EagleBurgmann®
Rely on excellence

# API 682 4th edition Category 1 Configurations

## Mechanical seals

## Piping plans


## Seal supply systems

## Configuration

# 3CW-FB

# API 682 4th edition

## Category 1

## Configuration 3CW-FB (Contacting Wet – Face-to-Back)

### EagleBurgmann mechanical seals applicable for this configuration

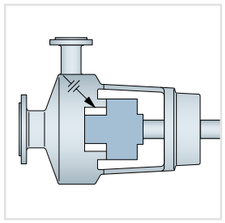
| | Seal type A (Balanced pusher seals) | Seal type B (Metal bellows seals with O-Rings) | Seal type C (Metal bellows seals with flexible graphite) |
|---|---|---|---|
| ROTATING | ■ APItex-T | | |
| STATIONARY | | | |

### Engineered seals

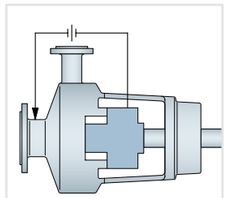
Beyond API specifications, EagleBurgmann offers a comprehensive range of engineered seals tailored to customer's specification. Please inquire.

### API piping plans applicable for 3CW-FB configuration

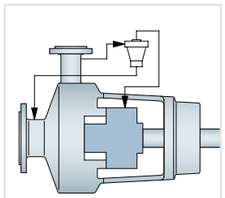
#### Process side



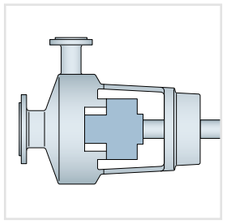
**Plan 01**
Integral (internal) recirculation from the pump discharge to the seal chamber.



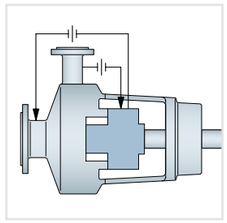
**Plan 13**
Recirculation from the seal chamber through a flow control orifice and back to the pump suction or pump suction piping.



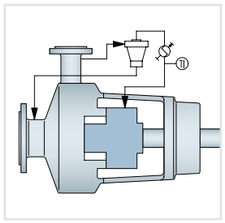
**Plan 31**
Recirculation from the pump discharge through a cyclone separator delivering the clean fluid to the seal chamber. The solids are delivered to the pump suction line.



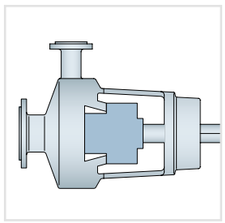
**Plan 02**
Dead-ended seal chamber with no recirculation of flushed fluid. Flush connections plugged.



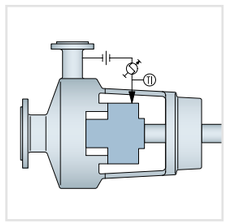
**Plan 14**
Recirculation from pump discharge through a flow control orifice to the seal and simultaneously from the seal chamber through a flow control orifice to pump suction.



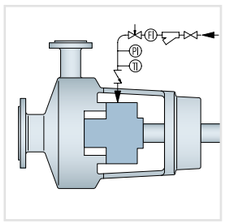
**Plan 41**
Recirculation from the pump discharge through a cyclone separator delivering the clean fluid to a cooler and then to the seal chamber. The solids are delivered to the pump suction line.



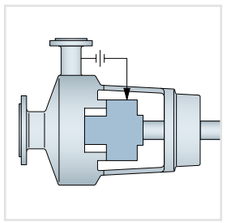
**Plan 03**
Circulation between the seal chamber and the pump created by the design of the seal chamber. Flush connections plugged.



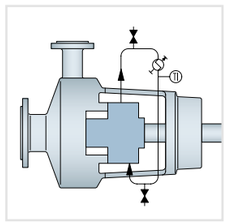
**Plan 21 (22)**
Recirculation from pump discharge through a flow control orifice and cooler (in Plan 22 through a strainer, a flow control orifice and a cooler) into the seal chamber.



**Plan 32**
Injection of clean fluid into the seal chamber from an external source.



**Plan 11 (12)**
Recirculation from the pump discharge through a flow control orifice (in Plan 12 through a strainer and a flow control orifice) into the seal chamber.

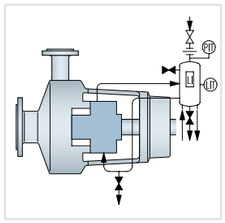


**Plan 23**
Recirculation from a circulation device in the seal chamber through a cooler and back into the seal chamber.

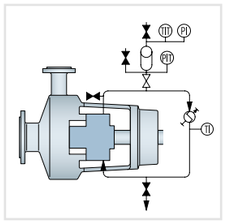
### EagleBurgmann seal supply systems and components

| Plans | Products |
|---|---|
| 21 (22), 23 | WEF6 Water cooler, WEL6 Air cooler, SPT6 Temperature indicator |
| 31 | ZYA6 Cyclone separator |
| 41 | WEF6 Water cooler, WEL6 Air cooler, SPT6 Temperature indicator, ZYA6 Cyclone separator |
| 32 | SPX6 Flush unit |
| 53A | TSA6 Barrier/buffer fluid system, TSB6 Barrier/buffer fluid system |
| 53B | SPB6 Barrier fluid system with bladder accumulator |
| 53C | SPC6 Barrier fluid system with piston accumulator |
| 65A | LSA6 Leakage collection reservoir |
| 65B | LSB6 Leakage collection reservoir |
| 54, 99 | Engineered to customer's specifications |

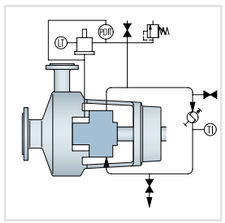
#### Between seals



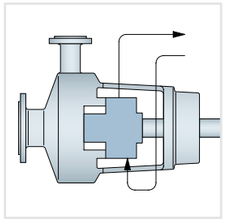
**Plan 53A**
Pressurized barrier fluid reservoir supplying clean fluid for an arrangement 3 pressurized dual seal.



**Plan 53B**
Barrier fluid system pressurized by a bladder accumulator supplying clean liquid for an arrangement 3 pressurized dual seal.

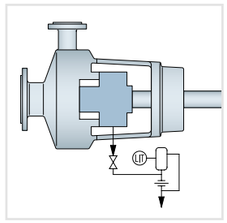


**Plan 53C**
Barrier fluid system pressurized by a piston accumulator supplying clean liquid for an arr. 3 pressurized dual seal. The barrier pressure is generated from the seal chamber pressure. The system is self-energizing and reacts to fluctuations in the seal chamber fluid pressure.

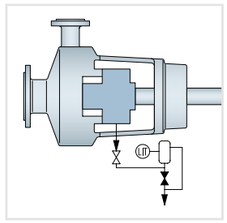


**Plan 54**
Pressurized external barrier fluid system supplying clean liquid for an arrangement 3 pressurized dual seal. The barrier liquid is maintained at a pressure greater than seal chamber pressure and is circulated by an external pump or pressure system.

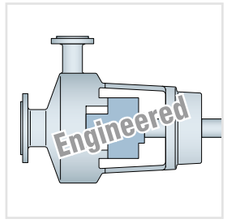
#### Atmospheric side



**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 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 99**
Engineered piping plan not defined by other existing plans.

* Possible

## The API experts

EagleBurgmann is one of the leading international system providers of sealing technology. For more than 20 years we have been actively contributing our expertise to developing and implementing the API 682 standard for the selection and application of seals and supply systems in centrifugal and rotary pumps.

## Solutions for more safety and productivity

The new 4th edition of API 682 is in line with the latest achievements and current developments. EagleBurgmann offers the widest portfolio of seals and seal supply systems acc. to API 682 4th edition, and consequently has the optimum product for each API-compliant requirement: technically mature, practical solutions that provide significantly greater safety and process reliability in refining technology, petrochemical, oil & gas and chemical industries.

**eagleburgmann.com**

**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.

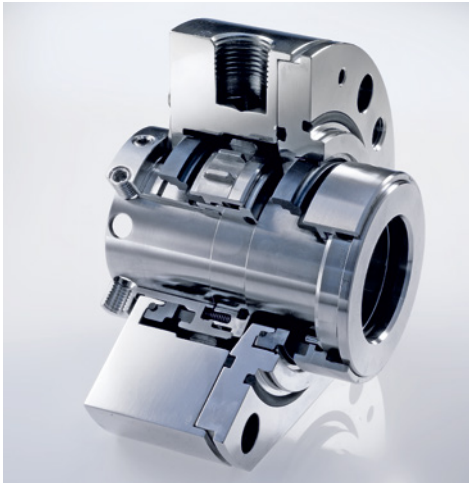
It should be noted that the extremal values of each operating parameter cannot be applied at the same time because of their interaction. Furthermore, the operating range of each specific product depends on the respective shaft diameter, materials used, mode of operation and on the medium to be sealed.

