

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Pipe Flange, Welded Connection

with type designation(s)
SPO COMPACT FLANGES

Issued to

Freudenberg Oil & Gas Technologies AS
Drammen, Norway

is found to comply with

DNVGL-OS-E101 – Drilling plant, Edition July 2015

DNVGL-OS-E201 – Oil and gas processing systems, Edition July 2015

Application :

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

Temperature range: -200°C to +250°C (material dependant)

Max. working press.: CL150 to CL2500 & 5K to 15K (see certificate)

Issued at **Høvik** on **2017-10-05**

This Certificate is valid until **2021-12-31**.

DNV GL local station: **Oslo Maritime and CAP**

for **DNV GL**

Approval Engineer: **Adel Samiei**

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Marianne Spæren Marveng
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.



Product description

SPO compact flanges (as described in designer's manual referenced in the type approval documents) designed according to ASME Section VIII Div.2 and DNV-RP-F112 (RP-F112:SPO-S CF WN flanges)
Materials:

	Flange	IX Ring & HX Ring	Stud Bolts
Carbon steel and low alloy	A105 ASTM 182 F22/F91 A350 LF2/LF3 A694 F52, F60, F65 A508 Grade 22 A522 Type I AISI 4130, 4140, 8630 P420QH EN10222-4	AISI 4140 B564 UNS N06625 B564 UNS N07725	A193 B7, B7M A320 L7, L43, L7M
Stainless steel	A182 F304,F316,F316L,F316N, F347,F347H,F44,F49,F51,F53, F55,F61	A182 F44 A564 630 A638 Gr 660 A182 F51, F53, F55	A193 B7, B7M, B8M Cl2 A320 L7, L43, L7M, B8M Cl2 A453 Gr 660 A182 F55 ASTM A564 Gr.630 (17/4PH)
Nickel alloy	B564 N06625,N04400,N08010, N08011, N08825	B564 N06625,N04400, N07718, N07725	B637 N07080,N07718
Titanium	ASTM B381 Gr.2,5,12,23,29	ASTM B381 Gr.5	-

Manufacturing facility: Freudenberg Oil & Gas Technologies, Port Talbot SA12 7BZ, United Kingdom

Application/Limitation

Size and pressure class

Pressure class overview, ASME classes					
Pressure class	SPO CF Class designation	PN designation	ASME pressure rating ceiling values at RT		SPO CF Size range NPS
			[psig]	[barg]	
Class 150	CL150	PN 20	290	20.0	½" to 64"
Class 300	CL300	PN 50	750	51.7	½" to 64"
Class 600	CL600	PN 110	1500	103.4	½" to 48"
Class 900	CL900	PN 150	2250	155.2	½" to 48"
Class 1500	CL1500	PN 260	3750	258.6	½" to 48"
Class 2500	CL2500	PN 420	6250	431.0	½" to 24"

Pressure class overview, API and Special classes					
Pressure class	SPO CF Class designation	PN designation	ASME pressure rating ceiling values at RT		SPO CF Size range NPS
			[psig]	[barg]	
Class 5K	5K	PN 345	5000	345.0	½" to 24"
Class 7.5K	7.5K	PN 520	7500	520.0	½" to 24"
Class 10K	10K	PN 690	10000	690.0	½" to 24"
Class 15K	15K	PN 1035	15000	1035.0	½" to 24"

The products approved by this certificate is/are qualified for use on pressure systems both subsea and topsides and are in accordance with the appropriate referenced standards listed below

- ASME B31.3 Process piping 2012
- ASME B31.8 Gas transmission and distribution piping systems
- ASME VIII Div.2 Part 5 ASME Boiler and pressure vessel code
- ASME VIII Div. 3 ASME Boiler and pressure vessel code
- ISO 13628-7 Petroleum and natural gas industries – Design and operation of subsea production systems – Part 7. Completion/workover riser systems.

- ISO 10423 / API 6A Petroleum and natural gas industries – Drilling and production equipment – Wellhead and Christmas tree equipment
- DNV-RP-F112 Design of duplex stainless steel subsea equipment exposed to cathodic protection

SPO-C CF flanges (CL150, CL300) have been approved for cryogenic use

SPO-S CF WN flanges (5K, 7.5K, 10K, 15K) have been designed in accordance with DNV-RP-F112
CRA overlay is acceptable. The capacity calculations shall take this into account as appropriate

Minimum design temperature shall be in accordance with ASME Sec.II-D & maximum design temperature 250°C - Pressure temperature rating as per manufacturer's technical documents.

Flanges shall be properly protected against corrosion. In sour service then NACE requirements shall be fulfilled and documented. Consider that traditional austenitic stainless steel grades 304, 304L, 316 and 316L shall not be considered seawater resistant.

Type Approval documentation

Tests carried out

Pressure testing, external loading (axial and bending moment), fatigue testing, fire resistance and pressure-temperature cycle testing, cryogenic testing

Certification

According to DNVGL-OS-E101, products covered by this certificate shall be considered as Category I when they are installed in category I piping systems. In this condition product certificate issued by the society is required. Otherwise manufacturer's work certificate is acceptable.

Products covered by this certificate shall be considered as Category I according to DNVGL-OS-E201. Therefore, products delivered to DNV GL Oil and gas processing units shall be certified by a DNV GL surveyor.

Marking of product

For traceability to this type approval the flanges are to be marked with:

- Manufacturer's name or trade mark
- Class
- Material identification
- Size

Periodical assessment

For retention of the Type Approval a DNV GL Surveyor shall perform a periodical assessment every second Year. The objective of the periodical assessment is to verify that the conditions for the TA are not altered since the TAC was issued.