

Mechanical Seal Piping Plans

What

pumps.

Where

What

chamber.

Where

through orifice.

fluid vapor margin.

Seal flush from pump discharge

Default single seal flush plan.

Why Seal chamber heat removal.

Seal chamber venting on horizontal

Increase seal chamber pressure and

General applications with clean fluids.

Clean, non-polymerizing fluids.

Seal flush from pump discharge

Centrifuged solids are returned

through cyclone separator.

Why Seal chamber heat removal.

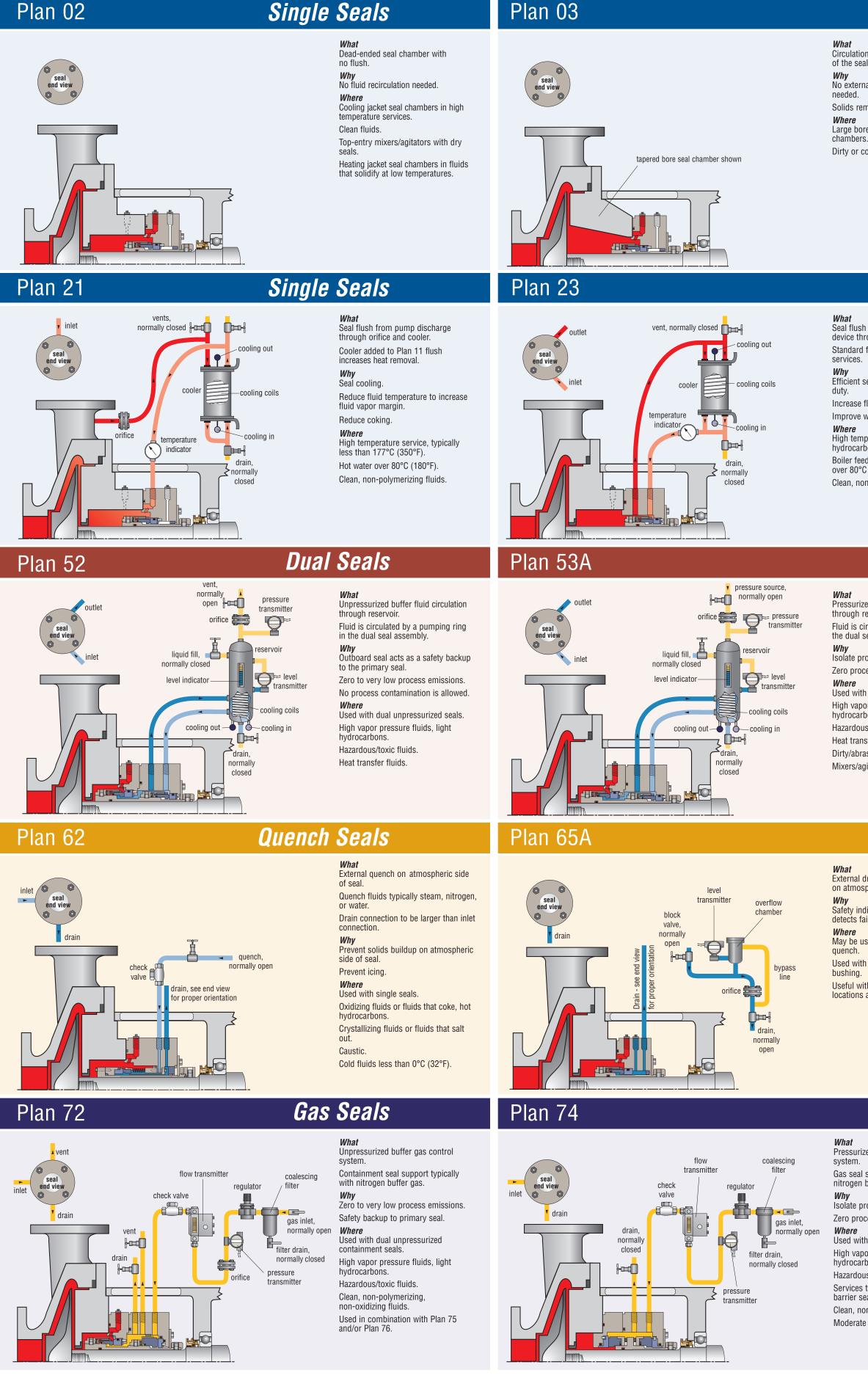
with sand or pipe slag.

