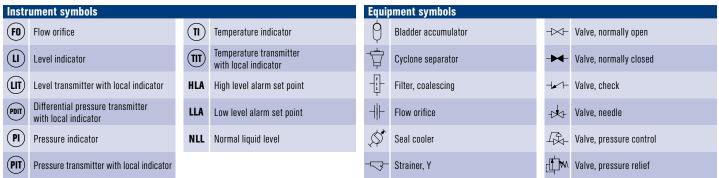
## **Categories, arrangements, configurations, seal types and spring positions**

Ca	tegory	Arrangement	Configuration	Seal type	Spring position
173.2, API 676 -	2 3	1 Single seal cartridge • Distributed flush system	Contacting Wet – FiXed throttle bushing     ICW-FL Contacting Wet – FLoating throttle bushing	► A Balanced pusher seal Temperature: -40 °C 176 °C (-40 °F 350 °F) Gauge pressure: 20 bar (300 PSI) / 40 bar (600 PSI) Multiple springs: Alloy C-276 or Alloy C-4 Single spring: SS 316	Rotating Seal face surface speed     23 m/s (75 ft/s)      Stationary
ASME B73.1, ASME B73.2, API 676	API 610	2 Dual seal cartridge p <sub>(buffer medium)</sub> < p <sub>(seal chamber)</sub> • Internal reverse balance		O-Rings: FKM or FFKM NBR, HNBR, EPM, EPDM, TFE → B Metal bellows seal with 0-Rings	Seal face surface speed 23 m/s (75 ft/s) Rotating
	) °C, 40 bar °F, 580 PSI)	feature - Distributed flush system (if possible) - Fixed carbon throttle bushing	(non-contacting or contacting CS )	Temperature: -40 °C 176 °C (-40 °F 350 °F) Gauge pressure: 20 bar (300 PSI) Metal bellows: Alloy C-276, Alloy 718 O-Rings: FKM or FFKM NBR, HNBR, EPM, EPDM, TFE	→ Stationary
-40 °C 260 °C, 20 bar (-40 °F 500 °F, 290 PSI)	-40 °C 400 °C, 40 (-40 °F 752 °F, 580	3 Dual seal cartridge p <sub>(barrier medium)</sub> > p <sub>(seal chamber)</sub> · Internal reverse balance feature · Fixed carbon throttle bushing	→ 3CW-FB Contacting Wet – Face-to-Back     → 3CW-BB Contacting Wet – Back-to-Back     → 3CW-FF	C Metal bellows seal with flexible graphite Temperature: -40 °C 400 °C (-40 °F 750 °F) Gauge pressure: 20 bar (300 PSI) Metal bellows: Alloy 718 Secondary seal: Flexible graphite	Rotating     Stationary For Arrangement 2 and Arrangement 3 the seal types can be mixed across configurations (see note of 4.1.3)
		Flush connection to	Contacting Wet – Face-to-Face	ES	
Minimal data requirements	Rigorous data requirements	process side	→ 3NC-BB Non-Contacting – Back-to-Back     → 3NC-FF Non-Contacting – Face-to-Face     → 3NC-FB Non-Contacting – Face-to-Back	Totally engineered sealing system           Temperature:         <-40 °C or > 260 °C           (<-40 °F or > 500 °F) (Category 1)         <-40 °C or > 400 °C           (<-40 °F or < 750 °F) (Category 2/3)	Media: Highly corrosive fluids for which the specified materials are not suitable, fluids with absolute vapor pressures >34 bar (493 PSI), unstable liquid properties (e.g. multiphase, non- Newtonian), high viscosity or pour point above or within 20 °C (36 °F) of minimum ambient temperature.
Defau	ult configuration	Optional configuration Opt	ional design feature		

