
# API 682 Seal Qualification Test Certificate

| | |
|---|---|
| **Seal Tested:** | CAPI-74 |
| **Nominal Sizes Tested:** | 50mm (2”), 100mm (4”) |
| **Seal Materials Tested:** | Premium Grade Blister Resistant Carbon Graphite<br>Nickel Bound Tungsten Carbide |
| **API Seal Type:** | Type A |
| **API Seal Configuration(s):** | 3NC-FF |
| **API Seal Category:** | 2, 3 |
| **API Flush Plan(s):** | 74 |
| **Test Fluid:** | Non-Flashing Hydrocarbon |
| **Base Pressure:** | 7 barg (100 psig) |
| **Base Temperature:** | 20°C (70°F) |
| **Speed:** | 3600 rpm |

**This is to certify that the above seals have been tested in accordance with API 682 requirements.**

Stephen Shaw CEng FIMechE CMIOSH BEng (Hons) MBA
Group Engineering Director

AESSEAL®
ENVIRONMENTAL TECHNOLOGY

# Mechanical Seal Qualification Test Form

2CW-CS, 2NC-CS, 3NC-FF, 3NC-BB, 3NC-FB

Test Ref: T4/5/PT01039 Revision: 06/23

Manufacturer: AESSEAL plc Seal Type / Model: CAPI 74 (Bi-direction)

Arrangement: 2CW-CS ☐ 2NC-CS ☐ 3NC-FF ☑ 3NC-BB ☐ 3NC-FB ☐

Materials of Construction: Primary Seal Faces: Ni Bound Tungsten Carbide/Antimony Carbon FH82A Secondary Seal Faces*: Ni Bound Tungsten Carbide/Antimony Carbon FH82A

Secondary Seals: Fluoroelastomer Metal Hardware: 316 SS

Seal Size: 50mm Shaft Speed: 3600 rpm

Pumped Fluid (Table I.2): Nonhydrocarbon (water, caustic acid) ☐ Nonflashing Hydrocarbon ☑ Flashing Hydrocarbon ☐

Shaft Runout (Figure 19): <0.1mm Sleeve Runout (Figure 19): Chamber Concentricity (Figure 12): <0.1mm Seal Chamber Face Runout (Figure 14): <0.1mm

Test Fluid: Mineral Oil Base-point Temperature °C (°F): 20 / (68) Base-point Pressure MPa (bar) (psi): 0.7 / (7) / (102)

Relative Density (SG): 0.873 Vapor Pressure: N/A Solids: None Particle Size: N/A *Dual Seals

Test Procedure: ☐ I.3.13 (for 2CW-CS, 2NC-CS Arrangements)
☑ I.3.15 (for 3NC-FF, 3NC-BB, 2NC-FB)

