EXPERIENCE THE EXCEPTIONAL

Installed Containment Seal Test Procedure

Purpose

To test the integrity of mechanical seals fitted with a secondary containment seal. This document is general in nature and does not refer to site specific requirements. The site has the responsibility for ensuring that tests are carried out.

1 Scope

The procedure outlines a procedure for testing containment seals (of any manufacturer) to be tested in service. The procedure also identifies the frequency of testing, method of testing and pass/fail criteria.

Instrumentation is present in the piping systems associated with containment seals, testing of such instruments should be carried out in accordance with the instrument manufacturer's guidelines. It is important that the instrument is functioning correctly.

2 References

API Standard 610 latest edition, Centrifugal Pumps for General Refinery Services.

API Standard 682 latest edition, Shaft Sealing Systems for Centrifugal and Rotary Pumps.

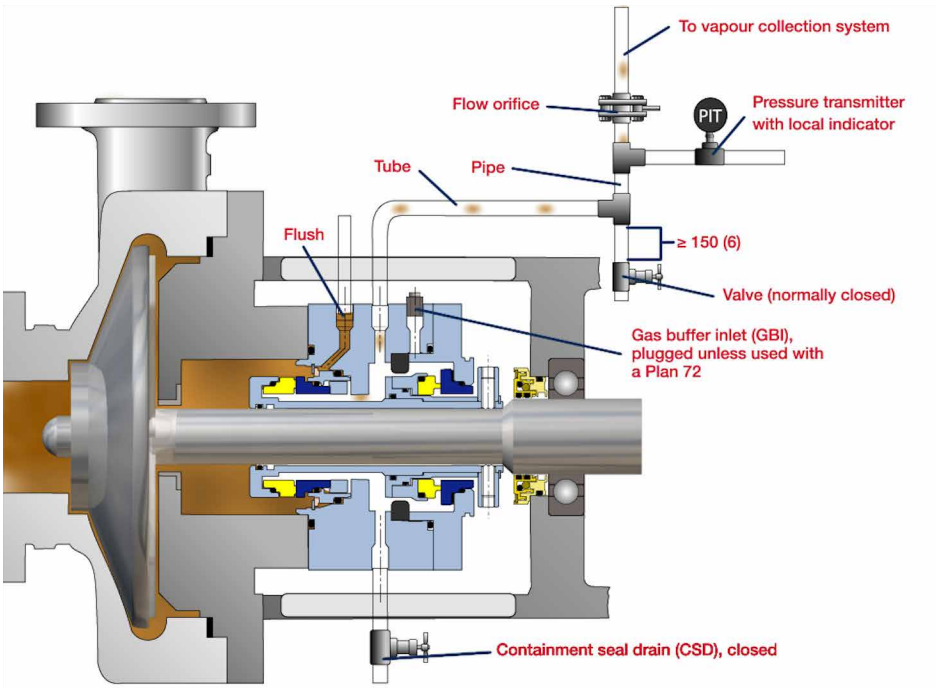
3 Definitions

The international standard API 682 defines containment seals by the coding 2CW-CS and 2NC-CS).

Mechanical containment seals can be contacting or non-contacting. Full definitions of these types of seals can be found in API 682 4th clauses 2.1.18 and 2.1.56.

4 Procedure

4.1 Containment seals used with API Plan 76 or containment seals vented directly to vapour recovery system such as flare.



It is advisable to test seals in service at regular intervals. Static testing of the seal is recommended. The intervals may vary dependent upon the duty in which the seals are applied. These intervals should be no longer than four months if applied in ideal environmental conditions, and considerably less otherwise.

The test should utilise a portable nitrogen test kit connected to a suitable test point (normally containment seal vent) between the seal gland plate and the block valve where the piping plan connects to a vapour recovery system in the seal pipe work, or, if available, in the seal gland in order to pressurise the seal cavity. The test volume is a combination of the seal cavity and the associated isolated piping plan.

4.1.1 Isolate any nitrogen buffer system (plan 72) or steam buffer supply to the seals, if present.

4.1.2 Isolate the seal vent to flare. Ensure that this does not isolate the pressure indicator and instrumentation as these are part of the piping plan to be tested.

4.1.3 Ensure the pressure indicator reads zero.

4.1.4 Check for any pressure rise which would indicate inner seals leakage. Any increase in pressure over 5 minutes should be noted and deducted from the allowable pressure drop in 4.1.8.

4.1.5 Set the supply test kit regulator to 0.7 bar g (10 psi g) or above the pressure instrument alarm setting.

4.1.6 Apply the test pressure gradually (refer to point 4.1.4 above) to the containment seal by using the portable test kit.

4.1.7 As pressure increases, check that the pressure alarm activates at the correct pressure.

4.1.8 Isolate the test kit from the test volume and monitor pressure for 5 minutes. If pressure drops by 0.14 bar g (2 psi g), less any pressure increase noted in 4.1.4, the test is considered a failure. It is recommended that the seal is removed and replaced.

