



# API 682 Seal Qualification Test Certificate

Seal Tested:	CAPI Type B Single	
Nominal Sizes Tested:	50mm (2"), 100mm (4")	
Seal Materials Tested:	Premium Grade Blister Resistant Carbon Graphite Reaction Bonded Silicon Carbide	
API Seal Type:	Type B	
API Seal Configuration(s):	1CW-FL	
API Seal Category:	2, 3	
API Flush Plan(s):	11 & 62	
Test Fluid:	Non-Flashing Hydrocarbon	Non-Flashing Hydrocarbon
Base Pressure:	7 barg (100 psig)	7 barg (100 psig)
Base Temperature:	20°C (70°F)	260°C (500°F)
Speed:	3600 rpm	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



ENVIRONMENTAL TECHNOLOGY

# Mechanical Seal Qualification Test Form



1CW, 2CW-CW, 3CW-FB, 3CW-FF, 3CW-BB

Test Ref: T4/2/PT00API\_6 Revision: 06/23

Manufacturer: AESSEAL plc Seal Type / Model: CAPI Type B Single

Seal Type: A  B  C  ES

Materials of Construction: Primary Seal Faces: Antimony Carbon FH82A/SC2 Reaction Bonded Silicon Carbide Secondary Seal Faces\*: N/A

Secondary Seals: Fluoroelastomer/Graphite Metal Hardware: 316 SS

Seal Size: 50mm Seal Code: 1CW-FL Piping Plan: 11 Shaft Speed: 3600rpm

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

Shaft Runout (Figure 19): 0.025mm 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

DYNAMIC TEST 100 h minimum			Pressure barg (psig)	Process Temp. °C (°F)	Flush Temp. IN °C (°F)	Flush Temp. OUT °C (°F)	Flush Flow Rate m <sup>3</sup> /h (U.S. gal/min)	Seal Chamber Temp. °C (°F)	Barrier Fluid Pressure barg (psig)	Barrier Fluid Temp. IN °C (°F)	Barrier Fluid Temp. OUT °C (°F)	Power Consumption kW (hp)	Hydrocarbon Leakage g/day (ppm)	Nonhydrocarbon Leakage cm <sup>3</sup> /min	Circulating Device m <sup>3</sup> /h (U.S. gal/min)
Date	Time														
	Start	Stop													
01-07-2002	15:20		6.92 (100)	20.1 (68)	17.56 (64)	19.72 (67)	0.24 (1.06)	17.54 (64)				0.14 (0.19)	0	N/A	
08-07-2002		09:41	6.98 (101)	20.56 (69)	18.75 (66)	20.24 (68)	0.25 (1.1)	17.95 (64)				0.14 (0.19)	0	N/A	
STATIC TEST 4 h minimum															
08-07-2002	09:42		7.13 (103)	19.9 (68)	18.43 (65)	18.51 (65)	0.17 (0.75)	15.91 (61)				0	0	N/A	
08-07-2002		13:41	6.76 (98)	20.11 (68)	17.51 (64)	17.67 (64)	0.16 (0.7)	15.83 (60)				0	0	N/A	
CYCLE TEST 5 cycles minimum															
08-07-2002	13:58		6.83 (99)	19.84 (68)	17.56 (64)	18.28 (65)	0.23 (1.01)	17.29 (63)				0.18 (0.24)	0	N/A	
09-07-2002			7.06 (102)	19.56 (67)	17.9 (64)	9.34 (49)	0.23 (1.01)	17.37 (63)				0.14 (0.19)	0	N/A	
10-07-2002		10:27	6.91 (100)	20.53 (69)	18.7 (66)	18.81 (66)	0.14 (0.62)	16.8 (62)				0	0	N/A	

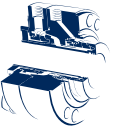
This is to certify that the seal noted above has been tested in accordance with the API 682 requirements.

Notes:

1. Conducted to latest version of API 682 at time of test; 1st edition.
2. API 682 specifies pass rate for liquid leakage as <5.6 g/h which equates to 134.4 g/day or 1000ppm for gas and vapour.
3. kW / HP are calculated theoretical values.