| Data Point Ref. | Date | Time | Inner Seal | | Buffer/Barrier | | | Speed r/min | Seal Leakage | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Pressure | Temp. | Medium | Pressure | Temp. | | | Total | | |
| | | | barg (psig) | °C (°F) | | barg (psig) | °C (°F) | | l/min | ml/m³ (vol. ppm) | l/min | L/h (normalized) |
| I.6;1 | 03-05-2011 | 19:00 | 7.08 (103) | 19.90 (68) | Nitrogen | 9.44 (137) | 20.16 (68) | 3600 | N/A | N/A | 1.29 | |
| I.6;1 | 08-05-2011 | 08:44 | 7.17 (104) | 19.08 (66) | Nitrogen | 9.12 (132) | 27.29 (81) | 3600 | N/A | N/A | 1.01 | |
| I.6;2 | 08-05-2011 | 08:52 | 6.98 (101) | 18.69 (66) | Nitrogen | 9.15 (133) | 25.55 (78) | 0 | N/A | N/A | 0.44 | |
| I.6;2 | 08-05-2011 | 18:06 | 6.97 (101) | 18.93 (66) | Nitrogen | 9.17 (133) | 19.94 (68) | 0 | N/A | N/A | 0.47 | |
| I.6;3 | 08-05-2011 | 18:20 | 7.01 (102) | 19.14 (66) | Nitrogen | 9.30 (135) | 21.98 (72) | Cyclic | N/A | N/A | 1.47 | |
| I.6;3 | 11-05-2011 | 07:38 | 7.04 (102) | 19.17 (67) | Nitrogen | 9.07 (132) | 26.76 (80) | Cyclic | N/A | N/A | 0.87 | |
| I.6;3 | 11-05-2011 | 08:13 | 6.90 (100) | 18.81 (66) | Nitrogen | 9.27 (134) | 23.69 (75) | Cyclic | N/A | N/A | 0.42 | |
| I.8;a1 | 11-05-2011 | 08:19 | 6.97 (100) | 18.89 (66) | Nitrogen | 0 | 23.43 (74) | 0 | N/A | N/A | 0.00 | |
| I.8;a2 | 11-05-2011 | 09:27 | 7.01 (102) | 18.89 (66) | Nitrogen | 0 | 21.96 (72) | 0 | N/A | N/A | 0.00 | |
| I.8;b1 | 11-05-2011 | 09:43 | 7.08 (103) | 19.41 (67) | Nitrogen | 9.57 (139) | 24.61 (76) | 3600 | N/A | N/A | 1.12 | |
| I.8;c1 | 11-05-2011 | 09:50 | 6.93 (101) | 19.27 (67) | Nitrogen | 9.4 (136) | 25.01 (77) | 3600 | N/A | N/A | 1.06 | |
| I.8;d1 | 11-05-2011 | 10:04 | 6.78 (98) | 19.26 (67) | Nitrogen | 9.25 (134) | 25.44 (78) | 3600 | N/A | N/A | 1.12 | |
| I.8;e1 | 11-05-2011 | 10:11 | 6.88 (100) | 18.94 (66) | Nitrogen | 9.72 (141) | 24.34 (76) | 0 | N/A | N/A | 0.32 | |
| I.8;e2 | 11-05-2011 | 10:33 | 6.98 (101) | 18.83 (66) | Nitrogen | 7.18 (104) | 22.7 (73) | 0 | N/A | N/A | 0.00 | |
| | | | | | | | | | | | | |

Outer Seal Face Wear: Stationary Face: 0 Rotating Face: 0.015 (0.0006) / 0.25% mm (in.) / % wear

Inner Seal Face Wear: Stationary Face: 0 Rotating Face: 0.004 (0.0002) / 0.06% mm (in.) / % wear (I.3.15 only)

This is to certify that the seal noted above has been tested in accordance with the API 682 requirements.

Authorised By:
Stephen Shaw
Group Engineering Director

Notes:
1. Conducted to latest version of API 682 at time of test; 3rd edition.
2. API 682 specifies pass rate for process liquid leakage as <5.6 g/h (6.43 ml/h) for Dynamic, Static and Cyclic Phases of Testing (not Recovery)
3. API 682 specifies pass rate for containment seal faces is <1% available seal face wear.
4. Process leakage measured <0.1 ml/h
5. Seal Leakage values given above refer to barrier gas consumption rates for NC seal types

AESSEAL® ENVIRONMENTAL TECHNOLOGY

# Mechanical Seal Qualification Test Form

2CW-CS, 2NC-CS, 3NC-FF, 3NC-BB, 3NC-FB

Test Ref: T4/6/PT01039 Revision: 06/23

Manufacturer: AESSEAL plc Seal Type / Model: CAPI 74 (Uni-direction)

Arrangement: 2CW-CS ☐ 2NC-CS ☐ 3NC-FF ☑ 3NC-BB ☐ 3NC-FB ☐

Materials of Construction: Primary Seal Faces: Ni Bound Tungsten Carbide/Antimony Carbon FH82A Secondary Seal Faces*: Ni Bound Tungsten Carbide/Antimony Carbon FH82A

Secondary Seals: Fluoroelastomer Metal Hardware: 316 SS

Seal Size: 50mm Shaft Speed: 3600 rpm

Pumped Fluid (Table I.2): Nonhydrocarbon (water, caustic acid) ☐ Nonflashing Hydrocarbon ☑ Flashing Hydrocarbon ☐

Shaft Runout (Figure 19): <0.1mm Sleeve Runout (Figure 19): Chamber Concentricity (Figure 12): <0.1mm Seal Chamber Face Runout (Figure 14): <0.1mm

Test Fluid: Mineral Oil Base-point Temperature °C (°F): 20 / (68) Base-point Pressure MPa (bar) (psi): 0.7 / (7) / (102)