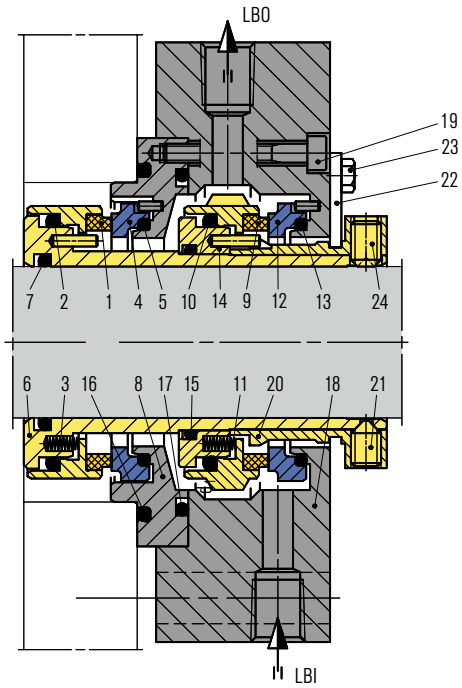
A guarantee can only be given in the individual case if the exact conditions of application are known and these are confirmed in a special agreement. When critical conditions of operation are involved, we recommend consulting with our specialist engineers.

Subject to change.

# Seal type A

# APItex-T






## Features

- API 682 Category 1, Type A, Arrangement 3 seal
- Dual seal in face-to-back arrangement
- Balanced
- Cartridge unit
- Independent of direction of rotation
- Shrink-fitted seal faces
- Solid mating rings

## Advantages

- Suitable for pressure reversal
- Insensitive to shaft deflections and process fluctuations
- Cover distortion cannot cause mating ring misalignment
- Good heat dissipation
- No external pump necessary
- Pre-assembled unit, ready to install
- Low space requirements
- Security due to proofed design
- Springs protected from the product

## Recommended applications

- Chemical industry
- Petrochemical industry
- Oil and gas industry
- Highly volatile hydrocarbons
- Toxic and hazardous media
- Media with poor lubrication properties
- Low solids content and low abrasive media
- Vertical and horizontal ANSI chemical standard pumps

## Operating range (see note on page 3)

Shaft diameter: d1 = 20 ... 110 mm (0.79" ... 4.33")
Pressure: p1 = 22 bar (319 PSI)
Temperature: t = –40 °C ... +176 °C (–40 °F ... +349 °F)
(>176 °C (349 °F) please inquire)
Sliding velocity: vg = 23 m/s (75 ft/s)

## Materials

Seal rings: Blister resistant carbon, Silicon carbide SSiC (Q12)
Mating rings: Silicon carbide SSiC (Q1)
Secondary seals: EPDM (E), NBR (P), FKM (V), FFKM (K)
Springs: Hastelloy® C-4 (M)* and C-276 (M5)
Metal parts: CrNiMo steel 316 (G) or equivalent,
optional materials on request.
* EagleBurgmann standard

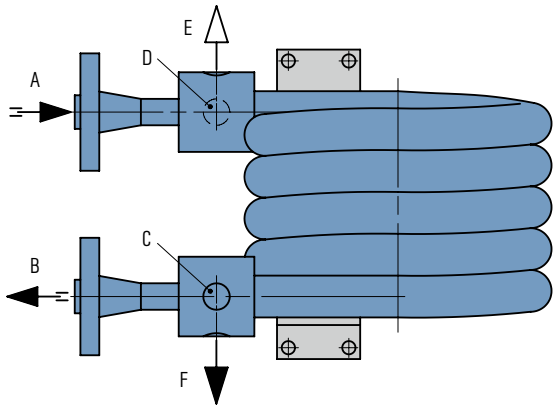
## Recommended piping plans

Process side:
01, 02, 03, 11, 12, 13, 14, 21, 22, 23, 31, 41, 32
Between seals: 53A, 53B, 53C, 54
Atmospheric side*: 61, 62, 65A, 65B
* Depending on application, please inquire

| Item | Description |
|---|---|
| 1, 9 | Seal ring |
| 2, 5, 7, 10, 13, 15, 16, 17 | O-Ring |
| 3, 11 | Spring |
| 4, 12 | Mating ring |
| 6 | Seal sleeve |
| 8, 18 | Gland plate |
| 14 | Driver |
| 19 | HSH Cap screw |
| 20 | Set ring |
| 21, 24 | Set screw |
| 22 | Setting device |
| 23 | Hexagon bolt |
| LBO | Liquid barrier OUT |
| LBI | Liquid barrier IN |

# Plans 21 (22), 23, 41

# WEF6 Water cooler




## Features

Heat exchangers of the WEF6000-A4 range are used to cool process/barrier fluids in seal supply circuits. WEF6000-A4 heat exchangers are fully compliant with API 682 4th edition regulations. The process/barrier medium is directed through the tube, and the cooling medium is directed through the shell.

Venting and draining of the process/barrier medium side as well as the cooling water side is ensured. In addition, the heat exchangers can also be combined with a temperature instrument in the supply line to the mechanical seal (optional in accordance with API 682 4th edition).

## Advantages

- Operating limits up to 45 bar/260 °C (653 PSI/500 °F) (tube side): suitable for a wide range of demanding operating conditions.
- Cooling water side and process side can be completely vented and drained
- Seamless pipes on process side
- Special design without welding inside the cooler
- Higher cooling water velocity due to innovative cooler design
- Stainless steel 316L: high resistance to corrosive media

## Recommended applications

- Refining technology
- Oil and gas industry
- Petrochemical industry
- Chemical industry
- Power plant technology

## Notes

Design and production in accordance with EU Pressure Equipment Directive PED 97/23 EC.
Design, calculation and production acc. to ASME VIII, Div. 1 (cooler not subject to ASME stamp requirements, piping <6")

Cleaning: Process/barrier medium side and cooling water side: flush with a suitable solvent.

| Item | Description |
|---|---|
| A | From mechanical seal |
| B | To mechanical seal |
| C | Cooling water IN |
| D | Cooling water OUT |
| E | Vent |
| F | Drain |

## Product variants

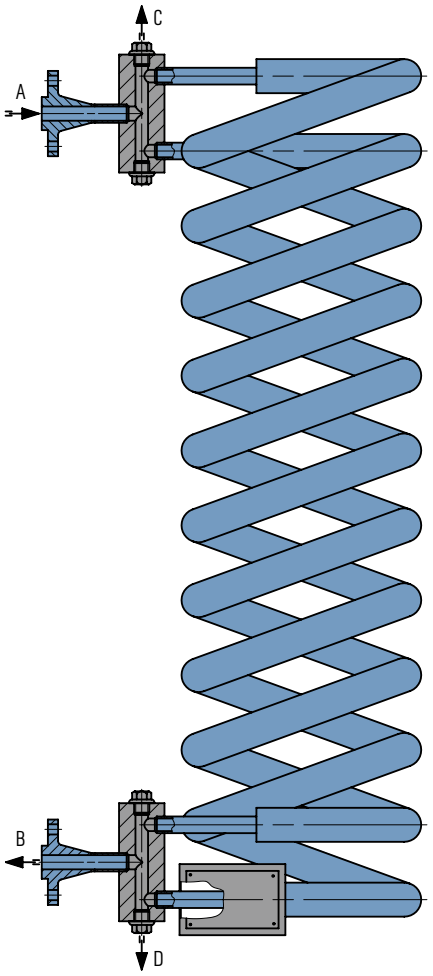
| Designation | WEF6100-A4 | | WEF6100-A4 | | WEF6000-A4 | | WEF6000-A4 | |
|---|---|---|---|---|---|---|---|---|
| Type of heat exchanger | ASME | | PED | | ASME | | PED | |
| | Tube | Shell | Tube | Shell | Tube | Shell | Tube | Shell |
| Process connections | Flange 3/4", 600 lbs | NPT 3/4" | Flange 3/4", 600 lbs | NPT 3/4" | Flange 3/4", 600 lbs | Flange 3/4", 300 lbs | Flange 3/4", 600 lbs | Flange 3/4", 300 lbs |
| Drain/vent connection | NPT 1/2" | | NPT 1/2" | | NPT 1/2" | | NPT 1/2" | |
| Allowable pressure[1] | 45 bar (653 PSI) | 16 bar (232 PSI) | 45 bar (653 PSI) | 16 bar (232 PSI) | 45 bar (653 PSI) | 16 bar (232 PSI) | 45 bar (653 PSI) | 16 bar (232 PSI) |
| Allowable temperature cooling water side (shell side)[1] | –29 °C ... +150 °C (–20 °F ... +302 °F) | | –29 °C ... +150 °C (–20 °F ... +302 °F) | | –29 °C ... +150 °C (–20 °F ... +302 °F) | | –29 °C ... +150 °C (–20 °F ... +302 °F) | |
| Allowable temperature process/ barrier medium side (tube side)[1] | –29 °C ... +260 °C (–20 °F ... +500 °F) | | –29 °C ... +260 °C (–20 °F ... +500 °F) | | –29 °C ... +260 °C (–20 °F ... +500 °F) | | –29 °C ... +260 °C (–20 °F ... +500 °F) | |
| Cooling capacity (kW)[2] | 10 | | 10 | | 10 | | 10 | |
| Cooling capacity (kW)[3] | 3 | | 3 | | 3 | | 3 | |
| Required cooling water quantity ($m^3/h$) | 0.6 | | 0.6 | | 0.6 | | 0.6 | |
| Metal parts | 316L | | 316L | | 316L | | 316L | |

Other versions on request.