Authorised By:  
Stephen Shaw  
Group Engineering Director

# Mechanical Seal Qualification Test Form



1CW, 2CW-CW, 3CW-FB, 3CW-FF, 3CW-BB

Test Ref: T4/3/PT00API\_7 Revision: 06/23

Manufacturer: AESSEAL plc Seal Type / Model: CAPI Type B Single

Seal Type: A  B  C  ES

Materials of Construction: Primary Seal Faces: Antimony Carbon FH82A/SC2 Reaction Bonded Silicon Carbide Secondary Seal Faces\*: N/A

Secondary Seals: Fluoroelastomer/Graphite Metal Hardware: 316 SS

Seal Size: 50mm Seal Code: 1CW-FL Piping Plan: 11 Shaft Speed: 3600rpm

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

Shaft Runout (Figure 19): 0.025mm 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

DYNAMIC TEST 100 h minimum			Pressure barg (psig)	Process Temp. °C (°F)	Flush Temp. IN °C (°F)	Flush Temp. OUT °C (°F)	Flush Flow Rate m <sup>3</sup> /h (U.S. gal/min)	Seal Chamber Temp. °C (°F)	Barrier Fluid Pressure barg (psig)	Barrier Fluid Temp. IN °C (°F)	Barrier Fluid Temp. OUT °C (°F)	Power Consumption kW (hp)	Hydrocarbon Leakage g/day (ppm)	Nonhydrocarbon Leakage cm <sup>3</sup> /min	Circulating Device m <sup>3</sup> /h (U.S. gal/min)
Date	Time														
	Start	Stop													
17-07-2002	14:30		6.91 (100)	20.44 (69)	19.69 (67)	18.58 (65)	0.32 (1.41)	18.64 (66)				0.14 (0.19)	0	N/A	
22-07-2002		10:31	7.1 (103)	19.99 (68)	18.88 (66)	18.3 (65)	0.21 (0.92)	18.45 (65)				0.14 (0.19)	0	N/A	
STATIC TEST 4 h minimum															
22-07-2002	10:31		7.1 (103)	19.99 (68)	18.88 (66)	18.3 (65)	0.21 (0.92)	18.45 (65)				0	0	N/A	
22-07-2002		14:31	6.76 (98)	19.76 (68)	17.43 (63)	17.25 (63)	0.2 (0.88)	17.64 (64)				0	101 (577)	N/A	
CYCLE TEST 5 cycles minimum															
22-07-2002	14:45		6.94 (101)	19.65 (67)	17.79 (64)	17.75 (64)	0.21 (0.92)	18.06 (65)				0.14 (0.19)	0	N/A	
23-07-2002			7.01 (102)	20.01 (68)	19.72 (67)	18.13 (65)	0.2 (0.88)	18.23 (65)				0.14 (0.19)	0	N/A	
24-07-2002		11:58	7.17 (104)	20.53 (69)	18.99 (66)	18.47 (65)	0.26 (1.14)	18.69 (66)				0	<2 (6.2)	N/A	

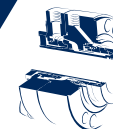
This is to certify that the seal noted above has been tested in accordance with the API 682 requirements.

Notes:

1. Conducted to latest version of API 682 at time of test; 1st edition.
2. API 682 specifies pass rate for liquid leakage as <5.6 g/h which equates to 134.4 g/day or 1000ppm for gas and vapour.
3. kW / HP are calculated theoretical values.

Authorised By:  
Stephen Shaw  
Group Engineering Director

# Mechanical Seal Qualification Test Form



1CW, 2CW-CW, 3CW-FB, 3CW-FF, 3CW-BB

Test Ref: T4/8/PT00API\_2 Revision: 06/23

Manufacturer: AESSEAL plc Seal Type / Model: CAPI Type B Single

Seal Type: A  B  C  ES

Materials of Construction: Primary Seal Faces: Antimony Carbon FH82A/SC2 Reaction Bonded Silicon Carbide Secondary Seal Faces\*: N/A