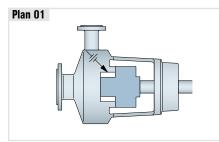
## Seal selection by media groups

Seal typ Defau	e recommendation	<b>1S</b> Option, if	specified	Seal type Category			1							A	2	and 3	}								2 2	B nd 3				C 2 and 3	3			Basic recommendations	s for the selection of a seal arrange	ement and piping plan(s)
Option	nal		ed Seal (not required ign and testing requirements)	Arrangement	1	2	3	3		1			2							3					1 2	3	3	1	2			3		Seal arrangement 1	Seal arrangement 2	Seal arrangement 3
Recor	mmended standard seal	Not applic	• • • • •		×	2	ی س	æ				CW		ŝ		,	-		-	<u> </u>		-	8				-		,		æ			lection criteria:	Selection criteria:	Selection criteria:
•	rgmann product inf			Configuration	CW-F	D-VO	2NC-CS 3CW-FB	3NC-B				D-WD		CW-C	l i i		CW-F		CW-B			NC-FI	3NC-B	NC-F	1CW-FL 2CW-CV	N-F	CV-B	1CW-FL	2CW-CW		ż	B-B	🚊 a	f enduser has good experience with rrangement 1 in his service	If emissions of Arrangement 1     exceed defined limits	If enduser has no good experience with arrangement 1 in his service
	ble EagleBurgmann mecha clarified with EagleBurgma			Flexible element	=	<b>N</b>			; 	= 		بة السا		<u>ہ</u>	~	4 4				~~~~~	5					ñ	e e		≂ stat.r	ot. sta		rot. si	If	f monitoring of emissions is sufficient f arrangement 1 meets reliability goals for	create unacceptable vapor clouds are a fire risk	If emissions of arrangement 1 and 2     exceed defined limits
e Engin	eered Seal based on refere	enced type A, B or	r C,	riexiple element	rot.	rot. r	ot. rot.	rot. ro	ot. rot.	stat. st	at. rot	. rot. si	at. rot	rot.	stat. ro	t. rot.	. rot. s	stat. ro	ot. rot	. stat.	stat. si	tat. sta	t. rot. s	tat. ru	ot. rot.	rot.	rot. s	stat. rot.	stat. r	ot. sta	at. rot.	rot. si	stat. s	ervices >260 °C (500 °F) acc. to enduser's experience	present a personal exposure hazard • If monitoring of emissions is sufficient	present a personal exposure hazard create unacceptable vapor clouds
lu ne	clarified with EagleBurgman ial features: internal circula	ann engineenng ex	khell	Mechanical seal			မှ		က္						မှ				_   _												-PTA			containing solids or fluids that are polymerizing involving fluids with poor lubricity, low relative	<ul> <li>If arrangement 2 meets reliability goals for services</li> </ul>	are a fire risk are not monitored
perflu	ioroelastomer secondary se	seals	1011 20,	incontantour oour	tex-S	tex-T	iLG4 tex-T	X-H			777  44-T		4-C	IEI		44-I						S-DI 992		2 2	SA DTSS		ZZ	TC 8682		2682 DZT	S682	S682	Eso .	densitiy and/or high vapor pressures	> 260 °C (500 °F) acc. to enduser's experience containing solids or fluids that are polymerizing	For services >260 °C (500 °F)
	Media/Piping plan	n	Temperature	Pressure range	API	API	H75 APII	CG S	H75	동	LEK H75		H75	L19	H75	H75	LL9		FL9 H %	LL9	E-HS	L   H	CGS	RGS	LV9   19	LY9	LY9	MB:	LY9			MB I		nsider to add Plan 62 (quench) or Plan 65A/B akage collection)	involving fluids with poor lubricity, low relative densitiy and/or high vapor pressures	
st 3)			<80 °C (176 °F)	<20 bar (290 PSI)																														an 11, Plan 13 or Plan 14		
sheet	Water	Ś	<80 °C (176 °F)	20 40 bar (290 580 PSI)										-	•		•	•				-		•									For	r media containing solids: Plan 32 or Plan 31		
ex A,		2	≥80 °C (176 °F)	<20 bar (290 PSI)										•	•		•							• E	ES ES	ES	ES						Pla	an 23		
<b>:arb</b> o I., ann		_		20 40 bar (290 580 PSI)											-																		Die	an 32 (horizontal pump)	-	
<b>rdroo</b> 4th ed	Sour Water	<	<80 °C (176 °F)	< 20 (300) 20 40 bar (290 580 PSI)														2.2																an 13 or Plan 14 (vertical pump)		
<b>n-H</b> 682 <sup>,</sup>			00 00 (470 07)	<20 bar (290 PSI)													•							- 0	•								Pla	an 11+62 or Plan 32	-	
o API	Caustic, Amines, Cr	rystalize <	<80 °C (176 °F)	20 40 bar (290 580 PSI)				(									•	•				•		•												
efer t	<b>H<sub>2</sub>SO<sub>4</sub></b> ≤20 %, 25 °C		<80 °C (176 °F)	<20 bar (290 PSI)																														an 11, Plan 13 or Plan 14 r media containing solids:		