[1] Design data, permissible working values depend on the actual conditions of service.
[2] Guidelines with buffer/barrier fluid water 60 °C (140 °F) – cooling water 20 °C (68 °F).
[3] Guidelines with buffer/barrier fluid oil 60 °C (140 °F) – cooling water 20 °C (68 °F).

# Plans 21 (22), 23, 41

# WEL6 Air cooler




## Features

Heat exchangers of the WEL6000-A4 range (shown here: WEL6002-A4) are used to cool process/barrier fluids in seal supply circuits. The heat exchangers are made of helical, laserwelded finned tubes. The cooling medium is ambient air. It is important, therefore, for WEL heat exchangers to be installed in well ventilated places indoors or, ideally, outdoors. There is a choice of three different basic versions of the WEL6000-A4 range as well as supplied fully assembled together with valves, base frame and other system components.

## Advantages

- Operating limits up to 44 bar/260 °C (638 PSI/500 °F) (tube side): suitable for a wide range of demanding operating conditions.
- Can be completely vented and drained
- Seamless pipes
- Stainless steel 316L: high resistance to corrosive media

## Recommended applications

- Refining technology
- Oil and gas industry
- Petrochemical industry
- Chemical industry
- Power plant technology

## Notes

Design and production in accordance with EU Pressure Equipment Directive PED 97/23 EC.
Design, calculation and production acc. to ASME VIII, Div. 1 (cooler not subject to ASME stamp requirements, piping <6")

| Item | Description |
|---|---|
| A | From mechanical seal |
| B | To mechanical seal |
| C | Vent |
| D | Drain |

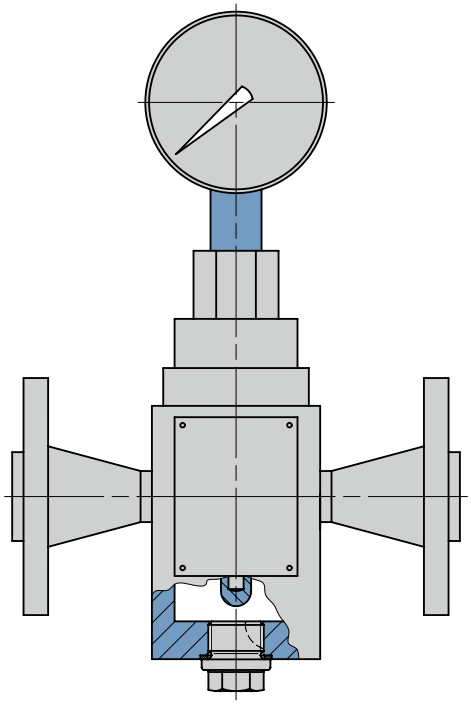
## Product variants

| Designation | WEL6001-A4A001-D0 | | WEL6002-A4A001-D0 | | WEL6003-A4A001-D0 | |
|---|---|---|---|---|---|---|
| Type of heat exchanger | ASME | PED | ASME | PED | ASME | PED |
| Number of finned tubes | 1 | | 2 finned tubes switched in parallel | | 2 finned tubes switched in parallel and doubled length | |
| Connections | Flange 3/4", 600 lbs | | Flange 3/4", 600 lbs | | Flange 3/4", 600 lbs | |
| Drain/vent connection | Flange 1/2", 600 lbs [4] | | Flange 1/2", 600 lbs [4] | | Flange 1/2", 600 lbs [4] | |
| Allowable pressure[1] | 44 bar (638 PSI) | 44 bar (638 PSI) | 44 bar (638 PSI) | 44 bar (638 PSI) | 44 bar (638 PSI) | 44 bar (638 PSI) |
| Allowable temperature process/ barrier medium side (tube side)[1] | −29 °C ... +260 °C (−20 °F ... +500 °F) | | −29 °C ... +260 °C (−20 °F ... +500 °F) | | −29 °C ... +260 °C (−20 °F ... +500 °F) | |
| Cooling capacity (kW)[2] | 1.5 | | 2 | | 3 | |
| Cooling capacity (kW)[3] | 1.2 | | 1.5 | | 2 | |
| Volume (liters) | 1.2 | | 2.4 | | 4.8 | |
| Metal parts | 316L | | 316L | | 316L | |

Other versions on request.
[1] Design data, permissible working values depend on the actual conditions of service.
[2] Guidelines with buffer/barrier fluid water 60 °C (140 °F) – ambient temperature 20 °C (68 °F); moved air at min. 0.7 m/s (2.3 ft/s); product flow rate 8 l/min.
[3] Guidelines with buffer/barrier fluid oil 60 °C (140 °F) – ambient temperature 20 °C (68 °F); moved air at min. 0.7 m/s (2.3 ft/s); product flow rate 8 l/min.
[4] Version with screwed connection G1/2" available as an option.

## Plans 21 (22), 23, 41

# SPT6 Temperature indicator

### Features

The measuring unit of the SPT6000-A4 range is used to visually monitor the operating temperature.

The measuring unit consists of a bi-metallic temperature gauge (NG100) with protective sleeve installed in a measuring block incl. drain connection.

### Advantages

- Operating limits up to 45 bar/260 °C (653 PSI/500 °F) (design parameters)
- Temperature indicating range up to 200 °C (392 °F)
- Wetted parts: Stainless steel 316L for high resistance to corrosive media

### Recommended applications

- Refining technology
- Oil and gas industry
- Petrochemical industry
- Chemical industry
- Power plant technology

### Product variants

| Designation | SPT6000-A4 | SPT6000-A4 |
|---|---|---|
| Connections – process | Flange 3/4", 600 lbs | Flange 3/4", 600 lbs |
| Connections – drain | G 1/2" | G 1/2" |
| Allowable pressure[1)] | 45 bar (653 PSI) | 45 bar (653 PSI) |
| Temperature range | 0 °C ... +120 °C<br>(+32 °F ... +248 °F) | 0 °C ... +200 °C<br>(+32 °F ... +392 °F) |
| Wetted parts | 316L | 316L |

Other versions on request.

[1)] Design data, permissible working values depend on the actual conditions of service.

## Plans 31, 41

# ZYA6 Cyclone separator

### Features

The ZY6000-A4 range is available in three versions:

**ZYA6000-A4:**
Cyclone separator for high flow rates and high pressures.

**ZYB6000-A4:**
Cyclone separator for high flow rates and high pressures; 100 % X-ray capability.

**ZYC6000-A4:**
Cast version, block-type design with integral flanges.

### Advantages

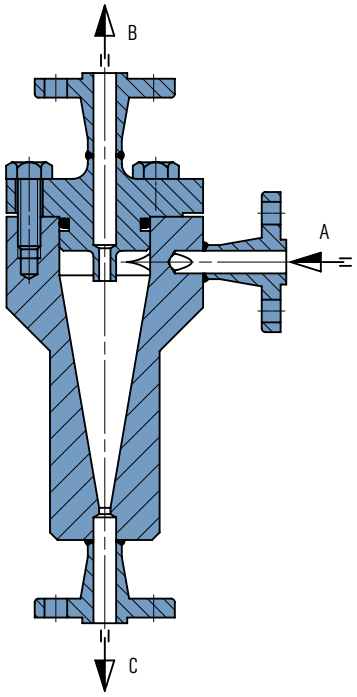
- Contamination is automatically conveyed to the suction nozzle of the pump: maintenance-free mode of operation for guaranteed reliability
- High filtration efficiency
- Wide range of products for the optimum solution for every application
- ZYA6000-A4 and ZYB6000-A4: available for operating pressures of up to 200 bar (2,900 PSI)
- ZYC6000-A4 in block-type design with integrated flange connections: low space requirements because of compact design

### Functional description

Cyclone separators of the ZY6000-A4 range are used to clean mainly aqueous liquids containing contamination such as dirts and solids (e. g., in circulation systems of sewage, sludge or pipeline pumps).

The best possible filtration efficiency is achieved when the specific weight of the solids is much higher than that of the carrier liquid and when the differential pressure is as large as possible within the permissible pressure range (min. 1.7 bar (24.7 PSI) in accordance with API 682). The viscosity of the medium is a factor that also needs to be taken into account.

