API 682 Seal Qualification Test Certificate

Seal Tested:	CAPI Type C 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 C
API Seal Configuration(s):	1CW-FL
API Seal Category:	2, 3
API Flush Plan(s):	11 & 62
Test Fluid:	Non-Flashing Hydrocarbon
Base Pressure:	7 barg (100 psig)
Base Temperature:	260°C (500°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®
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Mechanical Seal Qualification Test Form

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

Test Ref: T5/5/PT00API_13 Revision: 06/23

Manufacturer: AESSEAL plc Seal Type / Model: CAPI Type C 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: 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): 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^3/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^3/min	Circulating Device m^3/h (U.S. gal/min)
Date	Time														
	Start	Stop													
16-09-2004	11:37		7.09 (103)	240 (464)	238 (460)	243 (469)	0.26 (1.2)	242 (468)				0.15 (0.2)	105	N/A	
20-09-2004		15:37	7.07 (103)	240 (464)	239 (462)	243 (469)	0.29 (1.3)	242 (468)				0.15 (0.2)	134	N/A	
STATIC TEST 4 h minimum															
20-09-2004	15:37		7.15 (104)	239 (462)	239 (462)	247 (477)	0.32 (1.4)	240 (464)				0	63	N/A	
22-09-2004		10:06	7.08 (103)	225 (437)	223 (433)	227 (441)	0.24 (1.1)	225 (437)				0	0	N/A	
CYCLE TEST 5 cycles minimum															
22-09-2004	13:40		6.93 (101)	238 (460)	234 (453)	241 (466)	0.23 (1.0)	240 (464)				0.14 (0.2)	42	N/A	
24-09-2004			6.95 (101)	236 (457)	236 (457)	239 (462)	0.38 (1.7)	238 (460)				0.14 (0.2)	<21	N/A	
28-09-2004		16:20	7.09 (103)	235 (455)	236 (457)	237 (459)	0.39 (1.7)	238 (457)				0	<21	N/A	

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; 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.

AESSEAL® ENVIRONMENTAL TECHNOLOGY

Mechanical Seal Qualification Test Form

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

Test Ref: T5/9/PT00843_4 Revision: 06/23

Manufacturer: AESSEAL plc Seal Type / Model: CAPI Type C 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: 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^3/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^3/min	Circulating Device m^3/h (U.S. gal/min)
Date	Time														
	Start	Stop													
05-07-2007	10:30		7.17 (104)	259 (498)	228 (442)	228 (442)	0.15 (0.7)	239 (462)				0.56 (0.8)	0	N/A	
09-07-2007		14:30	6.95 (101)	259 (498)	235 (455)	239 (462)	0.22 (1.0)	247 (477)				0.55 (0.7)	0	N/A	
STATIC TEST 4 h minimum															
09-07-2007	14:34		6.94 (101)	259 (498)	240 (464)	230 (446)	0.31 (1.4)	235 (455)				0	0	N/A	
10-07-2007		08:50	6.90 (100)	259 (498)	256 (493)	235 (455)	0.30 (1.3)	237 (459)				0	0	N/A	
CYCLE TEST 5 cycles minimum															
10-07-2007	09:15		7.11 (103)	259 (498)	234 (453)	238 (460)	0.23 (1.0)	246 (475)				0.56 (0.8)	0	N/A	
11-07-2007			6.85 (99)	259 (498)	237 (459)	242 (468)	0.33 (1.5)	247 (477)				0.55 (0.7)	0	N/A	
11-07-2007		16:03	6.82 (99)	260 (500)	248 (478)	235 (455)	0.46 (2.0)	237 (459)				0	0	N/A	

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

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