E	<b>H<sub>3</sub>PO<sub>4</sub> ≤20 %, 80 °C</b>	L(1/b F)																															Pla	an 32 or Plan 31		
	Absolute vapor		-40 °C –5 °C (–40 °F 23 °F)	<20 bar (290 PSI) 20 40 bar (290 580 PSI)																								ES ES	ES 1		S ES	ES I		an 11 or Plan 13 r media containing solids: Plan 32 or Plan 31	Process side: same piping plans as for Arrangement 1	Process side:
ns B	pressure less than	_	-40 r 23 r) -5 °C 176 °C	<pre>&lt;20 40 bar (290 500 PSI)</pre> <20 bar (290 PSI)											-													E3 E3	ES			ES			Between seals:	Plan 02 or consider same piping plans as for Arrangement 1
ishin arbo	1 bar (15 PSI) at	(	(23 °F 349 °F)	20 40 bar (290 580 PSI)										•	•		•	• •				-		•				ES ES	ES I	ES ES	S ES	ES E	ES		Plan 52 or Plan 55 (buffer liquid) Plan 71 (no buffer gas system used)	Between seals:
Non-fla: Hydroca	pumping temperatu	1	176 °C 260 °C	<20 bar (290 PSI)	ES <sup>1)</sup>	ES <sup>1)</sup>	ES1)	ES E	ES <sup>1)</sup> ES <sup>1)</sup>	ES <sup>1)</sup> E	(S <sup>1</sup> ) ES <sup>1</sup>	) ES <sup>1)</sup> E	S <sup>1)</sup> ES <sup>1</sup>	) ES <sup>1)</sup>	ES <sup>1)</sup>	ES <sup>1)</sup>	) ES <sup>1)</sup> I	ES <sup>1)</sup> E	ES ES	ES	ES E	ES	ES I					• •				-	Pla For	an 11+62 or Plan 13+62, Type A and B: Plan 23 r media containing solids: Plan 31+62 or Plan 32	Plan 72 (buffer gas)	Plan 53A/B/C or Plan 54 (barrier liquid), Plan 74 (barrier gas)
ŽŹ	(Refer to API 682 4th	i eu., 🔤	, <u>,</u>					E	ES <sup>1)</sup> ES <sup>1)</sup>	ES <sup>1)</sup> E	S <sup>1)</sup> ES <sup>1</sup>	) ES <sup>1)</sup> E	S <sup>1)</sup> ES <sup>1</sup>	) ES <sup>1)</sup>	ES <sup>1)</sup>	ES <sup>1)</sup>	) ES <sup>1)</sup> I	ES <sup>1)</sup> E	ES ES	ES	ES E	ES		ES				ES ES				ES E	ES		Plan 76 (vaporizing leakage)	
	annex A, sheet 4)		260 °C 400 °C (500 °F 752 °F)	<20 bar (290 PSI) 20 40 bar (290 580 PSI)																								ES ES						an 11+62 or Plan 13+62 r media containing solids: Plan 31+62 or Plan 32		
			-40 °C –5 °C	<pre>&lt;20 40 bar (290 PSI)</pre>																					20 20	EC	EC							an 11+62 or Plan 13+62	1	
	Absolute vapor		-40 °C5 °C (-40 °F 23 °F)	20 40 bar (290 -51)														2.2						-	E0 E0	EO	ES	ES ES	ES I	ES ES	S ES	ES E	Тур	pe A and B >60 °C (140 °F): Plan 23 r media containing solids:		
suc	pressure above		-5 °C 176 °C	<20 bar (290 PSI)																								ES ES		ES ES		ES E		an 31+62 or Plan 32		
hing	1 bar (15 PSI) at pumping temperatu	(	(23 °F 349 °F)	20 40 bar (290 580 PSI)										-	•							-		•				ES ES	ES I	ES ES	S ES	ES E	ES			
Flas /droc		1	176 °C 260 °C	<20 bar (290 PSI)	ES <sup>1)</sup>	ES <sup>1)</sup>	ES <sup>1)</sup>	ES E	S <sup>1)</sup> ES <sup>1)</sup>	ES <sup>1)</sup> E	S <sup>1)</sup> ES <sup>1</sup>	) ES <sup>1)</sup> E	S <sup>1)</sup> ES <sup>1</sup>	) ES <sup>1)</sup>	ES <sup>1)</sup>				ES ES	ES	ES E		ES I													
Hy	(Refer to API 682 4th	GU.,	(349 °F 500 °F) 260 °C 400 °C	20 40 bar (290 580 PSI) <20 bar (290 PSI)				E	:S" ES"	ES <sup>17</sup> E	S" ES	' ES'' E	S <sup>17</sup> ES <sup>1</sup>	ES"	ES''	ES <sup>1</sup>	) ES <sup>1)</sup> I	ES <sup>17</sup> E	ES ES	ES	ES E	ES		ES				ES ES		ES ES	_			an 11+62 or Plan 13+62	-	
	annex A, sheet 5)			20 40 bar (290 580 PSI)																								ES ES						r media containing solids: Plan 31+62 or Plan 32		
	Plan 01		nternal circulation in p																															Comments	How to use the table	1
	Plan 02	D	Dead ended, clean me	dium		х.		•								1			•				•			•	х.				•			Additional or alternative piping	First determine the required <i>Category</i> based (	on the Category overview table on page 3
	Plan 03		lapered seal chamber l		•	•	• •	•								1							•		•	•	•				•		p	plans may be possible for a specific		