Secondary Seals: Fluoroelastomer/Graphite Metal Hardware: 316 SS

Seal Size: 100mm Seal Code: 1CW-FL Piping Plan: 11 Shaft Speed: 3600rpm

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

Shaft Runout (Figure 19): 0.2mm Sleeve Runout (Figure 19): \_\_\_\_\_ Chamber Concentricity (Figure 12): <0.1mm Seal Chamber Face Runout (Figure 14): 0.01mm

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

DYNAMIC TEST 100 h minimum			Pressure barg (psig)	Process Temp. °C (°F)	Flush Temp. IN °C (°F)	Flush Temp. OUT °C (°F)	Flush Flow Rate m <sup>3</sup> /h (U.S. gal/min)	Seal Chamber Temp. °C (°F)	Barrier Fluid Pressure barg (psig)	Barrier Fluid Temp. IN °C (°F)	Barrier Fluid Temp. OUT °C (°F)	Power Consumption kW (hp)	Hydrocarbon Leakage g/day	Nonhydrocarbon Leakage cm <sup>3</sup> /min	Circulating Device m <sup>3</sup> /h (U.S. gal/min)
Date	Time														
	Start	Stop													
04-11-2003	17:00		7.14 (104)	23.59 (75)	24.68 (76)	44.46 (112)	0.19 (0.8)	34.48 (94)				5.10 (6.8)	34.65	N/A	
10-11-2003		09:28	7.19 (104)	22.10 (72)	23.45 (74)	41.78 (107)	0.15 (0.7)	32.52 (91)				4.56 (6.1)	0	N/A	
STATIC TEST 4 h minimum															
10-11-2003	09:28		7.21 (105)	21.78 (71)	23.22 (74)	41.56 (107)	0.46 (2.0)	29.98 (86)				0	0	N/A	
10-11-2003		14:03	7.33 (106)	16.05 (61)	15.46 (60)	17.86 (64)	0.41 (1.8)	16.20 (61)				0	0	N/A	
CYCLE TEST 5 cycles minimum															
10-11-2003	15:06		7.14 (104)	20.03 (68)	21.23 (70)	41.11 (106)	0.11 (0.5)	30.69 (87)				4.59 (6.2)	0	N/A	
12-11-2003			6.96 (101)	20.04 (68)	21.84 (71)	37.85 (100)	0.11 (0.5)	29.58 (85)				3.52 (4.7)	6.3	N/A	
13-11-2003		09:25	7.1 (103)	20.24 (68)	20.17 (68)	34.14 (93)	0.49 (2.2)	24.84 (77)				0	<2.1	N/A	

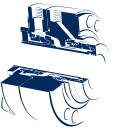
This is to certify that the seal noted above has been tested in accordance with the API 682 requirements.

Notes:

1. Conducted to latest version of API 682 at time of test; 2nd edition.
2. API 682 specifies pass rate for liquid leakage as <5.6 g/h which equates to 134.4 g/day or 1000ppm for gas and vapour.
3. kW / HP are calculated theoretical values.

Authorised By:  
Stephen Shaw  
Group Engineering Director

# Mechanical Seal Qualification Test Form



1CW, 2CW-CW, 3CW-FB, 3CW-FF, 3CW-BB

Test Ref: T5/1/PT00API\_5 Revision: 06/23

Manufacturer: AESSEAL plc Seal Type / Model: CAPI Type B Single

Seal Type: A  B  C  ES

Materials of Construction: Primary Seal Faces: Antimony Carbon FH82A/SC2 Reaction Bonded Silicon Carbide Secondary Seal Faces\*: N/A

Secondary Seals: Fluoroelastomer/Graphite Metal Hardware: 316 SS

Seal Size: 50mm Seal Code: 1CW-FL Piping Plan: 11 & 62 Shaft Speed: 3600rpm

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

Shaft Runout (Figure 19): 0.025mm 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): 260 (500) 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

