DNV·GL

Certificate No:
TAP00001T4

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Pipe Couplings, Flared or Welded Nipple Type

with type designation(s)
VOSSFlareORFS tube coupling

Issued to
VOSS Fluid GmbH
Wipperfürth, Nordrhein-Westfalen, Germany

is found to comply with
DNV GL rules for classification – Ships Pt.4 Ch.6 Piping systems
DNV GL class programme DNVGL-CP-0185 – Type approval – Mechanical joints

Application :

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

Temperature range:	**Refer to certificate**
Max. working press.:	**up to 630bar**
Sizes:	**6mm up to 38mm**

Issued at **Hamburg** on **2019-04-11**

This Certificate is valid until **2024-04-10**.
DNV GL local station: **Hamburg Machinery Systems & Marine Products**

Approval Engineer: **Hagen Markus**

for **DNV GL**
Digitally Signed By: Drews, Olaf
Location: DNV GL SE Hamburg, Germany
Signing Date: 2019-04-15

Olaf Drews
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

The VOSS*Flare*^{ORFS} flare tube coupling system consists of coupling bodies and nuts acc. to SAE J1453, ISO 8434-3 respectively. Connecting of tubes by 90° sealing surface formed on the pipe by using VOSS Fluid forming machine of type TD-TYPE110 and stiffener sleeve.

Component	Material designation[3]	Design standards
Pipe coupling	Carbon Steel	ISO8434-3, SAEJ1453
Nuts, Sleeves		
Soft sealing	NBR	VOSS Fluid
Tubes[1,2]	Carbon steel	DIN EN 10305-4

Notes
[1] For selection of tubes refer to VOSS Fluid catalogue "VOSS*Flare*^{ORFS} tube coupling technology".
[2] Tube wall thickness acc. to DNV GL Ship Rules Pt.4, Ch.6 - Section 9, Tables 3 and 4.
Regarding material certificates refer Section 2, Table 3.
[3] For detailed material designation refer to VOSS catalogue "Hydraulic connection technology, Edition 2018 - Section 9".

Scope of type approval

This type approval certificate includes the following pipe coupling types and accessories

Pipe coupling types	Type designation
Male stud connectors	SDE, SDS, SDSL, SWSDS, BHSDSLN
Unions	S, E, T, K
Bulkhead unions	BHSLN, BHELN, BHE45LN, BHLLN, BHTLN
Swivel connectors	SW2S, SWE, SWE45, SWL, SWT
Adjustable stud connectors with lock nut	SDAE, SWSDAE, SDAE45, SDAL, SDAT
Reducing adapters / Expanders	SWS / SWSX
Adapters for test points / Test point connectors	S / SWS
Weld connectors	WDNPS, WDE
System adapter ORFS / JIC	AP
Component parts and accessories for couplings	
Sleeves / Braze sleeves	SL, BRSL
Union nuts, Brazing nuts	N, BRN
Lock nut	GP-LN,
Caps, plugs, blanking plugs for ports	PLC, TBS, GP-PLIH / PLEH
Thread reducing couplings	GP-SDS
Sealing rings	OR, PEFLEX, RR
Tools	
Forming machine	VOSS*Flare* 110 – TD-TYPE110

For the following coupling types limitations as specified in the Rules Pt.4, Ch.6 are to be observed:

Brazed pipe connections
Use of braze sleeves type BRSL is not approved in piping systems conveying flammable fluids installed in machinery spaces of category A.
Refer to Pt.4, Ch.6 – Section 2 Materials, Para. 1.1.2.

Bulkhead unions
Coupling types with type designation BHSLN, BHELN, BHE45LN, BHLLN, BHTLN are not approved through tank walls, watertight decks and bulkheads.
For application through fire divisions a separate type approval is required.

Pipe couplings where pressure -tight joints are made on the threads are limited in the application as follows:

- Pipe connectors with parallel thread are not approved for pipe class I and II.
- Tapered or parallel thread is not approved for toxic or flammable media or services where fatigue, severe erosion or crevice corrosion is expected to occur.

Refer to DNVGL Rules, Pt.4, Ch.6 – Section 9 – 5.2.6.

Overview of threaded pipe couplings with limitations

Type	Name
SDE, SDS	Male stud connector with tapered thread
BHSDSLN	Male stud bulkhead unions with NPTF thread, tapered
SWS	Test point connectors with female thread BSPP thread, cylindrical
	Test point connectors with female thread UN/UNF
SWS, SWSX	Test point connectors with female thread metric fine thread, parallel

All other fittings with thread connection not listed in the above table may be used without limitations.

Application / Limitation

The VOSS*Flare*^{ORFS} flare tube coupling system is type approved for application in pipe class I, II and III-piping systems, as specified in DNV GL Ship Rules Pt. 4, Ch. 6, Sec. 9 Table 12 and 13 - compression couplings – fire resistant type.