de	Plan 11 (12)		Circulation, pressure in	crease					1										<b>A</b>		-		<b>A</b>											application, please contact EagleBurgmann for further details.	Select the <i>Media group</i> and a <i>Medium</i> on the representative for your application. Then select	
ss sid	Plan 13 Plan 14		Circulation, venting	n 11+13, vertical pumps						-		21		2			21									21		÷.,	12		21		4	Also to be considered:	and Pressure range.	
Process	Plan 21 (22)		Circulation, ventilig, ria		-					-																							•	Local emission standards National, regional or other standards	The color in this line indicates which Seal ty this application. The orange color indicates	
4	Plan 23	C	Closed loop via cooler		•	•				•																•					•			that define the seal arrangement to	Engineered seals are outside the normal ap	plication scope of a type A, B or C seal
	Plan 31		Circulation, cyclone sep		•				1																	•	•				•			be used Selection of seal arrangement based	and therefore do not need to meet any of th	ne design and testing requirements.
	Plan 41 Plan 22		Circulation, cyclone sep External flush	parator + cooler								÷.		÷.			÷.,		÷.				▲ ▲				÷.,				2	1		on Risk Phases or Hazard Codes (see API 682 4th ed., annex A.4)	The next step is to determine the required Ar in the upper right corner of the table. Each s	
	Plan 32 Plan 52		External nush Buffer liquid reservoir		•	÷		•											-					_			-	-				-	— ·	Suitable leakage detection method	various seal Configurations and Piping plan	s, which are shown at the bottom sectio
	Plan 55		External buffer liquid sy	vstem		÷.																												(if required) Hard/hard seal face material	of the table. The <i>Flexible element</i> (spring or can be rotating or stationary.	metal bellows) inside a seal cartridge
	Plan 53A		Barrier liquid, reservoir																•								•				•			combination for media containing abrasive particles	The available EagleBurgmann Mechanical se	eals for the defined defaults and options
seals	Plan 53B		Barrier liquid, bladder a																		-					•					•			Perfluoroelastomers for sour water, caustic, aromatics, H <sub>2</sub> S and amines	are listed in the middle head section of the determine which of the listed EagleBurgm	table. The marks in the following lines
een s	Plan 53C Plan 54		Barrier liquid, piston ac External barrier liquid s														÷				-					÷.					÷.			oucous, aromaalos, mgo and dillings	applications  . Some of these recommen	dations 🗆 require further clarification
Betwe	Plan 54 Plan 72 (71)		External barrier liquid s Buffer gas system (71:	,													-									-					-				with an EagleBurgmann application expert. clarification with an EagleBurgmann engine	ering expert. Some engineered seals
	Plan 74		Barrier gas system																				•												refer to the design of a listed type A, B or ( features ES <sup>1)</sup> .	
	Plan 75		eakage collection and	alarm, reservoir																													4	<ul> <li>Possible piping plan, depending on application</li> </ul>		publication range and the selected
	Plan 76		/apor leakage to flare				•									1								_										appending on application	Recommended <i>Piping plans</i> for a specific a arrangement can be found on the right side	
side	Plan 51 Plan 62 (61)		Dead-end quench resei External quench (61: Ta																									1							comments and the legend at top.	
eric s	Plan 65A		eakage collection and		1																														Example	
sphe	Plan 65B		eakage collection and																																CATEGORY 2 ► Non-flashing Hydrocarbons	
Itmo	Plan 66A		eakage detection and		•																				_										<ul> <li>Default: SEAL TYPE C &gt; ARRANGEMENT</li> <li>Option: rotating flexible element &gt; MBSE</li> </ul>	
4	Plan 66B		eakage detection and						1																-		_									
	Plan 99	E	Engineered to custome	r's specifications		•			1																						•					