DYNAMIC TEST 100 h minimum			Pressure barg (psig)	Process Temp. °C (°F)	Flush Temp. IN °C (°F)	Flush Temp. OUT °C (°F)	Flush Flow Rate m <sup>3</sup> /h (U.S. gal/min)	Seal Chamber Temp. °C (°F)	Barrier Fluid Pressure barg (psig)	Barrier Fluid Temp. IN °C (°F)	Barrier Fluid Temp. OUT °C (°F)	Power Consumption kW (hp)	Hydrocarbon Leakage g/day	Nonhydrocarbon Leakage cm <sup>3</sup> /min	Circulating Device m <sup>3</sup> /h (U.S. gal/min)
Date	Time														
	Start	Stop													
12-06-2002	11:20		7.15 (104)	253 (487)	232 (450)	254 (489)	0.35 (1.6)	253 (487)				0.15 (0.2)	42	N/A	
17-06-2002		15:21	6.92 (100)	262 (504)	234 (453)	263 (505)	0.30 (1.3)	262 (504)				0.14 (0.2)	126	N/A	
STATIC TEST 4 h minimum															
17-06-2002	15:21		6.92 (100)	262 (504)	233 (451)	263 (505)	0.30 (1.3)	262 (504)				0	126	N/A	
18-06-2002		09:43	7.18 (104)	261 (502)	230 (446)	262 (504)	0.29 (1.3)	260 (500)				0	147	N/A	
CYCLE TEST 5 cycles minimum															
18-06-2002	10:45		7.09 (103)	261 (502)	231 (448)	262 (504)	0.29 (1.3)	261 (502)				0.15 (0.2)	126	N/A	
19-06-2002			7.03 (102)	262 (504)	197 (387)	264 (507)	0.12 (0.5)	263 (505)				0.15 (0.2)	147	N/A	
20-06-2002		16:13	6.99 (101)	261 (502)	195 (383)	262 (504)	0.12 (0.5)	259 (498)				0	85	N/A	

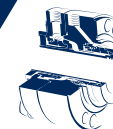
This is to certify that the seal noted above has been tested in accordance with the API 682 requirements.

Notes:

1. Conducted to latest version of API 682 at time of test; 1st edition.
2. API 682 specifies pass rate for liquid leakage as <5.6 g/h which equates to 134.4 g/day or 1000ppm for gas and vapour.
3. kW / HP are calculated theoretical values.

Authorised By:  
Stephen Shaw  
Group Engineering Director

# Mechanical Seal Qualification Test Form



1CW, 2CW-CW, 3CW-FB, 3CW-FF, 3CW-BB

Test Ref: T5/3/PT00API\_10 Revision: 06/23

Manufacturer: AESSEAL plc Seal Type / Model: CAPI Type B Single

Seal Type: A  B  C  ES

Materials of Construction: Primary Seal Faces: Antimony Carbon FH82A/SC2 Reaction Bonded Silicon Carbide Secondary Seal Faces\*: N/A

Secondary Seals: Fluoroelastomer/Graphite Metal Hardware: 316 SS

Seal Size: 50mm Seal Code: 1CW-FL Piping Plan: 11 & 62 Shaft Speed: 3600rpm

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

Shaft Runout (Figure 19): 0.025mm 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): 260 (500) 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

DYNAMIC TEST 100 h minimum			Pressure barg (psig)	Process Temp. °C (°F)	Flush Temp. IN °C (°F)	Flush Temp. OUT °C (°F)	Flush Flow Rate m <sup>3</sup> /h (U.S. gal/min)	Seal Chamber Temp. °C (°F)	Barrier Fluid Pressure barg (psig)	Barrier Fluid Temp. IN °C (°F)	Barrier Fluid Temp. OUT °C (°F)	Power Consumption kW (hp)	Hydrocarbon Leakage g/day	Nonhydrocarbon Leakage cm <sup>3</sup> /min	Circulating Device m <sup>3</sup> /h (U.S. gal/min)
Date	Time														
	Start	Stop													
09-09-2002	15:00		6.84 (99)	260 (500)	233 (451)	258 (496)	0.07 (0.3)	261 (502)				0.34 (0.5)	<21	N/A	
16-09-2002		10:13	7.23 (105)	260 (500)	244 (471)	258 (498)	0.10 (0.4)	261 (502)				0.20 (0.3)	120	N/A	
STATIC TEST 4 h minimum															
16-09-2002	10:13		7.38 (107)	261 (502)	247 (477)	257 (495)	0.12 (0.5)	261 (502)				0	0	N/A	
16-09-2002		14:13	7.33 (106)	261 (502)	249 (480)	257 (495)	0.11 (0.5)	261 (502)				0	158	N/A	
CYCLE TEST 5 cycles minimum															
16-09-2002	14:40		7.01 (102)	261 (502)	244 (471)	260 (500)	0.10 (0.4)	262 (504)				0.32 (0.4)	168	N/A	
17-09-2002			7.22 (105)	260 (500)	239 (462)	259 (498)	0.02 (0.1)	261 (502)				0.29 (0.4)	47	N/A	
19-09-2002		15:35	7.24 (105)	261 (502)	243 (469)	262 (504)	0.03 (0.1)	262 (504)				0	0	N/A	