Non-polymerizing fluids

Solids removal from flush and seal

Dirty or contaminated fluids, water

to pump suction.



Experience in Motion

Circulation created by the design

- of the seal chamber.
- No external fluid recirculation
- Solids removal from seal chamber. Large bore/open throat seal
- chambers. Dirty or contaminated fluids.

Seal flush from internal pumping device through cooler. Standard flush plan in hot water

- Efficient seal cooling with low cooler
- Increase fluid vapor margin. Improve water lubricity.
- High temperature service, hot hydrocarbons. Boiler feed water and hot water
- over 80°C (180°F). Clean, non-polymerizing fluids.

Pressurized barrier fluid circulation through reservoir.

- Fluid is circulated by a pumping ring in the dual seal assembly. Isolate process fluid.
- Zero process emissions.
- Used with dual pressurized seals.
- High vapor pressure fluids, light hydrocarbons.
- Hazardous/toxic fluids. Heat transfer fluids.
- Dirty/abrasive or polymerizing fluids. Mixers/agitators and vacuum service

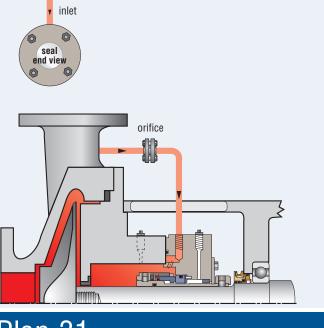
External drain with leakage detection on atmospheric side of seal.

- Safety indicator for primary seal detects failure.
- May be used alone or with Plan 62
- Used with close clearance throttle
- Useful with single seals in remote locations and critical services.

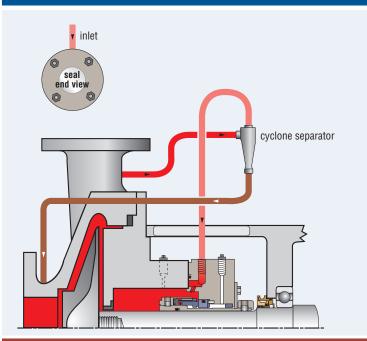
Pressurized barrier gas control Gas seal support typically with

- nitrogen barrier gas. Isolate process fluid.
- Zero process emissions.
- Used with dual pressurized gas seals. High vapor pressure fluids, light hydrocarbons.
- Hazardous/toxic fluids. Services that do not tolerate liquid barrier seals. Clean, non-polymerizing fluids.
- Moderate temperature fluids.

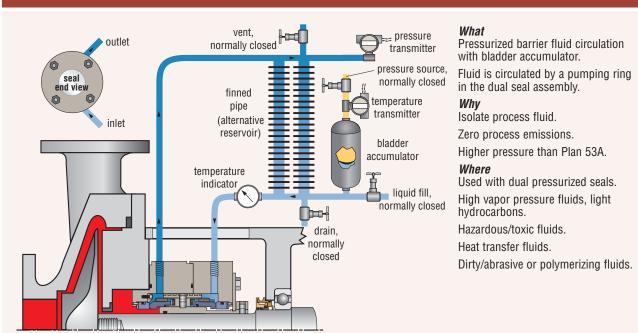
Plan 11



Plan 31



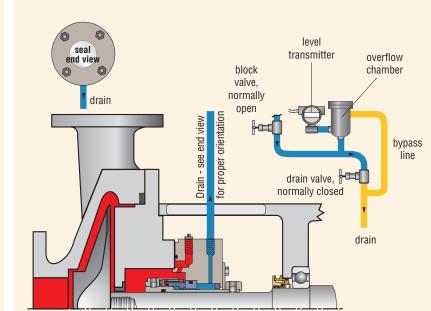
Plan 53B



Plan 65B

Plan 75

seal end view



pressure

reservoir located

below seal drain port

normall

normally

closed

open

What External drain with leakage detection on atmospheric side of seal. Why Leakage collection to detect for process leakage. Safety indicator to detect seal failure Continuous monitoring of leakage rates to atmosphere. Where Used with close clearance throttle bushing. Used with non-flashing, condensing

Higher pressure than Plan 53A

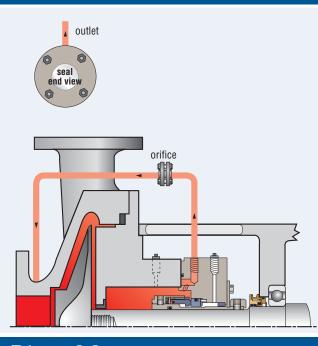
hvdrocarbons.