## **API piping plans**

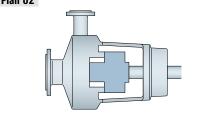


#### **Process side**

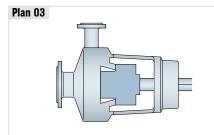


Integral (internal) recirculation from the pump discharge to the seal chamber.

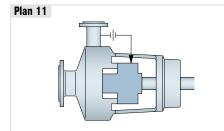
#### Plan 02



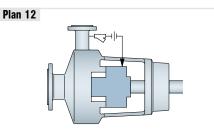
Dead-ended seal chamber with no recirculation of flushed fluid. Flush connections plugged.



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

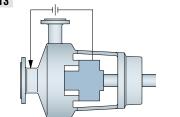


Recirculation from the pump discharge through a flow control orifice into the seal chamber.

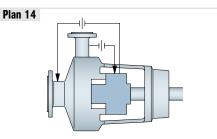


Recirculation from the pump discharge through a strainer and a flow control orifice into the seal chamber.

#### Plan 13



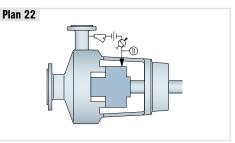
Recirculation from the seal chamber through a flow control orifice and back to the pump suction or pump suction piping.



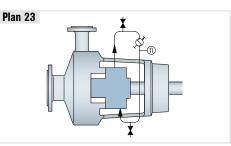
Recirculation from pump discharge through a flow control orifice to the seal and simultaneously from the seal chamber through a flow control orifice to pump suction.

Plan 21

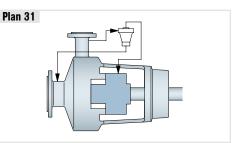
Recirculation from pump discharge through a flow control orifice and cooler into the seal chamber.



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

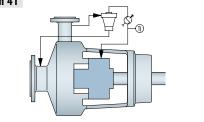


Recirculation from a circulation device in the seal chamber through a cooler and back into the seal chamber.

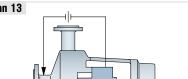


Recirculation from the pump discharge through a cyclone separator delivering the clean fluid to the seal chamber. The solids are delivered to the pump suction line.