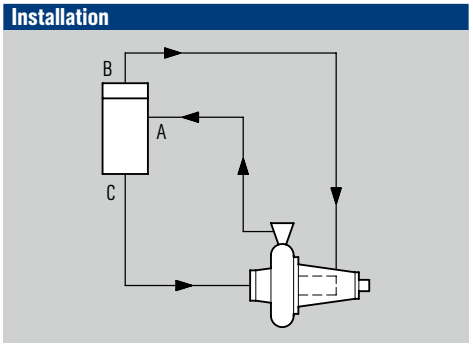
**ZYA6000**




### Recommended applications

- Refining technology
- Oil and gas industry
- Petrochemical industry
- Chemical industry
- Power plant technology

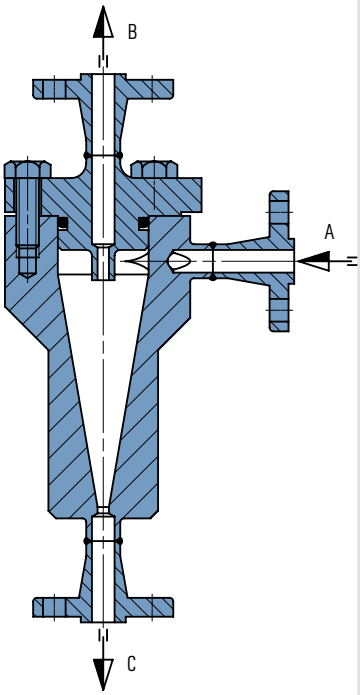
### Installation



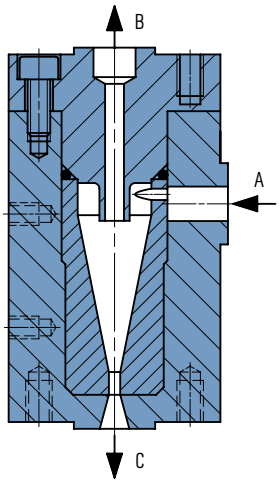

**P&ID for ZY6000-A4 Cyclone separators**
A Contaminated liquid IN
B Clean liquid OUT
C Separated liquid OUT

### Product variants

**ZYB6000**




**ZYC6000**



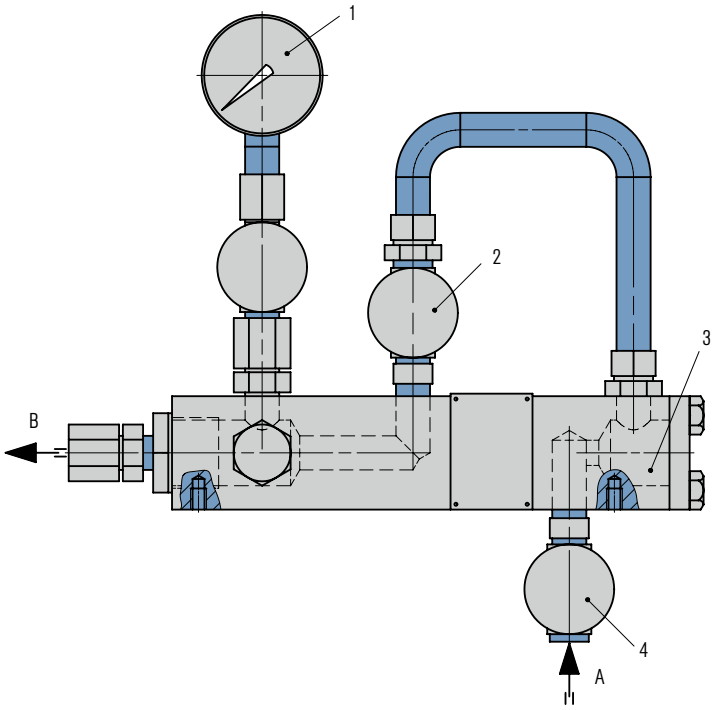

### Product variants

| Designation | ZYA6000 | ZYB6000 | ZYC6000 |
|---|---|---|---|
| Features | Standard | 100 % X-ray capability | Cast version |
| Connections – product inlet | Flange 3/4", 600 lbs | Flange 3/4", 600 lbs | Integral flange 3/4", 600 lbs |
| Connections – clean product outlet | Flange 3/4", 600 lbs | Flange 3/4", 600 lbs | Integral flange 3/4", 600 lbs |
| Connections – contaminated product outlet | Flange 3/4", 600 lbs | Flange 3/4", 600 lbs | Integral flange 3/4", 600 lbs |
| Allowable pressure[1] | 60 bar (870 PSI) | 60 bar (870 PSI) | 60 bar (870 PSI) |
| Temperature range | –29 °C ... +150 °C (–20 °F ... +302 °F) | –29 °C ... +150 °C (–20 °F ... +302 °F) | –29 °C ... +150 °C (–20 °F ... +302 °F) |
| O-Ring[2] | Viton® | Viton® | Viton® |
| Wetted parts | 316L | 316L | 316L |

Other versions on request.
[1] Max. permissible working values depend on version.
[2] Other materials on request, e. g. FKM, EPDM.

# Plan 32

# SPX6 Flush unit




## Features

The EagleBurgmann flush unit of the SPX6000-A4 range consists of a manifold with integrated inline filter supplied together with a needle valve and pressure gauge. Optional available with temperature gauge and/or flow indicator. The unit is used to control the flushing of a mechanical seal.

## Advantages

- Compact design due to integral filter
- Modular concept – optimal monitoring equipment available

## Recommended applications

- Refining technology
- Oil and gas industry
- Petrochemical industry
- Chemical industry
- Power plant technology

## Functional description

The SPX6000-A4 flush unit continuously supplies flushing media from an external source to the mechanical seal. This plan is almost always used in combination with a throat bushing which serve as a throttle device to maintain a higher pressure in the stuffing box to isolate the pumped product from the seal chamber.

| Item | Description |
|---|---|
| 1 | Pressure indicator |
| 2 | Needle valve |
| 3 | Integral filter |
| 4 | Valve |
| A | From external source |
| B | To mechanical seal |

## Product variants

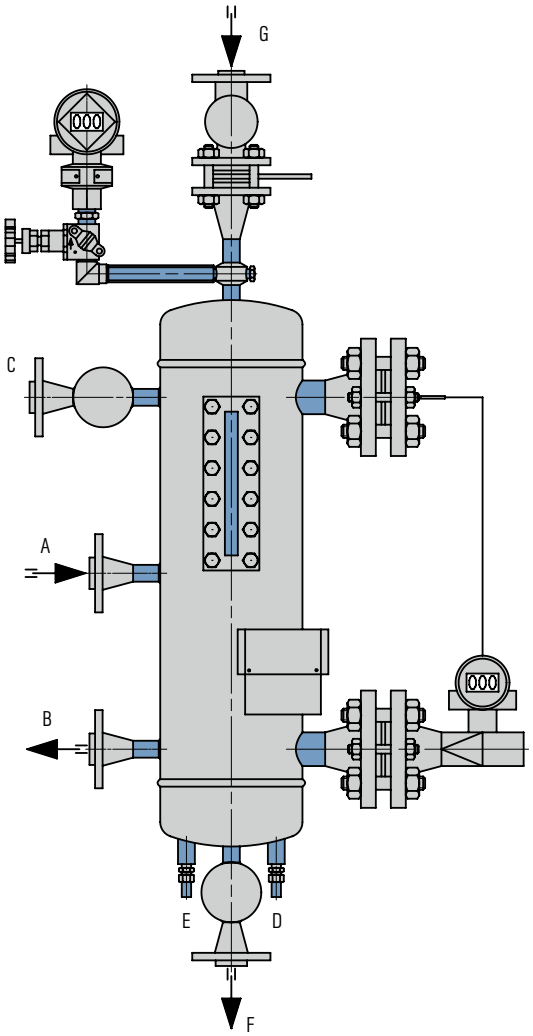
| Designation | SPX6000-A4 |
|---|---|
| Allowable pressure[1)] | 44 bar (638 PSI) |
| Allowable temperature[1)] | –20 °C ... +120 °C<br>(–4 °F ... +248 °F) |
| Process connections | 1/2" NPT |
| Metal parts | 316L |

Other versions on request.

[1)] Design data, permissible working values depend on the actual conditions of service.

# Plan 53A

# TSA6 Barrier/buffer fluid system




## Features

The EagleBurgmann barrier/buffer fluid systems of the TSA6000-A4 range meet all the requirements to supply mechanical seals in accordance with the API682 4th edition guidelines. The vessels are equipped with all essential connections for fitting additional components. The range is available in two standard vessel sizes with dished heads, and a bottom-flanged version which can be dismantled (TSB6000-A4) is also available. The modular system allows the TSA6000-A4 vessels to be combined with a wide range of system components such as level transmitter, pressure transmitter, base frame, etc.

## Advantages

- Operating limits up to 44 bar/260 °C (638 PSI/500 °F): suitable for a wide range of demanding operating conditions
- Robust design with weld-pad type sightglass for optimum visual level monitoring
- Modular system: combination possible with a wide range of system components

## Recommended applications

- Refining technology
- Oil and gas industry
- Petrochemical industry
- Chemical industry
- Power plant technology

## Notes

Design and production available in accordance with EU Pressure Equipment Directive PED 97/23 EC. Design, calculation and production available acc. to ASME VIII, Div. 1.
3rd party inspection, ASME stamp on request.

