

Plan 62

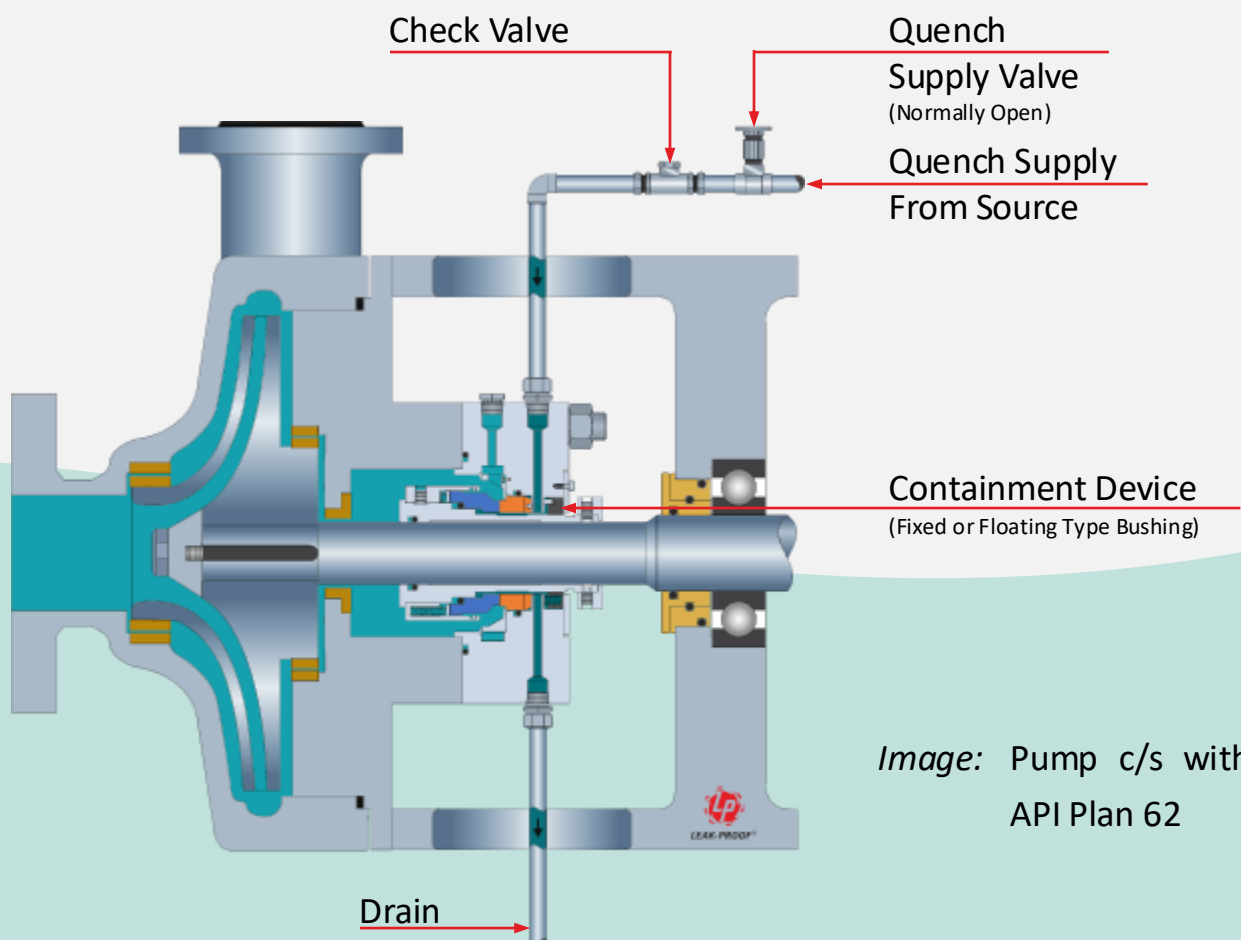
Quench Plan

External Quench on Atmospheric Side

Plan Overview:

API Plan 62 is a quench and drain plan that supplies an external utility fluid—typically steam, nitrogen, or clean water—to the atmospheric side of a mechanical seal. This plan is applicable for both single and double mechanical seals.