- Useful with seals in remote locations
- and critical services.

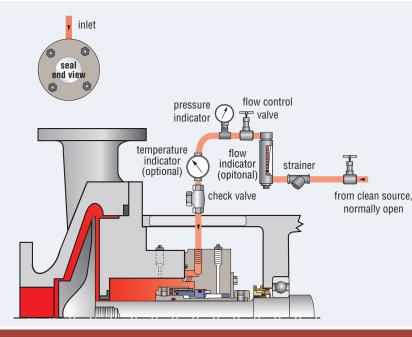
What Drain from containment seal cavity to liquid collector and vapor recovery.

- Why Leakage collection for zero to very low process emissions. Safety indicator for primary seal. Where May be used alone or with Plan 72 on containment seals. Fluids that condense at ambient
- temperature.
- High vapor pressure fluids, light hydrocarbons.
- Hazardous/toxic fluids.
- Clean, non-polymerizing, non-oxidizing

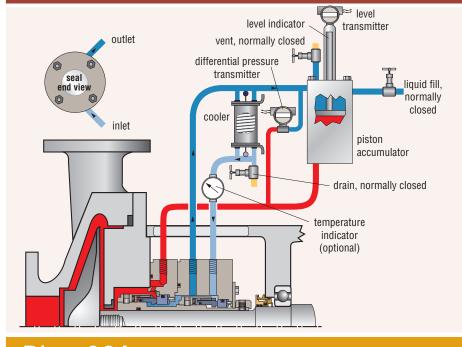
Plan 13



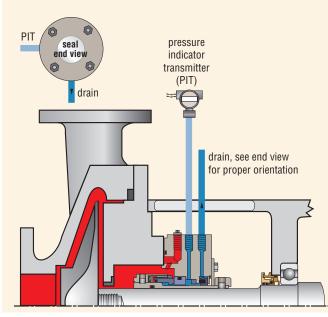
Plan 32



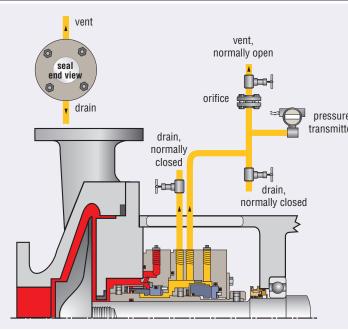
Plan 53C



Plan 66A



Plan 76





www.flowserve.com

What

Recirculation from seal chamber to pump suction through orifice. Standard flush plan on vertical pumps

Continuous seal chamber venting on vertical pumps. Seal chamber heat removal.

Where

What

source.

chamber.

Where

pulp.

Vertical pumps. Seal chamber pressure is greater than suction pressure. Moderate temperature fluids with moderate solids. Non-polymerizing fluids.

Seal flush from an external clean

Process and solids removal from seal

Increase seal chamber pressure and

Dirty or contaminated fluids, paper

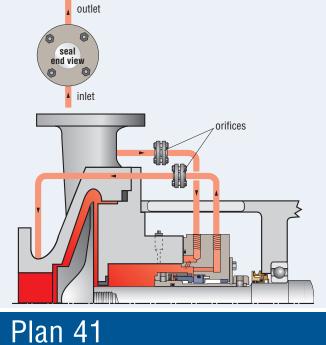
Polymerizing and/or oxidizing fluids.

Seal chamber heat removal.

fluid vapor margin.

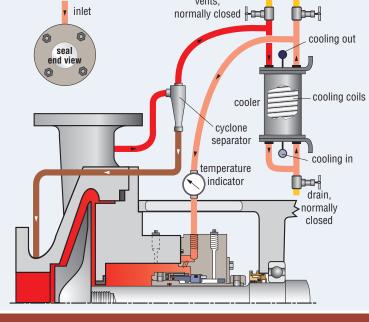
High temperature service.