Relative Density (SG): 0.873 Vapor Pressure: N/A Solids: None Particle Size: N/A *Dual Seals

Test Procedure: ☐ I.3.13 (for 2CW-CS, 2NC-CS Arrangements)
☑ I.3.15 (for 3NC-FF, 3NC-BB, 2NC-FB)

| Data Point Ref. | Date | Time | Inner Seal | | Buffer/Barrier | | | Speed r/min | Seal Leakage | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Pressure | Temp. | Medium | Pressure | Temp. | | Inner | Outer | | |
| | | | barg (psig) | °C (°F) | | barg (psig) | °C (°F) | | l/min | ml/m³ (vol. ppm) | l/min | L/h (normalized) |
| I.6;1 | 03-05-2011 | 19:00 | 7.08 (103) | 19.90 (68) | Nitrogen | 9.38 (136) | 20.52 (69) | 3600 | 1.25 | N/A | 0.99 | |
| I.6;1 | 08-05-2011 | 08:44 | 7.17 (104) | 19.08 (66) | Nitrogen | 9.05 (131) | 25.60 (78) | 3600 | 1.32 | N/A | 0.93 | |
| I.6;2 | 08-05-2011 | 08:52 | 6.98 (101) | 18.69 (66) | Nitrogen | 9.10 (132) | 23.91 (75) | 0 | 0.11 | N/A | 0.21 | |
| I.6;2 | 08-05-2011 | 18:06 | 6.97 (101) | 18.93 (66) | Nitrogen | 9.13 (132) | 19.94 (68) | 0 | 0.27 | N/A | 0.25 | |
| I.6;3 | 08-05-2011 | 18:20 | 7.01 (102) | 19.14 (66) | Nitrogen | 9.24 (134) | 21.95 (72) | Cyclic | 1.38 | N/A | 1.07 | |
| I.6;3 | 11-05-2011 | 07:38 | 7.04 (102) | 19.17 (67) | Nitrogen | 9.01 (131) | 25.56 (78) | Cyclic | 1.29 | N/A | 0.88 | |
| I.6;3 | 11-05-2011 | 08:13 | 6.90 (100) | 18.81 (66) | Nitrogen | 9.23 (134) | 22.72 (73) | Cyclic | 0.33 | N/A | 0.21 | |
| I.8;a1 | 11-05-2011 | 08:19 | 6.97 (100) | 18.89 (66) | Nitrogen | 0 | 22.57 (73) | 0 | 0.00 | N/A | 0.00 | |
| I.8;a2 | 11-05-2011 | 09:27 | 7.01 (102) | 18.89 (66) | Nitrogen | 0 | 21.18 (70) | 0 | 0.00 | N/A | 0.00 | |
| I.8;b1 | 11-05-2011 | 09:43 | 7.08 (103) | 19.41 (67) | Nitrogen | 9.51 (138) | 23.46 (74) | 3600 | 1.34 | N/A | 0.94 | |
| I.8;c1 | 11-05-2011 | 09:50 | 6.93 (101) | 19.27 (67) | Nitrogen | 9.33 (135) | 24.51 (78) | 3600 | 1.14 | N/A | 0.76 | |
| I.8;d1 | 11-05-2011 | 10:04 | 6.78 (98) | 19.26 (67) | Nitrogen | 9.19 (133) | 25.57 (78) | 3600 | 1.00 | N/A | 0.69 | |
| I.8;e1 | 11-05-2011 | 10:11 | 6.88 (100) | 18.94 (66) | Nitrogen | 9.68 (140) | 25.03 (77) | 0 | 0.10 | N/A | 0.01 | |
| I.8;e2 | 11-05-2011 | 10:33 | 6.98 (101) | 18.83 (66) | Nitrogen | 5.42 (79) | 22.52 (73) | 0 | 0.00 | N/A | 0.02 | |
| | | | | | | | | | | | | |

Outer Seal Face Wear: Stationary Face: 0 Rotating Face: 0.005 (0.0002) / 0.09% mm (in.) / % wear

Inner Seal Face Wear: Stationary Face: 0 Rotating Face: 0.003 (0.0001) / 0.05% mm (in.) / % wear (I.3.15 only)

This is to certify that the seal noted above has been tested in accordance with the API 682 requirements.