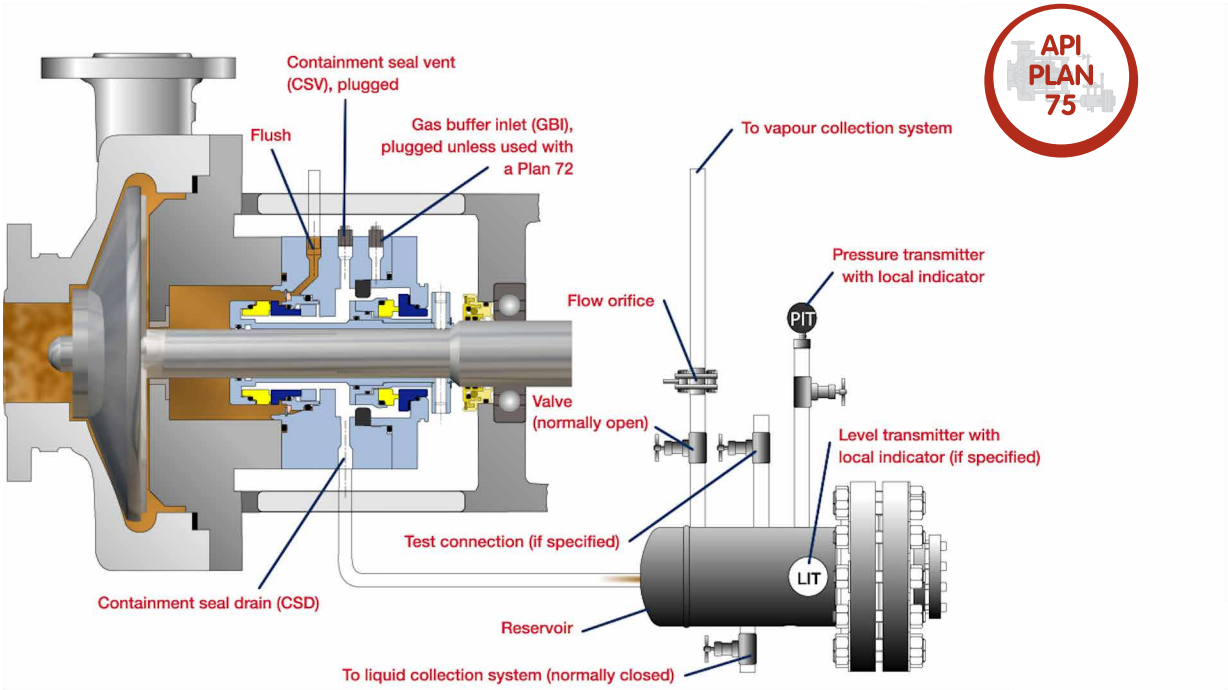
4.1.9 If the alarm condition does not activate at the correct pressure, the test is a fail and further investigation is required.

4.1.10 Disconnect the test kit nitrogen supply and de-pressurise to make safe.

4.1.11 Return the system to normal configuration after the test.

4.2 Containment seals used with API Plan 75 or containment seals connected to a leakage detection vessel or drain system.

(Note on older pumps API Plan 65 may be referenced on the seal drawing or pump data sheet recorded test procedure would be as per plan 75).



It is advisable to test seals in service at regular intervals. Static testing of the seal is recommended. The intervals may vary dependent upon the duty in which the seals are applied. These intervals should be no longer than four months if applied in ideal environmental conditions, and considerably less otherwise.

The test should utilise a portable nitrogen test kit connected to a suitable test point (normally a test connection in the containment vessel) between the seal gland plate and the block valve where the piping plan connects to a vapour recovery system in the seal pipe work, or, if available, in the seal gland in order to pressurise the seal cavity. The test volume is a combination of the seal cavity and the associated isolated piping plan and leakage detection reservoir.

4.2.1 Isolate any nitrogen buffer system (plan 72) or steam buffer supply to the seals if present.

4.2.2 Isolate the seal vent to flare. Isolate and drain connection downstream leakage detection reservoir. Ensure that this does not isolate the pressure indicator and instrumentation as these are part of the piping plan to be tested.

4.2.3 Ensure that the pressure indicator reads zero.

4.2.4 Check for any pressure rise which would indicate inner seals leakage. Any increase in pressure over 5 minutes should be noted and deducted from the allowable pressure drop in 4.2.8.

4.2.5 Set the supply test kit regulator to 0.7 bar g (10 psi g) or above the pressure instrument alarm setting.

4.2.6 Apply the test pressure gradually (refer to point 4.2.4 above) to the containment seal by using the portable test kit.

4.2.7 As pressure increases, check that the pressure alarm activates at the correct pressure.

4.2.8 Isolate the test kit from the test volume and monitor pressure for 5 minutes. If pressure drops by 0.14 bar g (2 psi g), less any pressure increase noted in 4.2.4, the test is considered a failure. It is recommended that the seal is removed and replaced.

4.2.9 If the alarm condition does not activate at the correct pressure, the test is a fail and further investigation is required.

4.2.10 Disconnect the test kit nitrogen supply and de-pressurise to make safe.

4.2.11 Return the system to normal configuration after the test.

Containment Seals Using Steam As a Buffer Gas

1. AESSEAL does not recommend using steam in this way on non-contacting containment seals (NCCS).

2. NCCS operate on dynamic gas lift and any impairment of the gas lift groove geometry may affect seal performance.

3. Contacting containment seals (CS) - the use of steam may accelerate seal face wear and result in premature failure.

Segmental Throttle Bush and Floating Carbon Throttle Bush

Testing not required.

Fixed Non Sparking Throttle Bush

Testing not required.