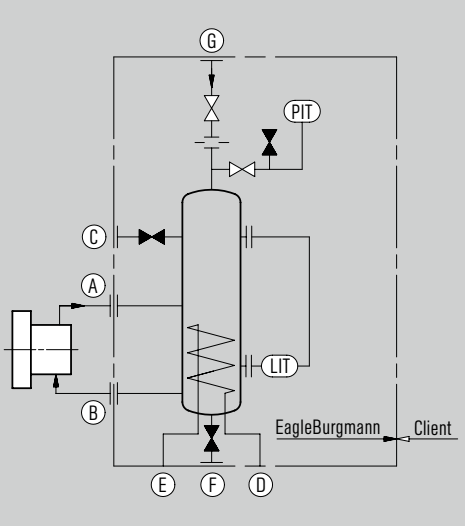
## Functional description

The TS system performs all the basic functions of a barrier/buffer system for the operation of dual seals:

- To pressurize the barrier/buffer chamber
- Leakage compensation
- Barrier/buffer fluid is circulated by thermosiphon effect or forced circulation system
- To cool the seal
- To selectively absorb product leakage and prevent dry running (tandem arrangement)

Use compressed air or nitrogen for pressurization; pressurization is monitored by a pressure transmitter (default). The incorporated level transmitter issues a signal whenever the level of barrier/buffer fluid is too low.

## Installation




**P&ID for TSA6000-A4, Plan 53A**
A From mechanical seal
B To mechanical seal
C Filling connection
D Cooling water IN
E Cooling water OUT
F Drain
G N2 IN

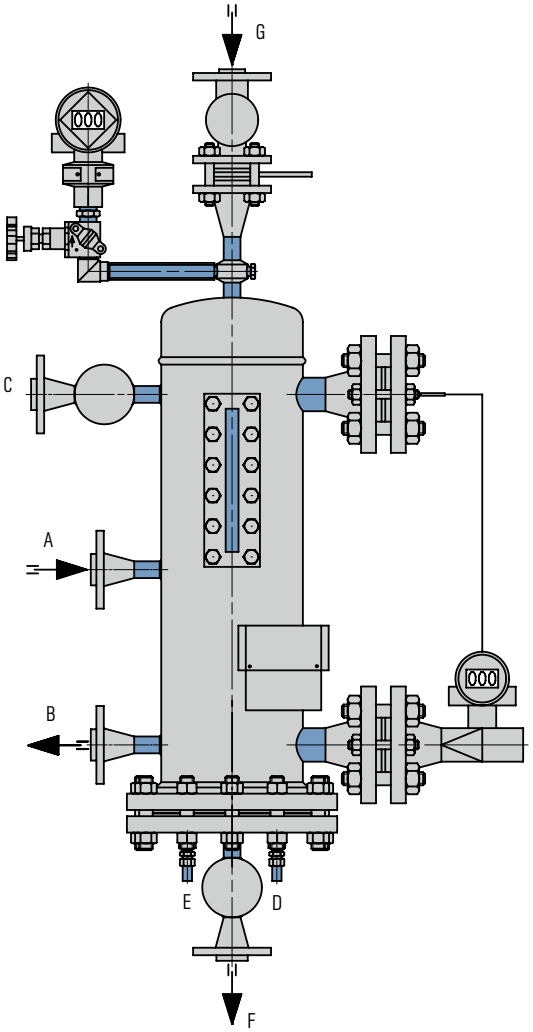
## Product variants

| Designation | TSA6000-A4 | TSA6001-A4 | TSA6002-A4 | TSA6003-A4 |
|---|---|---|---|---|
| Pressure Equipment Directive | ASME | PED | ASME | PED |
| For shaft diameters ≤60 mm (acc. to API 682) | X | X | | |
| For shaft diameters >60 mm (acc. to API 682) | | | X | X |
| Integrated cooling coil | X | X | X | X |
| Volume, vessel (liters) | 15 | 15 | 26 | 26 |
| Volume, tube (liters) | 0.3 | 0.3 | 0.4 | 0.4 |
| Allowable pressure – shell[1)] | 44 bar (638 PSI) | 44 bar (638 PSI) | 44 bar (638 PSI) | 44 bar (638 PSI) |
| Allowable pressure – tube[1)] | 44 bar (638 PSI) | 44 bar (638 PSI) | 44 bar (638 PSI) | 44 bar (638 PSI) |
| Allowable temperature – vessel[1)] | –29 °C ... +260 °C (–20 °F ... +500 °F) | –29 °C ... +260 °C (–20 °F ... +500 °F) | –29 °C ... +260 °C (–20 °F ... +500 °F) | –29 °C ... +260 °C (–20 °F ... +500 °F) |
| Allowable temperature – system[1)] | –29 °C ... +260 °C (–20 °F ... +500 °F) | –29 °C ... +260 °C (–20 °F ... +500 °F) | –29 °C ... +260 °C (–20 °F ... +500 °F) | –29 °C ... +260 °C (–20 °F ... +500 °F) |
| Liquid volume at NLL – Normal Liquid Level (liters) | 12 | 12 | 20 | 20 |
| Working volume MAX-MIN (liters) | 4 | 4 | 6.5 | 6.5 |
| Cooling capacity – without cooling water (kW)[3)] | 0.75 | 0.75 | 1 | 1 |
| Cooling capacity – natural circulation (kW)[2)] | 1.9 | 1.9 | 2.5 | 2.5 |
| Cooling capacity – forced circulation (kW)[2)] | 5 | 5 | 6.5 | 6.5 |
| Required cooling water quantity ($m^3$/h) | 0.4 | 0.4 | 0.7 | 0.7 |
| Metal parts | 316L | 316L | 316L | 316L |
| Sight-glass | Borosilicate | Borosilicate | Borosilicate | Borosilicate |
| Gaskets | PTFE | PTFE | PTFE | PTFE |
| Net weight (approx.) | 68 kg (150 lbs) | 68 kg (150 lbs) | 75 kg (165 lbs) | 75 kg (165 lbs) |

Other versions on request.
[1)] Design data, permissible working values depend on the actual conditions of service.
[2)] Guidelines with barrier/buffer fluid water 60 °C (140 °F) – cooling water 20 °C (68 °F).
[3)] Guidelines with barrier/buffer fluid water 60 °C (140 °F) – ambient temperature 20 °C (68 °F)
(valid for thermosiphon systems without cooling water with natural circulation resp. forced circulation).

# Plan 53A

# TSB6 Barrier/buffer fluid system




## Features

The EagleBurgmann barrier/buffer fluid systems of the TSB6000-A4 range meet all the requirements to supply mechanical seals in accordance with the API682 4th edition guidelines. The vessels are equipped with all essential connections for fitting additional components. TSB6 bottom-flanged vessels are available in two standard sizes. A version with dished heads (TSA6000-A4) is also available. The modular system allows the TSB6000-A4 vessels to be combined with a wide range of system components such as level transmitter, pressure transmitter, base frame, etc.

## Advantages

- Operating limits up to 44 bar/260 °C (638 PSI/500 °F): suitable for a wide range of demanding operating conditions
- Robust design with weld-pad type sightglass for optimum visual level monitoring
- Modular system: combination possible with a wide range of system components

## Recommended applications

- Refining technology
- Oil and gas industry
- Petrochemical industry
- Chemical industry
- Power plant technology

## Notes

Design and production available in accordance with EU Pressure Equipment Directive PED 97/23 EC. Design, calculation and production available acc. to ASME VIII, Div. 1.
3rd party inspection, ASME stamp on request.

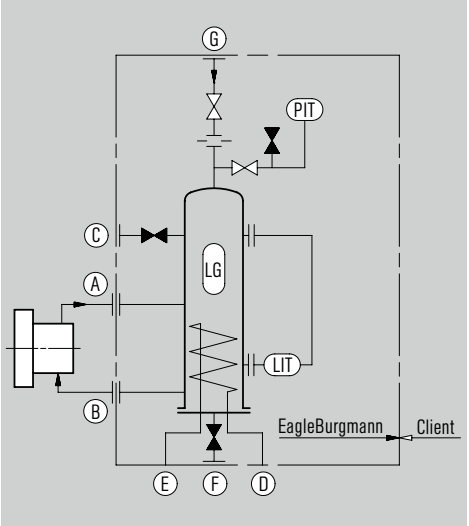
## Functional description

The TS system performs all the basic functions of a barrier/buffer system for the operation of dual seals:

- To pressurize the barrier/buffer chamber
- Leakage compensation
- Barrier/buffer fluid is circulated by thermosiphon effect or forced circulation system
- To cool the seal
- To selectively absorb product leakage and prevent dry running (tandem arrangement)

Use compressed air or nitrogen for pressurization; pressurization is monitored by a pressure transmitter (default). The incorporated level transmitter issues a signal whenever the level of barrier/buffer fluid is too low.