Authorised By:
Stephen Shaw
Group Engineering Director

Notes:
1. Conducted to latest version of API 682 at time of test; 3rd edition.
2. API 682 specifies pass rate for liquid leakage as <5.6 g/h (6.43 ml/h) for Dynamic, Static and Cyclic Phases of Testing (not Recovery)
3. API 682 specifies pass rate for containment seal faces is <1% available seal face wear.
4. Process leakage measured <0.1 ml/h
5. Seal Leakage values given above refer to barrier gas consumption rates for NC seal types

AESSEAL® ENVIRONMENTAL TECHNOLOGY

# Mechanical Seal Qualification Test Form

2CW-CS, 2NC-CS, 3NC-FF, 3NC-BB, 3NC-FB

Test Ref: T4/11/PT01115 Revision: 06/23

Manufacturer: AESSEAL plc Seal Type / Model: CAPI 74 (Bi-direction)

Arrangement: 2CW-CS ☐ 2NC-CS ☐ 3NC-FF ☑ 3NC-BB ☐ 3NC-FB ☐

Materials of Construction: Primary Seal Faces: Ni Bound Tungsten Carbide/Antimony Carbon FH82A Secondary Seal Faces*: Ni Bound Tungsten Carbide/Antimony Carbon FH82A

Secondary Seals: Fluoroelastomer Metal Hardware: 316 SS

Seal Size: 100mm Shaft Speed: 3600 rpm

Pumped Fluid (Table I.2): Nonhydrocarbon (water, caustic acid) ☐ Nonflashing Hydrocarbon ☑ Flashing Hydrocarbon ☐

Shaft Runout (Figure 19): <0.1mm Sleeve Runout (Figure 19): Chamber Concentricity (Figure 12): <0.1mm Seal Chamber Face Runout (Figure 14): <0.1mm

Test Fluid: Mineral Oil Base-point Temperature °C (°F): 20 / (68) Base-point Pressure MPa (bar) (psi): 0.7 / (7) / (102)

Relative Density (SG): 0.873 Vapor Pressure: N/A Solids: None Particle Size: N/A *Dual Seals

Test Procedure: ☐ I.3.13 (for 2CW-CS, 2NC-CS Arrangements)

☑ I.3.15 (for 3NC-FF, 3NC-BB, 2NC-FB)

| Data Point Ref. | Date | Time | Inner Seal | | Buffer/Barrier | | | Speed r/min | Seal Leakage | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Pressure | Temp. | Medium | Pressure | Temp. | | | Total | | |
| | | | barg (psig) | °C (°F) | | barg (psig) | °C (°F) | | l/min | ml/m³ (vol. ppm) | l/min | L/h (normalized) |
| I.6;1 | 26-04-2012 | 10:55 | 7.08 (103) | 20.10 (68) | Nitrogen | 8.78 (127) | 25.9 (79) | 3600 | N/A | N/A | 2.92 | |
| I.6;1 | 30-04-2012 | 16:30 | 6.92 (100) | 20.40 (69) | Nitrogen | 9.01 (131) | 23.8 (75) | 3600 | N/A | N/A | 3.06 | |
| I.6;2 | 30-04-2012 | 16:38 | 6.91 (100) | 20.30 (69) | Nitrogen | 8.82 (128) | 22.5 (73) | 0 | N/A | N/A | 1.02 | |
| I.6;2 | 01-05-2012 | 10:10 | 7.01 (102) | 19.60 (67) | Nitrogen | 8.71 (126) | 18.4 (65) | 0 | N/A | N/A | 1.36 | |
| I.6;3 | 02-05-2012 | 11:03 | 7.07 (103) | 21.70 (71) | Nitrogen | 10.98 (159) | 21.1 (70) | Cyclic | N/A | N/A | 11.50 | |
| I.6;3 | 04-05-2012 | 14:45 | 7.01 (102) | 22.00 (72) | Nitrogen | 10.03 (145) | 20.9 (70) | Cyclic | N/A | N/A | 2.65 | |
| I.6;3 | 04-05-2012 | 14:56 | 6.92 (100) | 19.60 (67) | Nitrogen | 10.22 (145) | 19.2 (67) | Cyclic | N/A | N/A | 0.63 | |
| I.8;a1 | 04-05-2012 | 15:16 | 7.11 (103) | 18.90 (66) | Nitrogen | 0 | 20.3 (69) | 0 | N/A | N/A | 0.00 | |
| I.8;a2 | 04-05-2012 | 16:21 | 7.08 (103) | 18.8 (66) | Nitrogen | 0 | 21.3 (70) | 0 | N/A | N/A | 0.00 | |
| I.8;b1 | 04-05-2012 | 16:24 | 7.09 (103) | 19.30 (67) | Nitrogen | 11.23 (163) | 22.9 (73) | 3600 | N/A | N/A | 0.00 | |
| I.8;c1 | 04-05-2012 | 16:26 | 6.86 (100) | 19.30 (67) | Nitrogen | 11.51 (167) | 21.8 (71) | 3600 | N/A | N/A | 0.00 | |
| I.8;d1 | 04-05-2012 | 16:27 | 6.99 (101) | 19.10 (66) | Nitrogen | 11.22 (163) | 22.7 (73) | 3600 | N/A | N/A | 6.65 | |
| I.8;e1 | 04-05-2012 | 16:30 | 6.89 (100) | 18.80 (66) | Nitrogen | 11.25 (163) | 21.5 (71) | 0 | N/A | N/A | 2.32 | |
| I.8;e2 | 04-05-2012 | 16:41 | 6.96 (101) | 19.00 (66) | Nitrogen | 4.41 (64) | 21.2 (70) | 0 | N/A | N/A | 0.00 | |
| | | | | | | | | | | | | |