The pipe couplings are not approved for application in high pressure fuel injection systems of combustion engines.

Selection of materials

It shall be noted that the selection of the materials considers the applicable service condition with respect to type of media, flow velocity, media temperature etc. and installation area of the piping system. In particular, the resistance to corrosion, erosion, oxidation and other deterioration during projected service life are to be considered.

Pipe couplings made of stainless steel material 1.4571 are not approved for application in sea water systems and unprotected installation against green sea on open deck.

Reference is made to DNVGL Rules Pt.4, Ch.6 – Section 2 – Materials.

Sizes and pressure range[2]

Tube O.D.	Tube O.D.	Nominal pressure
Metric mm	Inch in	PN[1]
6, 8, 10, 12	¼, 5/16, 3/8, ½	630
14, 15, 16	5/8	420
18, 20	¾	
22, 25	1	
28, 30, 32	1 1/4	
35, 38	1 1/2	350

Notes
[1] For PN of individual pipe couplings refer to VOSS Fluid catalogue "VOSS*Flare*^{ORFS} tube coupling technology".
[2] Max working pressure of the piping system depend on the selected pipe material and wall thickness.

Temperature range

The temperature range of the VOSS*Flare*^{ORFS} flare coupling system is limited by the fitting material or soft seal material.

Material	Lowest allowable Temperature	Maximum allowable Temperature
Carbon steel[1]	- 20°C[2]	+ 250°C
NBR	- 35°C	+ 100°C

Notes
[1] For service temperatures above 120°C the pressure reductions factors specified in VOSS Fluid catalogue "Hydraulic connection technology", Edition 2018 – Section 9 are to be observed.
[2] Lowest medium temperature -20°C and lowest environmental temperature -40°C. Refer to DIN 3859-1.

Assembling and Installation

For the assembling and installation, the VOSS Fluid catalogue " VOSS*Flare*^{ORFS} tube coupling technology" is to be observed.

Type Approval documentation

Test reports (based on test plan released on 2017-01-19)
VOSS Automotive GmbH – Testing Laboratory, Wipperfürth

2017_0667/1	Repeated assembly test, gas tightness test (70bar), hydraulic pressure test and burst pressure test, sizes 06, 16, 25, 38. Remarks: - NW 6, brazed - NW16, 25 - flared - NW38, brazed - Tube material E235, fitting material 11SMnPb30+C
2017_0668/1	Gas tightness test (70bar), hydraulic pressure test, vacuum and pull-out test, sizes 6, 16, 25, 38. Remarks: - NW 6, brazed - NW16, 25 – 90° flared - NW38, brazed - Tube material E235, fitting material 11SMnPb30+C

IMA Materialforschung und Anwendungstechnik GmbH, Dresden

K075/18, 2018-07-13	Tightness pressure test (PN), Combined pressure pulsation and vibration test Remarks: - pipes and fittings made of carbon steel - Pipe sizes 6mm, 16mm, 25mm, 38mm

Dr. -Ing. T. Bäumer GmbH test laboratory, Herford
- Fire resistance tests acc. to ISO 19921/22 on pipe stud couplings with elastomeric seals

Test report	Date
IBB1308:L06	2014-10-22
IBB1304:L18	
IBB1306:S6	
IBB1302:S16	
IBB1310:L42	2014-10-23
IBB1312:S38	

- Fire resistance tests acc. to ISO 19921/22 on straight pipe couplings with elastomeric seals

Test report	Date
IBB1986:38mm	2018-04-10
IBB1984:25mm	
IBB1982:16mm	
IBB1980:6mm	

Miscellaneous
- DNVGL Assessment report of VOSS Fluid GmbH, D-51688 Wipperfürth, 2019-04-08
- VOSS Fluid catalogue " VOSS*Flare*^{ORFS} tube coupling technology"
- Data sheet forming machine VOSS*Flare*110 - FL-TD-TYPE40VL

Tests carried out
Repeat assmbly test, gas leak test (70bar), hydraulik tighness test, burst pressure test, combiened pressure impulse and vibration test, pull-out test, vaccuum test, fire resistance test.

Marking of product

Component	Scope	Example
Fitting body	Manufacturer sign, suppliers mark	VOSS, 1K
		VOSS, 33
O-Ring - NBR	Color	Black
Nut	Size, suppliers mark	M24, 86

PERIODICAL ASSESSMENT
For retention of the Type Approval, a DNV GL Surveyor shall perform periodical assessment after two years (+/- 90 days) and after 3.5 years (+/- 90 days) to verify that the conditions for the Type Approval are complied with. Refer to DNVGL-CP-0338, Sec.4.

End of certificate