What Seal flush from pump discharge and recirculation to pump suction with orifices. Combination of Plan 11 and Plan 13. Continuous seal chamber venting on vertical pumps. Seal chamber heat removal. Increase seal chamber pressure and fluid vapor margin. Where Vertical pumps.

Clean, non-polymerizing fluids at moderate temperatures.



Seal flush from pump discharge through cyclone separator and cooler. Combination of Plan 21 and Plan 31.

Why Seal cooling.

Solids removal from flush and seal chamber Where High temperature service, typically less

than 177°C (350°F). Dirty or contaminated fluids, water with sand or pipe slag. Non-polymerizing fluids.

Pressurized barrier fluid circulation

Used with pressurized dual seals.

Unpressurized buffer fluid circulation

Zero to very low process emissions. No process contamination is allowed

Used with unpressurized dual seals.

Leakage detection on atmospheric side

of seal utilizing a throttle bushing and

Safety indicator for primary seal detects

May be used alone or with Plan 65A

Used with close clearance throttle

Used with flashing or non-flashing fluids.

Useful when adding atmospheric side

leakage detection to an existing seal.

Useful with single seals in remote

locations and critical services.

Outboard seal acts as a safety

backup to the primary seal.

by external system.

solate process fluid

by external system.

Zero process emissions.

Whv

Where

What

Where

What

Why

failure.

Where

bushing.

orifice plug.

or Plan 65B.

Pressurized barrier fluid circulation with piston accumulator. Fluid is circulated by a pumping ring Dynamic tracking of system pressure. Used with dual pressurized seals.

normally open

in the dual seal assembly. Isolate process fluid. Zero process emissions. Higher pressure than Plan 53A. Where

High vapor pressure fluids, light hydrocarbons. Hazardous/toxic fluids. Heat transfer fluids.

Why Safety indicator for primary seal to

Minimize leakage from seal gland in

May be used alone or with Plan 65A

Used with flashing or non-flashing

Used with close clearance throttle

tions and critical services.

What

series.

Where

fluids

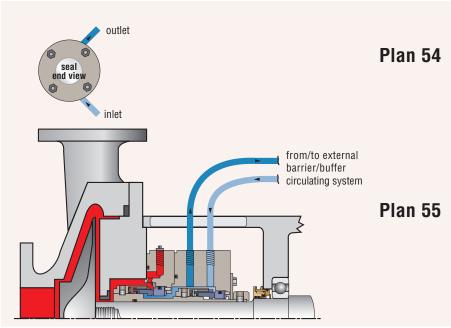
bushings

or Plan 65B.

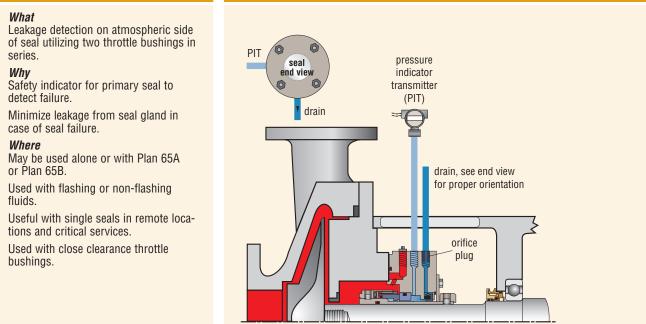
detect failure.

case of seal failure.

Plan 54 & 55



Plan 66B



Good Piping Practices

Minimize line losses 🗹 Use long radius bends Plan 53A Plan 23 🗹 Use large diameter ☑ Minimize component losses example example tubing Optimize for thermosyphon Only upward sloping Check rotation direction high point vent lines. Slope shall be 🗹 Test for leaks 40 mm/m (0.5 in/ft). 0.91 m (3 ft) 0.45 - 0.60 m normal liquid level (1.5 - 2 ft) low point drain 🗕 🗖 Iow point drain 1.2 m (4 ft) max —— — 0.9 m (3 ft) max — ►

What Vent from containment seal cavity to vapor recovery.

Why Leakage collection for zero to very low process emissions. Safety indicator for primary seal.

Where May be used alone or with Plan 72 on containment seals. Fluids that do not condense at ambient temperature. High vapor pressure fluids, light

hydrocarbons. Hazardous/toxic fluids.

Clean, non-polymerizing, non-oxidizing fluids

FTA157eng REV 12-14

© 2014 Flowserve Corporation