## Installation




**P&ID for TSA6000-A4, Plan 53A**
A From mechanical seal
B To mechanical seal
C Filling connection
D Cooling water IN
E Cooling water OUT
F Drain
G N2 IN

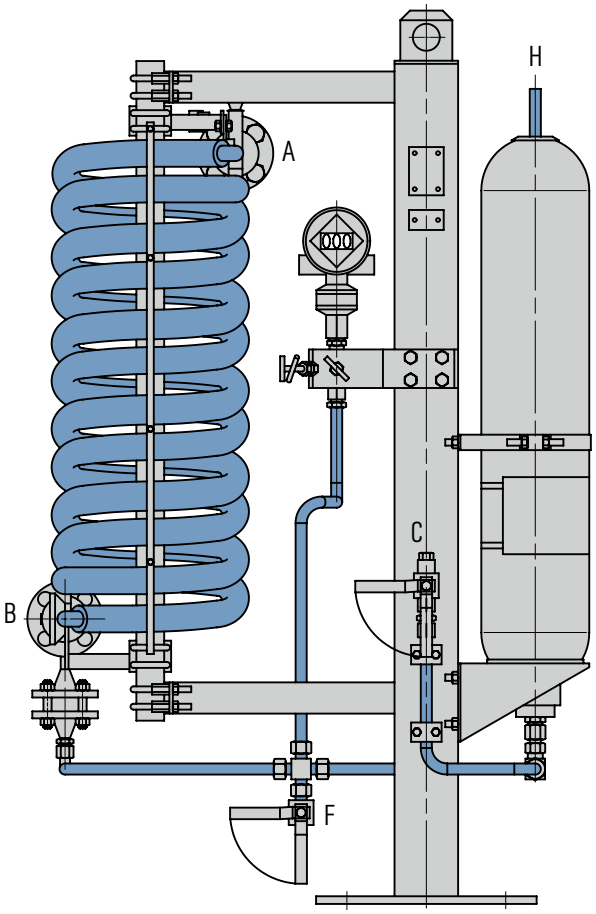
## Product variants

| Designation | TSB6000-A4 | TSB6001-A4 | TSB6002-A4 | TSB6003-A4 |
|---|---|---|---|---|
| Pressure Equipment Directive | ASME | PED | ASME | PED |
| For shaft diameters ≤60 mm (acc. to API 682) | X | X | | |
| For shaft diameters >60 mm (acc. to API 682) | | | X | X |
| Integrated cooling coil | X | X | X | X |
| Volume, vessel (liters) | 15 | 15 | 26 | 26 |
| Volume, tube (liters) | 0.3 | 0.3 | 0.4 | 0.4 |
| Allowable pressure – shell[1)] | 44 bar (638 PSI) | 44 bar (638 PSI) | 44 bar (638 PSI) | 44 bar (638 PSI) |
| Allowable pressure – tube[1)] | 44 bar (638 PSI) | 44 bar (638 PSI) | 44 bar (638 PSI) | 44 bar (638 PSI) |
| Allowable temperature – vessel[1)] | –29 °C ... +260 °C (–20 °F ... +500 °F) | –29 °C ... +260 °C (–20 °F ... +500 °F) | –29 °C ... +260 °C (–20 °F ... +500 °F) | –29 °C ... +260 °C (–20 °F ... +500 °F) |
| Allowable temperature – system[1)] | –29 °C ... +260 °C (–20 °F ... +500 °F) | –29 °C ... +260 °C (–20 °F ... +500 °F) | –29 °C ... +260 °C (–20 °F ... +500 °F) | –29 °C ... +260 °C (–20 °F ... +500 °F) |
| Liquid volume at NLL – Normal Liquid Level (liters) | 12 | 12 | 20 | 20 |
| Working volume MAX-MIN (liters) | 4 | 4 | 6.5 | 6.5 |
| Cooling capacity – without cooling water (kW)[3)] | 0.75 | 0.75 | 1 | 1 |
| Cooling capacity – natural circulation (kW)[2)] | 1.9 | 1.9 | 2.5 | 2.5 |
| Cooling capacity – forced circulation (kW)[2)] | 5 | 5 | 6.5 | 6.5 |
| Required cooling water quantity ($m^3$/h) | 0.4 | 0.4 | 0.7 | 0.7 |
| Metal parts | 316L | 316L | 316L | 316L |
| Sight-glass | Borosilicate | Borosilicate | Borosilicate | Borosilicate |
| Gaskets | PTFE | PTFE | PTFE | PTFE |

Other versions on request.
[1)] Design data, permissible working values depend on the actual conditions of service.
[2)] Guidelines with barrier/buffer fluid water 60 °C (140 °F) – cooling water 20 °C (68 °F).
[3)] Guidelines with barrier/buffer fluid water 60 °C (140 °F) – ambient temperature 20 °C (68 °F)
(valid for thermosiphon systems without cooling water with natural circulation resp. forced circulation).

# Plan 53B

# SPB6 Barrier fluid system with bladder accumulator




## Features

Pressurized barrier system (closed circuit) for use in seal systems with high pressures and/or for hazardous/ environmentally harmful processes. The SPB6000-A4 (Plan 53B) range is available with a pressure accumulator, cooler (finned tube, water or air cooler with fan) and a wide range of instruments. A refilling unit must be provided.

## Advantages

- Pressurization occurs by means of a pre-loaded bladder accumulator
- Membranes in the accumulator separate the nitrogen from the barrier medium: nitrogen cannot get into the barrier medium or process medium
- Barrier pressure is created without any need for connection to a nitrogen supply
- Available with finned tube, water or air coolers with fan
- Modular system: combination possible with a wide range system components/instruments

## Recommended applications

- Refining technology
- Oil and gas industry
- Petrochemical industry
- Chemical industry
- Power plant technology

## Functional description

The SPB6000-A4 is designed to perform the following functions of a barrier system:

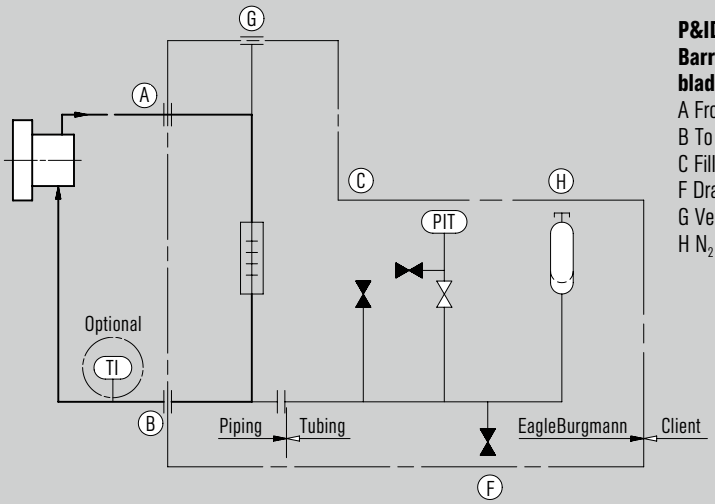
- To pressurize the buffer chamber
- Leakage compensation
- To cool the seal

Pressurization (> process pressure) prevents the process medium from getting into the barrier circuit or the atmosphere. Pressurization is supplied by a pressure accumulator which is pre-loaded with nitrogen. Circulation in the barrier circuit occurs via the thermosiphon principle or by forced circulation, e. g., with a pumping screw.

## Notes

Design and production available in accordance with EU Pressure Equipment Directive PED 97/23 EC. Design, calculation and production available acc. to ASME VIII, Div. 1.
3rd party inspection, ASME stamp on request.