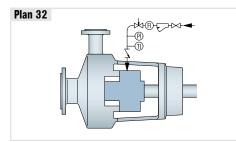
Plan 41



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.

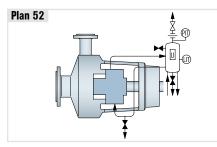


#### **Process side**



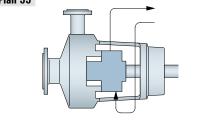
Injection of clean fluid into the seal chamber from an external source.

#### Between seals

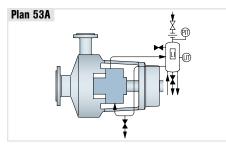


Reservoir providing buffer liquid for the outer seal of an arrangement 2 unpressurized dual seal. The buffer liquid shall be maintained at a pressure less than seal chamber pressure and less than 2.8 bar (40 PSI).

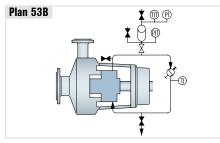




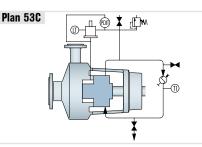
Unpressurized external buffer fluid system supplying clean buffer liquid for the outer seal of an arrangement 2 unpressurized dual seal. Buffer liquid is circulated by an external pump or pressure system.



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

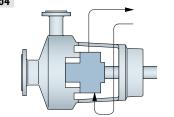


Barrier fluid system pressurized by a bladder accumulator supplying clean liquid for an arrangement 3 pressurized dual seal.

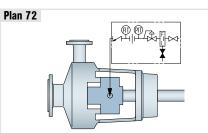


Barrier fluid system pressurized by a piston accumulator supplying clean liquid for an arrangement 3 pressurized dual seal. The barrier pressure is generated from the seal chamber pressure. The system is self-energizing and reacts to fluctuations in the seal chamber fluid pressure.

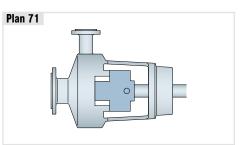
#### Plan 54



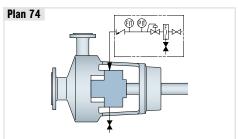
Pressurized external barrier fluid system supplying clean liquid for an arrangement 3 pressurized dual seal. The barrier liquid is maintained at a pressure greater than seal chamber pressure and is circulated by an external pump or pressure system.



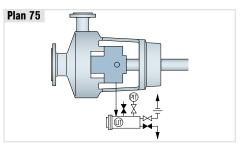
Externally supplied buffer gas for arrangement 2 unpressurized seals with a dry running containment seal (2CW-CS and 2NC-CS). Buffer gas is maintained at a pressure less than seal chamber pressure. The buffer gas pressure should not exceed 0.7 bar (10 PSI).



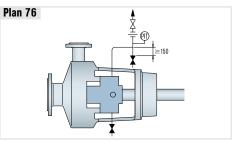
Tapped connections for the purchaser's use e.g., for future use of buffer gas.



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



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).

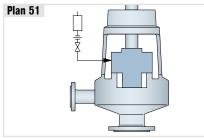


A containment seal chamber drain for non-condensing leakage on arrangement 2 unpressurized seals with containment seals (2CW-CS and 2NC-CS). Used if the pumped fluid does not condense at ambient temperatures.

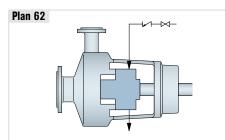
7

## **API** piping plans

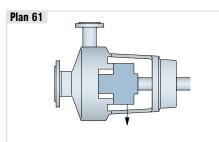
#### Atmospheric side



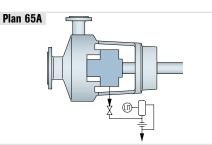
Reservoir providing a dead-ended blanket for fluid to the quench connection of the gland plate. Only recommended for vertical pumps.



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.



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

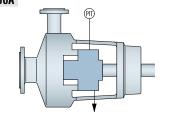


Atmospheric leakage collection and alarm system for condensing leakage. Failure of the seal will be detected by an excessive flow rate into the leakage collection system.

