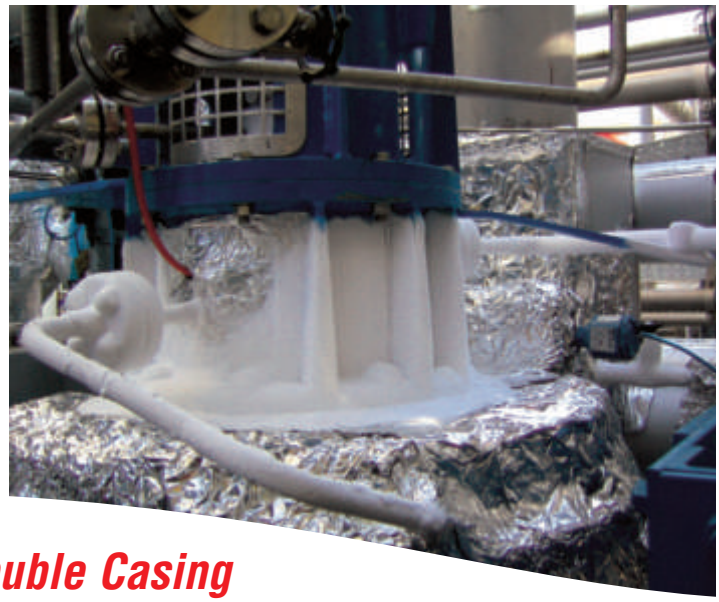
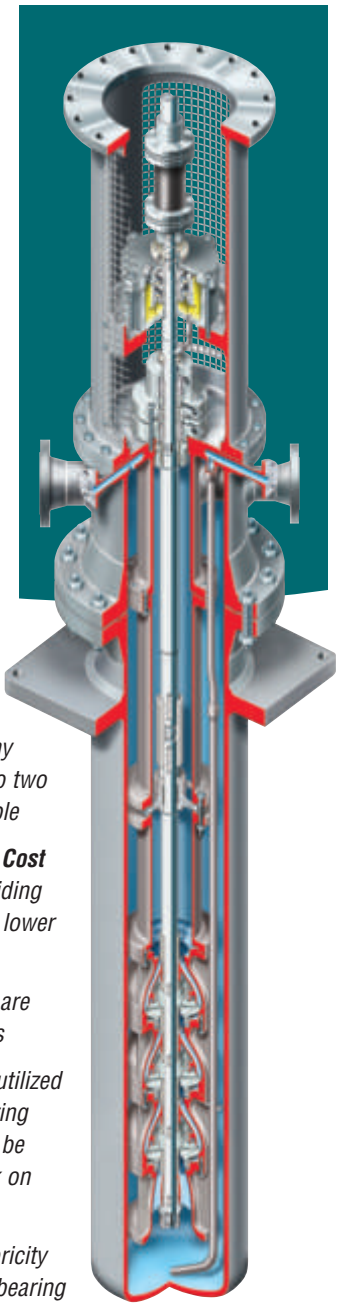
WUC API 610 (VS6)
Vertical Multistage Process Pump
For Cryogenic Applications (or Services)

Reliability and efficiency of the Flowserve WUC pump for cryogenic services is the result of more than 35 years of experience, continuous improvement and research.





The Ultimate Double Casing Vertical Pump

The model WUC covers the highly engineered speciality end of the Flowserve family of double casing vertical pumps. The pump line is based on a modular system, thus providing maximum design and operating flexibility. This is combined with specific design features, including stiff shaft construction, a self-contained axial thrust bearing housing and pressure containing parts certified to various international standards. Used in conjunction with the gas coffer dam system, the WUC is the pump of choice for even the most critical cryogenic services.