## Installation




**P&ID for SPB6000-A4**
**Barrier fluid system with bladder accumulator**
A From mechanical seal
B To mechanical seal
C Fill
F Drain
G Vent
H $N_2$ Precharge

## Product variants

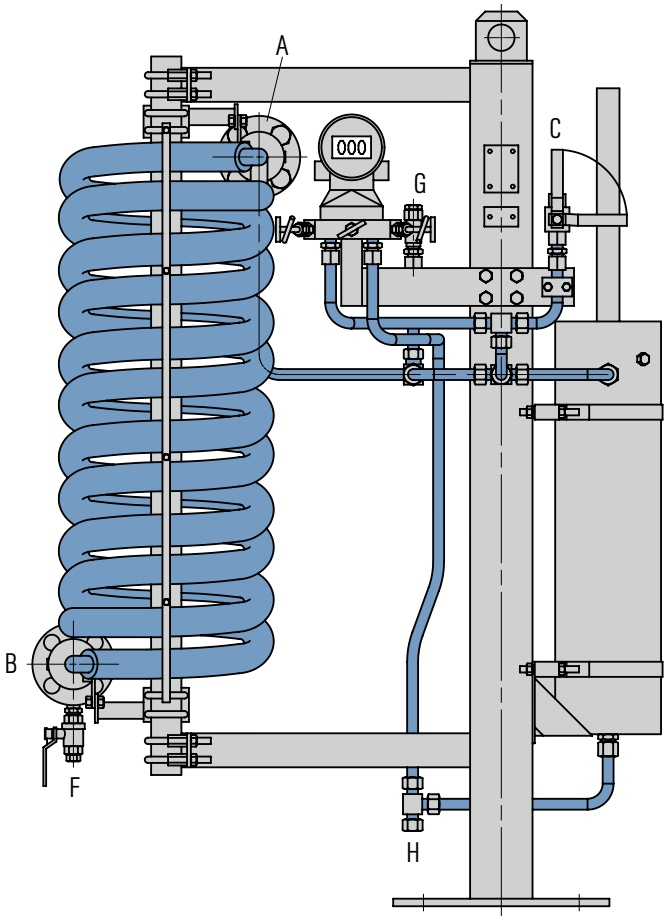
| **Designation** | **SPB6000-A4** | | **SPB6001-A4** | | **SPB6002-A4** | | **SPB6003-A4** | |
|---|---|---|---|---|---|---|---|---|
| Pressure Equipment Directive | ASME | | PED | | ASME | | PED | |
| Type of heat exchanger | Air cooler [a] | Water cooler [b] | Air cooler [a] | Water cooler [b] | Air cooler [a] | Water cooler [b] | Air cooler [a] | Water cooler [b] |
| For shaft diameters ≤ 60 mm (acc. to API 682) | X | | X | | | | | |
| For shaft diameters > 60 mm (acc. to API 682) | | | | | X | | X | |
| Bladder accumulator (liters) | 20 | | 20 | | 35 | | 35 | |
| Allowable pressure[1] | 44 bar (638 PSI) | | 44 bar (638 PSI) | | 44 bar (638 PSI) | | 44 bar (638 PSI) | |
| Allowable temperature bladder accumulator[1] | –20 °C ... +90 °C (–4 °F ... +194 °F) | | –20 °C ... +90 °C (–4 °F ... +194 °F) | | –20 °C ... +90 °C (–4 °F ... +194 °F) | | –20 °C ... +90 °C (–4 °F ... +194 °F) | |
| Allowable temperature system[1] | –20 °C ... +90 °C (–4 °F ... +194 °F) | | –20 °C ... +90 °C (–4 °F ... +194 °F) | | –20 °C ... +90 °C (–4 °F ... +194 °F) | | –20 °C ... +90 °C (–4 °F ... +194 °F) | |
| Cooling capacity – with water cooled heat exchanger (kW)[2] | | 10 | | 10 | | 10 | | 10 |
| Cooling capacity – with water cooled heat exchanger (kW)[3] | | 3 | | 3 | | 3 | | 3 |
| Required cooling water quantity ($m^3/h$) | | 0.6 | | 0.6 | | 0.6 | | 0.6 |
| Cooling capacity – with air cooled heat exchanger (kW)[4] | 2.0 | | 2.0 | | 2.0 | | 2.0 | |
| Cooling capacity – with air cooled heat exchanger (kW)[5] | 1.5 | | 1.5 | | 1.5 | | 1.5 | |
| Metal parts | 316L | | 316L | | 316L | | 316L | |
| Accumulator | CrMo steel | | CrMo steel | | CrMo steel | | CrMo steel | |
| Bladder | Nitrile | | Nitrile | | Nitrile | | Nitrile | |

Other versions on request.
[1] Design data, permissible working values depend on the actual conditions of service.
[2] Guidelines with barrier fluid water 60 °C (140 °F) – cooling water 20 °C (68 °F).
[3] Guidelines with barrier fluid oil 60 °C (140 °F) – cooling water 20 °C (68 °F).
[4] Guidelines with barrier fluid water 60 °C (140 °F ) – ambient temperature 20 °C (68 °F); moved air at min. 0,7 m/s (2.3 ft/s); product flow rate 8 l/min.
[5] Guidelines with barrier fluid oil 60 °C (140 °F) – ambient temperature 20 °C (68 °F); moved air at min. 0,7 m/s (2.3 ft/s); product flow rate 8 l/min.

[a] WEL6002-A4
[b] WEF6000-A4

# Plan 53C

# SPC6 Barrier fluid system with piston accumulator




## Features

Pressurized barrier system (closed circuit) for use in seal systems with high pressures and/or for hazardous/ environmentally harmful processes. The SPC6000-A4 (Plan 53C) range is available with a pressure booster, cooler (finned tube, water or air cooler with fan) and a wide range of instruments. A refilling unit must be provided.

## Advantages

- Pressurization occurs by means of a pressure booster
- Automatic setting of the barrier pressure via reference pressure: simple and reliable mode of operation
- Safe operation even in case of pressure changes
- Barrier pressure is created without any need for connection to a nitrogen supply
- Available with finned tube, water or air coolers with fan
- Modular system: combination possible with a wide range system components/instruments

## Recommended applications

- Refining technology
- Oil and gas industry
- Petrochemical industry
- Chemical industry
- Power plant technology

## Functional description

The SPC6000-A4 is designed to perform the following functions of a barrier system:

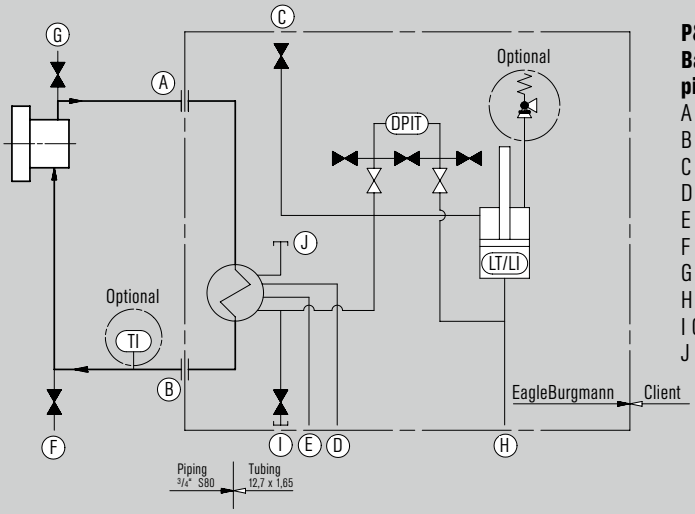
- To pressurize the buffer chamber
- Leakage compensation
- To cool the seal

Pressurization (> process pressure) prevents the process medium from getting into the barrier circuit or the atmosphere. Circulation in the barrier circuit occurs via the thermosiphon principle or by forced circulation, e. g., with a pumping screw.

## Notes

Design and production available in accordance with EU Pressure Equipment Directive PED 97/23 EC. Design, calculation and production available acc. to ASME VIII, Div. 1.
3rd party inspection, ASME stamp on request.

## Installation




**P&ID for SPC6000-A4**
**Barrier fluid system with piston accumulator**
A From mechanical seal
B To mechanical seal
C Fill
D Cooling water IN
E Cooling water OUT
F Drain
G Vent
H Pressure reference
I Cooling water drain
J Cooling water vent