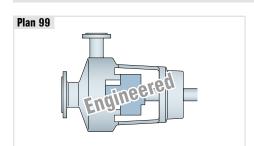
# Plan 65B

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

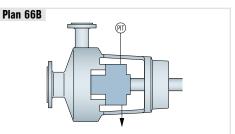
#### Plan 66A



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.



Engineered piping plan not defined by other existing plans.



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.

## Selection of barrier/buffer media

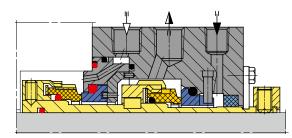
Sealed fluid	Barrier/buffer fluid	Special demands	General demands				
		Most desirable viscosity between 2 and 10 mm <sup>2</sup> /s (cSt) at operating temperature	Three years continuous operation without adverse deterioration				
Not specified	Hydrocarbon fluid	Hydrocarbon fluids for high operating temperatures sometimes have a much higher viscosity at ambient temperatures and require special caution during start-up	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				
		For hydrocarbon streams, mineral oil may degrade at temperatures above 70 °C (158 °F)	<ul> <li>Initial boiling point 28 °C (82 °F) above exposed temperature</li> </ul>				
Auucouc etroomo	Mixture of water and ethylene glycol	Ethylene glycol can be considered a hazardous material and/or waste	<ul> <li>If oxygen is present: flash point &gt; service temperature</li> <li>Compatibility with max./min. process temperature</li> <li>Freezing temperature &lt; min. ambient temperature at</li> </ul>				
Aqueous streams	Mixture of water and propylene glycol	Do not use commercially available automotive antifreeze (plating of additives at seal parts)	site • Viscosity < 500 mm²/s at the minimum temperature				
	Paraffin-based high purity oils	With little or no additive for wear/oxidation resistance (plating of additives at seal parts)	to which it is exposed (before start-up) • Check viscosity over the entire operating temperature				
Hydrocarbon streams	Synthetic-based oils	-	<ul> <li>range</li> <li>Consider limited gas solubility of viscous fluids (&gt;10 bar (145 PSI)), released gas may cause foaming and loss of lubrication</li> </ul>				

## Seal coding system

	Mechanical sea	al		Design options		Size		Pl	ans	
Category	Arrangement	Туре	Containment device	Secondary seal material	Face material	Shaft size		Pipin	g plar	
1 2 3	1 2 3	A B C	<ul><li>P: Plain gland for Arrangement 2 and 3</li><li>L: Floating throttle bushing for</li></ul>	F: FKM G: PTFE H: Nitrile	M: Carbon/Nickel bounded tungsten N: Carbon/RBSiC	Three digits, rounded up to the next whole millimeter	orde		umeric arated slash	
			Arrangement 1, Category 1, 2, 3 <b>F:</b> Fixed throttle bushing for	I: FFKM R: Flexible graphite	0: RBSiC/Nickel bounded tungsten	Examples:	01	51		99
			Arrangement 1, Category 1	X: Unspecified	P: RBSiC/RBSiC	25.00 mm: <b>025</b>	02	52		
			C: Containment seal for 2CW-CS, 2NC-CS		Q: SSiC/SSiC R: Carbon/SSiC	25.25 mm: <b>026</b> 25.90 mm: <b>026</b>	03		65A	
			<b>S:</b> Floating, segmented carbon		<b>S:</b> Graphite loaded RBSiC/RBSiC	20.90 IIIII: <b>U20</b>			65B 66A	
		Dual seal with	bushing		T: Graphite loaded RBSiC/SSiC	XXX: Unspecified	12		66B	
		different seal	X: Unspecified		X: Unspecified		14	55	UUD	
		types in the inner and		Dual seal with different secondary	Dual seal with different face		21	71		
		outer position:		seal materials at the inner and	materials at the inner and outer		22	72		
		Inner tuno /		outer position:	position:		23	74		
		Inner type / Outer type		Inner material/Outer material	Inner material/Outer material		31	75		
		e.g. C/B		e.g. I/F	e.g. P/N		32	76		
							41			