The objective of this plan is to maintain a clean, non-reactive, and temperature-controlled environment outside the seal by minimizing atmospheric exposure and environmental contamination. By quenching the atmospheric side seal area, Plan 62 helps prevent frost formation, coke buildup, polymerization, or crystallization, and enhances the overall reliability and lifespan of the mechanical seal—especially in challenging process conditions.



Features

1. **Controlled Environment on Atmospheric Side:** Plan 62 provides a clean and conditioned environment on the atmospheric side of the outer seal faces by introducing an external fluid that prevents environmental contamination, air ingress, or material buildup at the gland.
2. **Supports Various Utility Fluids:** Compatible with multiple utility fluids—steam to prevent coking, nitrogen for inert blanketing, or clean water for cooling and washing. The quench medium should be selected based on process conditions, ensuring compatibility with seal materials and preventing issues like frosting, corrosion, or residue buildup.
3. **Prevents Crystallization and Deposits:** Continuous quenching helps prevent crystallization, polymerization, or salt/coke formation on the atmospheric side of the seal. These deposits can obstruct seal movement or degrade secondary sealing surfaces. Maintaining a clean area between the sleeve and gland minimizes the risk of O-ring extrusion, stick-slip behavior, and secondary seal hang-up, all of which can lead to premature failure.
4. **Drainage of Quench and Leakage Fluid:** The inclusion of a drain port allows for the effective removal of condensate or leaked process fluid, maintaining cleanliness and preventing fluid accumulation around the outboard seal area. Drainage can be directed to recovery or disposal as per plant protocol.

Applications

1. Applicable to both horizontal and vertical pumps, and adaptable to single or double seal arrangements requiring atmospheric-side quenching.
2. Suitable for applications handling crystallizing or polymerizing fluids with water or steam quench, where atmospheric exposure can lead to salt, polymer, or crystal formation.
3. Suitable for applications handling high-temperature hydrocarbons (above 150°C) with steam quench, where atmospheric exposure can lead to coke formation and solid deposits (commonly used with stationary metal bellows seal design to prevent coking).
4. Suitable for applications handling cryogenic or low-temperature fluids with nitrogen quench, where atmospheric exposure can lead to frost buildup and moisture ingress.
5. Suitable for applications handling oxidizing chemicals prone to air-induced degradation, typically using nitrogen quench.

Precautions

1. **Quench Fluid Compatibility:** Ensure the quench fluid is chemically compatible with both the process fluid and seal materials. Incompatible quench can cause seal face blistering, elastomer swelling, or corrosive by-products at the gland. Avoid water in hydrocarbon services unless tested for emulsification or coking risk. Use only dry and oil-free nitrogen in oxygen-sensitive or cryogenic services. Always consult Material Safety Data Sheet (MSDS) and seal vendor guidelines before finalizing the quench selection.
2. **Drain Sizing and Orientation:** Always install a properly sized and oriented drain, ideally positioned at the 6 o'clock location on the gland to ensure gravity-assisted removal of condensate or leaked process fluid. The drain port should be at least one size larger than the quench port (e.g., 1/2" drain for 3/8" quench). Undersized or poorly sloped drains can cause fluid pooling around the seal. Ensure the drain piping has a free-draining layout with no traps, vertical loops, or restrictions to prevent fluid accumulation or flow obstruction.
3. **Quench Direction and Baffle:** For steam quench applications, ensure the flow is directed toward the seal faces and secondary sealing elements for effective coke prevention. If space allows, use a non-sparking baffle to guide steam across critical areas. The baffle must accommodate thermal expansion and avoid contact with rotating parts.

4. **Containment Device:** For both single and double mechanical seals, a throttle bushing—fixed or floating—is essential in Plan 62 to contain the quench fluid at the atmospheric side. It is recommended to use a bearing isolator instead of a conventional oil seal on the bearing housing assembly to protect the bearing from quench spray or mist escaping from the gland.
5. **Quench Pressure:** Maintain quench pressure between 0.2 bar (2.9 psi) and 0.4 bar (5.8 psi). Excessive pressure may cause quench fluid to spray or escape forcefully from the gland, reducing control and potentially affecting nearby components. Insufficient pressure, on the other hand, may result in ineffective quenching. A pressure regulator and flow control valve should be used to ensure steady and optimal operation.