Industrial Lubrication
& Fluid special applications

Sealing systems API 682 (ISO 21049)
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Introduction:

API 682 and ISO 21049 specify the most common plans and sealing systems, with the design parameters to be considered, such as, disposition, configuration, API plan type...

An API plan determine piping or auxiliary systems that are connected to the sealing chamber and/or the mechanical seal. Some seal configurations only work in combination with the API plan. The external control combined with the supply units with many API plans is usually called “Supply system”.

Applications:

New sealing systems or reaconditionated, for rotary or centrifugal pumps, mainly used in harmful products applications, incedives and/or toxic in chemical, petrochemical and oil&gas industry.
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Documentation:

One of the most important handicaps to design an API plan 682/ISO 21049, is the documentation to be included in the project. These normative, require the highest quality and security for the end user and requires from manufacturer to document all equipment details, and all design and manufacturing critical points.

- Standard Documentation
  - General Arrangement (GA)
  - Piping & instrumentation Diagram (P&Id)
  - Quality dossier
    - Test
    - Calibration certificates
    - Materials Traceability
  - Datasheets and bill of materials (B.O.M)
  - Start-up and commissioning spare parts.

- Optional Documentation
  - Sectional & specific drawings
  - Components calculation
  - Special certificates
    - NDT (non-destructive tests)
    - PMI (Positive Material Identification)
  - Welding procedures
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API 682 – Plan 21

Recirculation from pump discharge through a flow control orifice and heat exchanger and finally enter to the seal chamber.

API 682 – Plan 22

Similar to Plan21 but it include a strainer at pump discharge. They are not recommended due to in case of filter clogging can generate seal breakdown. This system is not valid for periods longer than 3 years.
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API 682 – Plan 23

Recirculation from pump discharge through a flow control orifice and heat exchanger and finally enter to the seal chamber. This plan is required for high temperature applications to reduce the heat duty in the heat exchanger, cooling the flow recirculating.

API 682 – Plan 31

Recirculation from pump discharge through a cyclonic separator, supplying clean fluid to the seal chamber. Solid particles return to the pump aspiration.
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API 682 – Plan 32

Fluid is pumped is done by an external media. The media selected has to be chose very carefully to avoid potential vaporizations and avoid the pumped fluid media to be contaminated. This systems is usually used when the media pumped has not good lubricant properties, or solid particles are with the pumped fluid and/or is harmful.

API 682 – Plan 52

External reservoir provides barrier fluid to the external seal. During normal operation the circulation is maintained by a internal pumping cycle. The reservoir is vented continuously to a vapours recovery system and maintain a lower pressure than sealing chamber. This plan is used when the media is harmful and/or when the barrier fluid cannot contaminate the pumped product.
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API 682 – Plan 53A

A external pressurized reservoir supplies clean barrier fluid to the seal chamber. The circulation is done by a internal ring circulation cycle. Reservoir pressure is higher than pumped fluid. This plan is used in “hot” applications, low pressure applications or harmful fluids.

API 682 – Plan 53B

External piping supplies fluid to the external ring in a double seal design. A pressurized bladder accumulator supplies pressure to the circulating system. Flow is maintained due to the internal ring circulation cycle. Heat is dissipated by a heat exchanger which can be refrigerated with air or water. This Plan is used on applications where high pressures and/or harmful fluids are involved.
External piping supplies fluid to the external seal in a double mechanical seal. Pressurized is from the sealing chamber to a piston accumulator, supplies pressure to the circulation system. Flow is maintained by a continuous cycle. Heat is dissipated by a water or air heat exchanger. This system is applied on high pressures and harmful fluids.

External pressurized reservoir supplies clean barrier fluid to the seal chamber. Circulation is done by an external pump or a pressurised system. Reservoir pressure is higher than sea pressure. This system is applied on high pressures and harmful fluids.
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API 682 – Plan 75

Drain included in a seal chamber to avoid condensed leakages. Valves shall be installed according attached drawing and has to be easy accesible.

API 682 – Plan 76

Drain included in a seal chamber to avoid non-condesated leakages. Piping has to be minimum 13 mm (1/2” inch) and has to be increased continously from the vent to the piping and instrumentation connections. This sytem is used when the fluid pumped is not condensed at ambient temperature.
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Examples

Plan 21 / 22 / 23

Plan 31
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Examples

Plan 54

Plan 53A
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Ejemplos

Plan 53B

Plan 75
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Examples

Plan 52

Filling systems
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References