Outer Seal Face Wear: Stationary Face: 0 Rotating Face: 0.016 (0.0006) / 0.47% mm (in.) / % wear

Inner Seal Face Wear: Stationary Face: 0 Rotating Face: 0.008 (0.0003) / 0.24% mm (in.) / % wear (I.3.15 only)

This is to certify that the seal noted above has been tested in accordance with the API 682 requirements.

Authorised By:
Stephen Shaw
Group Engineering Director

Notes:
1. Conducted to latest version of API 682 at time of test; 3rd edition.
2. API 682 specifies pass rate for process liquid leakage as <5.6 g/h (6.43 ml/h) for Dynamic, Static and Cyclic Phases of Testing (not Recovery)
3. API 682 specifies pass rate for containment seal faces is <1% available seal face wear.
4. Process leakage measured <0.1 ml/h
5. Seal Leakage values given above refer to barrier gas consumption rates for NC seal types

AESSEAL® ENVIRONMENTAL TECHNOLOGY

# Mechanical Seal Qualification Test Form

2CW-CS, 2NC-CS, 3NC-FF, 3NC-BB, 3NC-FB

Test Ref: T4/12/PT01115 Revision: 06/23

Manufacturer: AESSEAL plc Seal Type / Model: CAPI 74 (Uni-direction)

Arrangement: 2CW-CS ☐ 2NC-CS ☐ 3NC-FF ☑ 3NC-BB ☐ 3NC-FB ☐

Materials of Construction: Primary Seal Faces: Ni Bound Tungsten Carbide/Antimony Carbon FH82A Secondary Seal Faces*: Ni Bound Tungsten Carbide/Antimony Carbon FH82A

Secondary Seals: Fluoroelastomer Metal Hardware: 316 SS

Seal Size: 100mm Shaft Speed: 3600 rpm

Pumped Fluid (Table I.2): Nonhydrocarbon (water, caustic acid) ☐ Nonflashing Hydrocarbon ☑ Flashing Hydrocarbon ☐

Shaft Runout (Figure 19): <0.1mm Sleeve Runout (Figure 19): Chamber Concentricity (Figure 12): <0.1mm Seal Chamber Face Runout (Figure 14): <0.1mm

Test Fluid: Mineral Oil Base-point Temperature °C (°F): 20 / (68) Base-point Pressure MPa (bar) (psi): 0.7 / (7) / (102)

Relative Density (SG): 0.873 Vapor Pressure: N/A Solids: None Particle Size: N/A *Dual Seals

Test Procedure: ☐ I.3.13 (for 2CW-CS, 2NC-CS Arrangements)