Operating Parameters

- Flows to 3000 m³/h (13 200 gpm)
- Heads to 1200 m (3900 ft)
- Temperatures minimum -200 °C (-325°F)
- Pressures to 200 bar (3000 psi)

Typical Services

- Ammonia
- Ethylene
- Propylene
- LPG, LNG
- Methane
- Butane

Features and Benefits

Flexibility to Size the Pump *to any specific operating condition due to two different types of hydraulic available*

Lower Initial – and Maintenance Cost *due to radial flow hydraulics providing higher head per stage resulting in lower number of stages*

High Capacities and Efficiencies *are achieved on mixed flow hydraulics*

Standard Electric Motors *can be utilized due to built into pump thrust bearing (the pump rotor does not need to be readjusted after major repair work on the e-motor)*

No Reliance *on cleanliness or lubricity of pumped product due to thrust bearing not in contact with pumpage*

Shorter Cans *resulting in lower initial costs and maintenance savings due to availability of inducers*

Any Pump Size *suitable also for temperatures below -50°C (-48°F) due to availability of gas coffer dam design (described on page 2)*

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Gas Coffer Dam Design

The design feature is applied for liquid temperatures below -50°C (-60°F) to prevent the **mechanical seals** (b) from icing up.

Function

A small part of pump flow passes the **throttle** (h), where it starts to vaporize due to pressure reduction to suction pressure. **Chamber I** (f) is connected to the gas phase of the **suction tank** via a balance line and contains a mixture of gas and liquid. The pressure in **chamber I** (f) is equal to the back pressure of this balance line (usually approximately 1 to 2 bar above suction pressure). In **chamber II** (d) the heat input from the environment forces the fluid to change completely into the gas phase. The **drain** (e) of **chamber II** (d) is normally plugged or can be used to connect a separate vessel to increase the storage capacity for the **barrier fluid** (a) in case of a **mechanical seal** (b) failure.

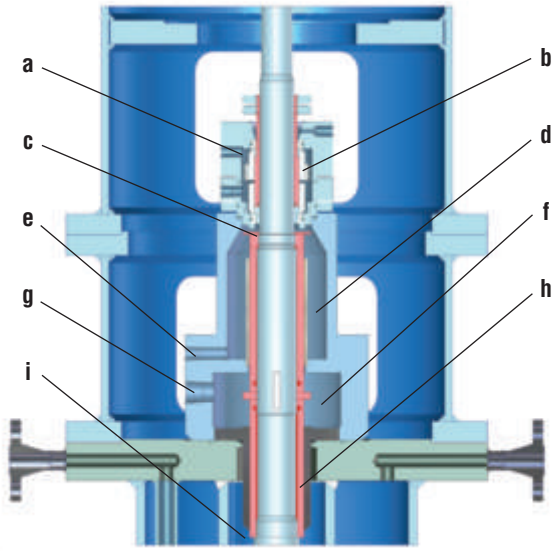
The **mechanical seal** (b) features a back-to-back arrangement, and the product side is exposed only to gas at 1 to 2 bar above suction pressure. Therefore no icing can occur and the barrier fluid reservoir (API Plan 53A) can be pressurized with nitrogen due to the low pressure at the product side of the seal. Monitoring the gas coffer dam pressure (is also a measurement for the wear of the throttle) via a pressure switch (optional) ensures long **mechanical seal** (b) life. Due to the low pressure and the ice-free seal ambient, standard mechanical seals can be used.

In case of a failure of the inner **mechanical seal** (b) a rotating disk (c) ensures that no barrier fluid can enter **chamber I** (f) and be mixed with the pumped fluid. **Chamber II** (d) is able to store approximately 2 liters of **barrier fluid** (a).

For Information

At standby (cooled down) the gas coffer dam is covered with ice depending on the pumped fluid temperature:

- At -50°C (-58°F) usually **chamber I** (f) is fully covered with ice
- At -106°C (-159°F) **chamber II** (d) is also covered with ice up to approximately 5 cm before the **mechanical seal** (b). During operation the ice coverage will be reduced a little because of the heat input of the mechanical seal (b)
- At -200°C (-328°F) **chamber II** (d) and partially the seal gland is fully coverd with ice. During operation the seal gland is free of ice due to heat input from the **mechanical seal** (b)



a) - Barrier fluid
b) - Mechanical seal
c) - Disk
d) - Chamber II (gas)
e) - Drain
f) - Chamber I (liquid and gas)
g) - To suction tank
h) - Throttle
i) - Discharge pressure

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