## Product variants

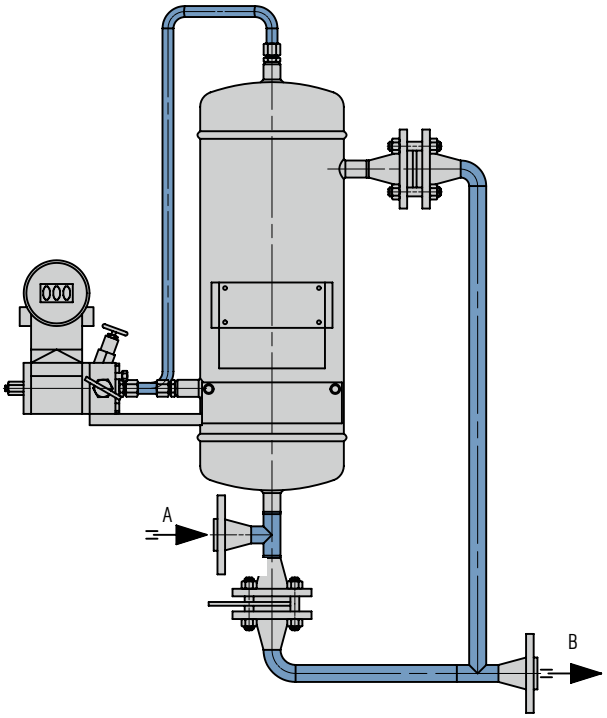
| **Designation** | **SPC6000-A4** | | **SPC6001-A4** | | **SPC6002-A4** | | **SPC6003-A4** | |
|---|---|---|---|---|---|---|---|---|
| Pressure Equipment Directive | ASME | | PED | | ASME | | PED | |
| Type of heat exchanger | Air cooler [a] | Water cooler [b] | Air cooler [a] | Water cooler [b] | Air cooler [a] | Water cooler [b] | Air cooler [a] | Water cooler [b] |
| For shaft diameters ≤ 60 mm (acc. to API 682) | X | | X | | | | | |
| For shaft diameters > 60 mm (acc. to API 682) | | | | | X | | X | |
| Piston accumulator (liters) | 2.8 | | 2.8 | | 5.1 | | 5.1 | |
| Allowable pressure[1] | 44 bar (638 PSI) | | 44 bar (638 PSI) | | 44 bar (638 PSI) | | 44 bar (638 PSI) | |
| Allowable temperature piston accumulator[1] | –20 °C ... +90 °C (–4 °F ... +194 °F) | | –20 °C ... +90 °C (–4 °F ... +194 °F) | | –20 °C ... +90 °C (–4 °F ... +194 °F) | | –20 °C ... +90 °C (–4 °F ... +194 °F) | |
| Allowable temperature system[1] | –20 °C ... +90 °C (–4 °F ... +194 °F) | | –20 °C ... +90 °C (–4 °F ... +194 °F) | | –20 °C ... +90 °C (–4 °F ... +194 °F) | | –20 °C ... +90 °C (–4 °F ... +194 °F) | |
| Cooling capacity – with water cooled heat exchanger (kW)[2] | | 10 | | 10 | | 10 | | 10 |
| Cooling capacity – with water cooled heat exchanger (kW)[3] | | 3 | | 3 | | 3 | | 3 |
| Required cooling water quantity ($m^3/h$) | | 0.6 | | 0.6 | | 0.6 | | 0.6 |
| Cooling capacity – with air cooled heat exchanger (kW)[3] | 2.0 | | 2.0 | | 2.0 | | 2.0 | |
| Cooling capacity – with air cooled heat exchanger (kW)[3] | 1.5 | | 1.5 | | 1.5 | | 1.5 | |
| Metal parts | 316L | | 316L | | 316L | | 316L | |

Other versions on request.
[1] Design data, permissible working values depend on the actual conditions of service.
[2] Guidelines with barrier fluid water 60 °C (140 °F) – cooling water 20 °C (68 °F).
[3] Guidelines with barrier fluid oil 60 °C (140 °F) – cooling water 20 °C (68 °F).
[4] Guidelines with barrier fluid water 60 °C (140 °F) – ambient temperature 20 °C (68 °F); moved air at min. 0,7 m/s (2.3 ft/s); product flow rate 8 l/min.
[5] Guidelines with barrier fluid oil 60 °C (140 °F) – ambient temperature 20 °C (68 °F); moved air at min. 0,7 m/s (2.3 ft/s); product flow rate 8 l/min.

[a] WEL6002-A4
[b] WEF6000-A4

# Plan 65A

# LSA6 Leakage collection reservoir




## Features

The EagleBurgmann leakage control systems of the LSA6000 range in accordance with API Plan 65A consist of a leakage collection tank with integrated orifice and overflow pipe. The level can be monitored with the differential pressure transmitter which is supplied together with a five-way manifold valve.

## Advantages

- Seal failure detection
- Safe discarding of excessive seal leakage
- To ensure durability, all components are corrosion resistant

## Recommended applications

- Refining technology
- Oil and gas industry
- Petrochemical industry
- Chemical industry
- Power plant technology

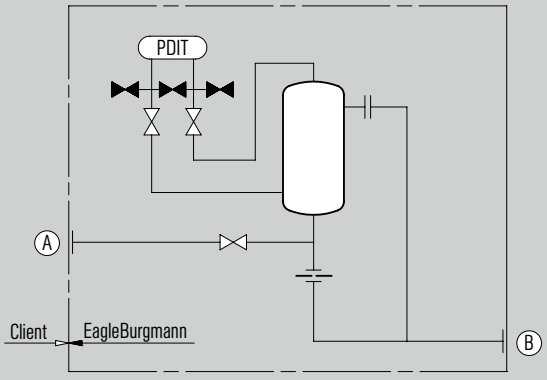
## Functional description

In accordance with API Plan 65A, the LSA6000 leakage control system is used to discharge leakage from single seals. The outboard leakage is collected in an external tank; the leakage volume is monitored (level in the tank).

## Notes

Design and production available in accordance with EU Pressure Equipment Directive PED 97/23 EC. Design, calculation and production available acc. to ASME VIII, Div. 1.
3rd party inspection, ASME stamp on request.

## Installation




**P&ID for LSA6000-A4**
**Leakage collection system**
A From mechanical seal
B To leakage collection system

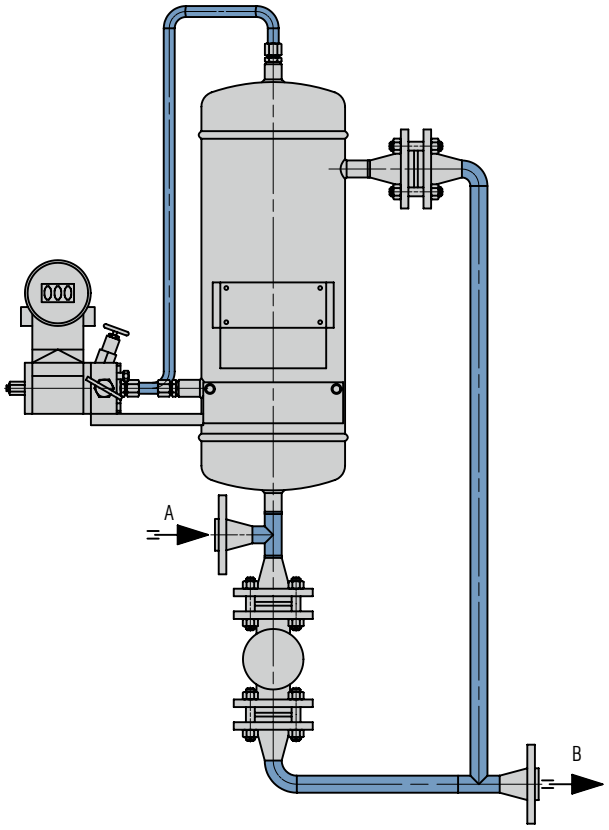
## Product variants

| Designation | LSA6000-A4 |
|---|---|
| Pressure Equipment Directive | PED \| ASME |
| Volume of vessel (liters) | 4 |
| Allowable pressure[1)] | 44 bar (638 PSI) |
| Allowable temperature[1)] | –20 °C ... +120 °C<br>(–4 °F ... +248 °F) |
| Connection | Flange 3/4", 600 lbs |
| Metal parts | 316L |

Other versions on request.
[1)] Design data, permissible working values depend on the actual conditions of service.

# Plan 65B

# LSB6 Leakage collection reservoir




## Features

In accordance with API Plan 65B, the EagleBurgmann leakage control systems of the LSB6000 range consist of a leakage collection tank with valve and overflow pipe. The level can be monitored with the differential pressure transmitter which is supplied together with a five-way manifold valve.

## Advantages

- Seal failure detection
- Safe discarding of excessive seal leakage
- To ensure durability, all components are corrosion resistant.

## Recommended applications

- Refining technology
- Oil and gas industry
- Petrochemical industry
- Chemical industry
- Power plant technology

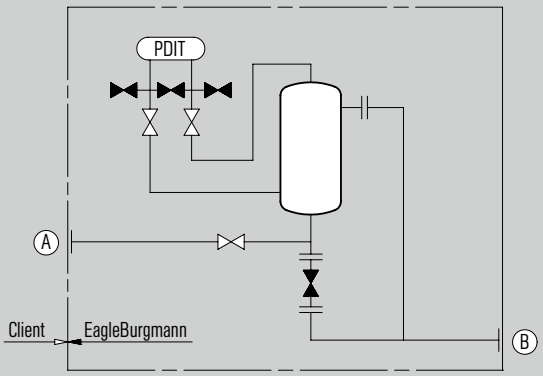
## Functional description

In accordance with API Plan 65B, the LSB6000 leakage control system is used to discharge leakage from single seals. The outboard leakage is collected in an external tank; the leakage volume is monitored (level in the tank).

## Notes

Design and production available in accordance with EU Pressure Equipment Directive PED 97/23 EC. Design, calculation and production available acc. to ASME VIII, Div. 1.
3rd party inspection, ASME stamp on request.

## Installation




**P&ID for LSB6000-A4**
**Leakage collection system**
A From mechanical seal
B To liquid collection system

## Product variants

| Designation | LSB6000-A4 |
|---|---|
| Pressure Equipment Directive | PED \| ASME |
| Volume of vessel (liters) | 4 |
| Allowable pressure[1)] | 44 bar (638 PSI) |
| Allowable temperature[1)] | –20 °C ... +120 °C<br>(–4 °F ... +248 °F) |
| Connection | Flange 3/4", 600 lbs |
| Metal parts | 316L |

Other versions on request.
[1)] Design data, permissible working values depend on the actual conditions of service.

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**API 682**
**4th edition**



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**eagleburgmann.com/api682**
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