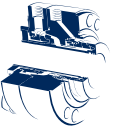
This is to certify that the seal noted above has been tested in accordance with the API 682 requirements.

Notes:

1. Conducted to latest version of API 682 at time of test; 1st edition.
2. API 682 specifies pass rate for liquid leakage as <5.6 g/h which equates to 134.4 g/day or 1000ppm for gas and vapour.
3. kW / HP are calculated theoretical values.

Authorised By:  
Stephen Shaw  
Group Engineering Director

# Mechanical Seal Qualification Test Form



1CW, 2CW-CW, 3CW-FB, 3CW-FF, 3CW-BB

Test Ref: T5/8/PT00843\_4 Revision: 06/23

Manufacturer: AESSEAL plc Seal Type / Model: CAPI Type B Single

Seal Type: A  B  C  ES

Materials of Construction: Primary Seal Faces: Antimony Carbon FH82A/SC2 Reaction Bonded Silicon Carbide Secondary Seal Faces\*: N/A

Secondary Seals: Fluoroelastomer/Graphite Metal Hardware: 316 SS

Seal Size: 100mm Seal Code: 1CW-FL Piping Plan: 11 & 62 Shaft Speed: 3600rpm

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

Shaft Runout (Figure 19): 0.025mm 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): 260 (500) 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

DYNAMIC TEST 100 h minimum			Pressure barg (psig)	Process Temp. °C (°F)	Flush Temp. IN °C (°F)	Flush Temp. OUT °C (°F)	Flush Flow Rate m <sup>3</sup> /h (U.S. gal/min)	Seal Chamber Temp. °C (°F)	Barrier Fluid Pressure barg (psig)	Barrier Fluid Temp. IN °C (°F)	Barrier Fluid Temp. OUT °C (°F)	Power Consumption kW (hp)	Hydrocarbon Leakage g/day (ppm)	Nonhydrocarbon Leakage cm <sup>3</sup> /min	Circulating Device m <sup>3</sup> /h (U.S. gal/min)
Date	Time														
	Start	Stop													
05-07-2007	10:30		7.17 (104)	259 (498)	248 (478)	251 (484)	0.32 (1.4)	237 (459)				0.56 (0.8)	0	N/A	
09-07-2007		14:30	6.95 (101)	259 (498)	250 (482)	254 (489)	0.36 (1.6)	247 (477)				0.55 (0.7)	32	N/A	
STATIC TEST 4 h minimum															
09-07-2007	14:34		6.94 (101)	259 (498)	254 (489)	239 (462)	0.40 (1.8)	235 (455)				0	4.2	N/A	
10-07-2007		08:50	6.90 (100)	259 (498)	256 (493)	239 (462)	0.40 (1.8)	237 (459)				0	21	N/A	
CYCLE TEST 5 cycles minimum															
10-07-2007	09:15		7.11 (103)	259 (498)	250 (482)	253 (487)	0.37 (1.6)	246 (275)				0.56 (0.8)	23	N/A	
11-07-2007			6.85 (99)	259 (498)	253 (487)	253 (487)	0.44 (1.9)	247 (477)				0.55 (0.7)	21	N/A	
11-07-2007		16:03	6.82 (99)	260 (500)	259 (498)	235 (455)	0.49 (2.2)	237 (459)				0	0	N/A	

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

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 which equates to 134.4 g/day or 1000ppm for gas and vapour.
3. kW / HP are calculated theoretical values.

Authorised By:  
Stephen Shaw  
Group Engineering Director