☑ I.3.15 (for 3NC-FF, 3NC-BB, 2NC-FB)

| Data Point Ref. | Date | Time | Inner Seal | | Buffer/Barrier | | | Speed r/min | Seal Leakage | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Pressure | Temp. | Medium | Pressure | Temp. | | | Total | | |
| | | | barg (psig) | °C (°F) | | barg (psig) | °C (°F) | | l/min | ml/m³ (vol. ppm) | l/min | L/h (normalized) |
| I.6;1 | 26-04-2012 | 10:55 | 7.08 (103) | 20.10 (68) | Nitrogen | 9.46 (137) | 25.9 (79) | 3600 | N/A | N/A | 2.37 | |
| I.6;1 | 30-04-2012 | 16:30 | 6.92 (100) | 20.40 (69) | Nitrogen | 9.18 (133) | 23.8 (75) | 3600 | N/A | N/A | 2.36 | |
| I.6;2 | 30-04-2012 | 16:38 | 6.91 (100) | 20.30 (69) | Nitrogen | 9.65 (140) | 22.5 (73) | 0 | N/A | N/A | 0.21 | |
| I.6;2 | 01-05-2012 | 10:10 | 7.01 (102) | 19.60 (67) | Nitrogen | 9.41 (136) | 18.4 (65) | 0 | N/A | N/A | 0.28 | |
| I.6;3 | 02-05-2012 | 11:03 | 7.07 (103) | 21.70 (71) | Nitrogen | 9.37 (136) | 21.1 (70) | Cyclic | N/A | N/A | 3.06 | |
| I.6;3 | 04-05-2012 | 14:45 | 7.01 (102) | 22.00 (72) | Nitrogen | 9.20 (133) | 20.9 (70) | Cyclic | N/A | N/A | 2.05 | |
| I.6;3 | 04-05-2012 | 14:56 | 6.92 (100) | 19.60 (67) | Nitrogen | 9.46 (137) | 19.2 (67) | Cyclic | N/A | N/A | 0.00 | |
| I.8;a1 | 04-05-2012 | 15:16 | 7.11 (103) | 18.90 (66) | Nitrogen | 0 | 20.3 (69) | 0 | N/A | N/A | 0.00 | |
| I.8;a2 | 04-05-2012 | 16:21 | 7.08 (103) | 18.8 (66) | Nitrogen | 0 | 21.3 (70) | 0 | N/A | N/A | 0.00 | |
| I.8;b1 | 04-05-2012 | 16:24 | 7.09 (103) | 19.30 (67) | Nitrogen | 10.37 (150) | 22.9 (73) | 3600 | N/A | N/A | 5.06 | |
| I.8;c1 | 04-05-2012 | 16:26 | 6.86 (100) | 19.30 (67) | Nitrogen | 10.61 (154) | 21.8 (71) | 3600 | N/A | N/A | 0.00 | |
| I.8;d1 | 04-05-2012 | 16:27 | 6.99 (101) | 19.10 (66) | Nitrogen | 10.27 (149) | 22.7 (73) | 3600 | N/A | N/A | 6.98 | |
| I.8;e1 | 04-05-2012 | 16:30 | 6.89 (100) | 18.80 (66) | Nitrogen | 10.36 (150) | 21.5 (71) | 0 | N/A | N/A | 0.00 | |
| I.8;e2 | 04-05-2012 | 16:41 | 6.96 (101) | 19.00 (66) | Nitrogen | 5.15 (75) | 21.2 (70) | 0 | N/A | N/A | 0.00 | |
| | | | | | | | | | | | | |

Outer Seal Face Wear: Stationary Face: 0 Rotating Face: 0.012 (0.0005) / 0.35% mm (in.) / % wear

Inner Seal Face Wear: Stationary Face: 0 Rotating Face: 0.006 (0.0002) / 0.18% mm (in.) / % wear (I.3.15 only)

This is to certify that the seal noted above has been tested in accordance with the API 682 requirements.

Authorised By:
Stephen Shaw
Group Engineering Director

Notes:
1. Conducted to latest version of API 682 at time of test; 3rd edition.
2. API 682 specifies pass rate for liquid leakage as <5.6 g/h (6.43 ml/h) for Dynamic, Static and Cyclic Phases of Testing (not Recovery)
3. API 682 specifies pass rate for containment seal faces is <1% available seal face wear.
4. Process leakage measured <0.1 ml/h
5. Seal Leakage values given above refer to barrier gas consumption rates for NC seal types

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