#### Example

	Mechanical se	al		Size	Plans		
Category	Arrangement	Туре	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-PI/FN-080-11/52/62

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

Cate	gory						Categor	y 2 and 3							Category 1			
	Configuration		1CW-FL	2CW-CW	2CW-CS	2NC-CS	3CW-FB	3CW-BB	3CW-FF	3NC-FB	3NC-BB	3NC-FF	1CW-FX	2CW-CW	2NC-CS	3CW-FB	3NC-BB	
		ROTATING	H75VA4-S Ll9UC	H75A4-T Ll9Dtuu	H75A4-C Ll9dtue	H75LG4-C	H75A4-T Ll9dtuu	H75A4-B Ll9Dkuu			CGSH-KD		APItex-S	APItex-T	H75LG4-C	APItex-T	CGSH-KD	
	Seal type A	STATIONARY	LEK777 Sh	LL9DJUU	LL9DJUE		LL9DJUU		LL9DSUU SH-D	HRGS-DD LNF992		RGS-D						
Mechanical Seals	Seal type B	ROTATING	LY9SA	LY9DTSS			LY9DTSS	LY9DZSS										
Mechai	Seal type C	ROTATING	MBS682	MBS682-PTA			MBS682-PTA	MBS682P-D										
	Seal type 6	STATIONARY	LY9TC	LY9DZTT			LY9DZTT		LY9DSTT									
	Engineered se	als	Beyond API spec	cifications, EagleB	urgmann offers a	comprehensive ra	nge of engineered s	eals and systems,	, tailored to custo	mers specification	ns. Please inquire.							Seal supp
	Plan 01																	
	Plan 02																	
	Plan 03																	
	Plan 11 (12)																	
	Plan 13	SIDE																
	Plan 14	PROCESS SIDE																
	Plan 21 (22)	PRO										<b>A</b>						WEF6, W
	Plan 23																	WEF6, W
	Plan 31																	ZYA6
	Plan 41											<b>A</b>						WEF6, W
	Plan 32											<b>A</b>						SPX6
us	Plan 52																	TSA6, TS
ı pla	Plan 55 Plan 524																	Engineer
API piping plans	Plan 53A Plan 53B	ŝ						1.1	- i -									TSA6, TSI SPB6
l pi	Plan 53C	SEALS																SPC6
AP	Plan 54	TWEEN																Engineer
	Plan 72 (71)	BETW																GSS6000
	Plan 74																	GSS6001
	Plan 75																	LSC6
	Plan 76																	SPP6
	Plan 51																	QFT6
	Plan 62 (61)	SIDE																Engineer
	Plan 65A	ATMOSPHERIC SIDE																LSA6
	Plan 65B	HASC																LSB6
	Plan 66A	ATMC																SPP6
	Plan 66B																	SPP6
	Plan 99																	Engineer

Recommended A Possible

#### 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.



#### eagleburgmann.com

systems and components

L6, SPT6 L6. SPT6

L6, SPT6, ZYA6

Argentina · Australia · Australia · Belarus · Belgium · Brazil · Bulgaria · Canada · Chile · China · Colombia · Cyprus · Czech Republic · Denmark · Ecuador · Egypt · Estonia Finland · France · Germany · Great Britain · Greece · Hungary · India · Indonesia · Iraq · Israel · Italy · Japan · Jordan · Kazakhstan · Korea · Kuwait · Latvia · Libya Lithuania · Malaysia · Mauritius · Mexico · Morocco · Myanmar · Netherlands · New Zealand · Nigeria · Norway · Oman · Pakistan · Paraguay · Peru · Philippines Poland · Qatar · Romania · Russia · Saudi Arabia · Singapore · Slovak Republic · Slovenia · South Africa · Spain · Sweden · Switzerland · Syria · Taiwan · Thailand Trinidad and Tobago · Tunisia · Turkey · Turkmenistan · Ukraine · United Arab Emirates · Uruguay · USA · Uzbekistan · Venezuela · Vietnam · **eagleburgmann.com/world** 



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