API 682 Most common Plans and Sealing Systems

**Process side**

- **Plan 02**: Seal chamber cooling or heating and neck bush are necessary, unless otherwise specified. Seal end seal chamber with no circulation. Plugged connections to prevent liquid circulation and spillage.

- **Plan 11**: For general applications. Product pumped clean, good lubricating properties and heat removed from the mechanical seal. Recirculation from pump discharge through a flow control orifices to the seal chamber.

- **Plan 13**: Used when the seal chamber pressure is at discharge pressure (mainly vertical pump). Recirculation from pump discharge through a flow control orifices and back to the seal chamber.

- **Plan 21 (22)**: Used for hot liquid applications or where the temperature and pressure in the seal chamber is close to the vapour point of the product. Recirculation from pump discharge through a flow control orifices and scaler into the seal chamber.

- **Plan 23**: Used for hot liquid applications or where the temperature and pressure in the seal chamber is close to the vapour curve of the product. Recirculation by means of a pump seal chamber drain for wear or seal chamber through a source fluid and back to the seal chamber.

- **Plan 31**: Used in applications with suspended solids where the SG of the particles are > 2x that of the liquid. Recirculation from pump discharge through a cyclone separator, clean fluid from the seal chamber into the conditioned fluid to return.

- **Plan 32**: Used when the product being pumped does not have good lubrication properties, in bulk or hazardous applications. Clean injection of clean fluid into the seal chamber from an external source.

**Between seals**

- **Plan 05**: Application with plan 75 or plan 76. Externally supplied gas buffer (pressure lower than seal pressure). Buffer gas used to dilute and cool.

- **Plan 52**: Used where the principal component is harmful/hazardous and a buffer fluid may not contain the product. Externally pressurized at pressure below seal chamber pressure providing buffer liquid forced circulation.

- **Plan 53A**: Used for applications where the product has high pressure and are harmful/hazardous. Externally pressurized separator provides pressure to the seal chamber providing barrier fluid for mechanical seals. Forced circulation.

- **Plan 53B**: Used for applications where products have low pressure and are harmful/hazardous. Pressure control valve/accumulator provides pressure to the seal chamber, heat removed by the air/water heat exchanger. Forced circulation.

- **Plan 53C**: Used for applications where products have high pressure and are harmful/hazardous. Pressure control valve/accumulator provides a buffer fluid to the seal chamber for mechanical seals. Forced circulation.

- **Plan 54**: Used in harmful/hazardous applications. Processed clean barrier fluid from an external system. Final circulation by an external pump at pressure system. Forged casting.

**Atmospheric side**

- **Plan 06**: Used to keep atmosphere side of seal clean. External source providing a flow through spacers to atmospheric side.

- **Plan 65**: Used for leakage detection at seal ending. Atmospheric side leakage collection and rejections into external vessel.

**API plan functions**
- Leakage alarm and collection
- Buffer systems (Pbuffer > Pproduct)
- Barrier systems (Pbuffer < Pproduct)
- Flushing and cooling

**Media characteristics**
- Suspended solids
- Poor lubrication
- High temperature
- Hazardous / harmful
- Leakage may form solids
- Close to vapourisation point

The API 682 has emerged to become a worldwide accepted standard in today’s refinery and hydrocarbon related applications. EagleBurgmann offers a wide range of high quality mechanical seals and supply systems which fully comply with API 682.

From expert consulting and engineering up to modular TotalSealCare® service solutions for entire plants – EagleBurgmann is your reliable partner for sealing technology. Please ask also for our detailed brochure 58E, our API 682 seal selection software on CD or find your nearest contact at www.eagleburgmann.com/world

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API 682 Seal Classification

**Category**

<table>
<thead>
<tr>
<th>Category 1</th>
<th>Category 2</th>
<th>Category 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>-40 °C ... 260 °C, 21 bar g</td>
<td>-40 °C ... 400 °C, 41 bar g</td>
<td>-40 °C ... 750 °F, 600 PSI</td>
</tr>
</tbody>
</table>

Minimal data requirements
Rigorous data requirements

**Types**

- **Type A**
  Pusher seal
  Temperature: -40 ... 176 °C (-40 ... 350 °F), pressure: 41 bar g (800 PSI)

- **Type B**
  Metal bellows seal with O-rings
  Temperature: -40 ... 176 °C (-40 ... 350 °F), pressure: 21 bar g (300 PSI)

- **Type C**
  Metal bellows seal with flexible graphite
  Temperature: -40 ... 400 °C (-40 ... 750 °F), pressure: 21 bar g (300 PSI)

**Type ES**
Totaly Engineered Sealing system for service conditions outside the operating limits of type A, B and C

**Seal Code according to API 682 3rd edition**

<table>
<thead>
<tr>
<th>Example</th>
<th>Category</th>
<th>Arrangement</th>
<th>Type</th>
<th>API plan(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3CW-FX</td>
<td>C2</td>
<td>A</td>
<td>A</td>
<td>1153A</td>
</tr>
</tbody>
</table>

**Explanation of example 1153A**

- Category 2 seal chamber, operating conditions and data requirements
- Double seal with barrier fluid pressure higher than seal chamber pressure
- Pusher type seal
- API plans 11 + 53A

**Examples**

- 3CW-FX: Contacting Wet - Pusher throttle bushing
  Burgmann K7946 (Type A)
- 3CW-DW: Contacting Wet - Contacting Wet
  Burgmann K7946-K7947 (Type A)
- 3CW-BB: Contacting Wet - Back-to-Back
  Burgmann K7948-BC97 (Type A)
- 3NC-CS: Non-Contacting - Contacting Seal
  Burgmann CGSH-CD97 (Type A)

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See reverse side for most common API plans and sealing systems.