DNV·GL

Certificate No:
TAP0000166

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Pipe Coupling With O-Ring Seal

with type designation(s)
VOSS 24° DKO taper couplings made of carbon steel and stainless steel

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 approved by this certificate are accepted for installation on all vessels classed by DNV GL.

Temperature range:	**Refer to certificate.**
Max. working press.:	**250bar up to 800bar**
Sizes:	**6mm up to 42mm**

Issued at **Hamburg** on **2019-03-05**

This Certificate is valid until **2024-03-04**.
DNV GL local station: **Essen**

Approval Engineer: **Hagen Markus**

for **DNV GL**
Digitally Signed By: Drews, Olaf
Location: DNV GL SE Hamburg, Germany
Signing Date: 2019-03-07

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

Adjustable 24° taper coupling with special cap nut for holding function by means of a wire pin.
Connection dimensions correspond to ISO 8434-1.

This type approval certificate includes coupling types as specified in the VOSS catalogue "Hydraulic connection technology, Edition 2018 - Section 3 – 24° taper couplings (DKO)".
In addition, the following coupling types and accessories are included:

Coupling type	**Type designation**
Male stud connectors	SDS, SDE, SDL, SDT
Unions	S, E, T, K
Bulkhead unions, Welding bulkhead connectors	BHSLN, BHELN, BHSDSLN, WDBHS
Adjustable couplings with tube socket	SWE, SWT, SWL, SWSDS, SWS
Adjustable stud connectors with locknut	SDAE, SDAE45, SDAL, SDAT
Female and gauge connectors	S, PGS, SWPGS, SWOPGS
Component parts and accessories for couplings	
Double nipple	SD2S
Thread reducing couplings, Straight adapters ISO6149 / DIN3852	SDS
Blanking plug for ports, caps, plugs, Hexagonal nuts	PLIH/PLEH, PLB, PLO/PLOC, TBS, LN
Reinforcing sleeves	RS
Sealing rings	OR, PEFLEX

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

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

Coupling types WDBHS is approved through tank walls, watertight decks and bulkheads.
Through fire divisions the coupling and connected pipe is to be provided with same insulation material as used for the divisions. Total insulation length of 450mm.

Pipe connectors 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**
SDS, SDE, SDL, SDT	Male stud connector sealing types tapered thread,
GP-SDS	Thread reducing couplings ISO 1179-2, 4
	Straight adapter ISO 6149 / DIN 3852
SWSDS	Swivel connector sealing type tapered thread

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

Materials

Component	Material designation[1]	Design standard
Fittings	Carbon steel with VOSS coat corrosion protection	ISO 8434-1
	1.4571	
Tubes[2,3]	Carbon steel	DIN EN 10305-4
	Stainless steel	DIN EN 10305-1
O-ring (standard)	FKM	VOSS Fluid

Notes
[1] For detailed material designation refer to VOSS catalogue “Hydraulic connection technology, Edition 2018 - Section 9”.
[2] For selection of the tubes refer to VOSS catalogue “Hydraulic connection technology”, Edition 2018 - Section 9.
[3] 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.

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 as well as installation area of the piping system.
In particular, the resistance to corrosion, erosion, oxidation and other deterioration during projected service life are to be taken into account.

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 DNV GL Rules Pt.4, Ch.6 – Section 2 – Materials.

Application / Limitation

The VOSS Fluid DKO taper couplings are 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.

Temperature range

The temperature range of the VOSS DKO pipe coupling is limited by the soft seal material of the fittings, if applicable.

Material	Lowest allowable Temperature	Maximum allowable Temperature
Carbon steel[2]	- 20°C[1]	+ 250°C
Stainless steel[2]	- 55°C	+ 400°C
NBR	- 35°C	+ 100°C
FKM	- 25°C	+ 200°C

Notes
[1] Lowest medium temperature -20°C and lowest environmental temperature -40°C. Refer to DIN 3859-1.
[2] For service temperatures above 120°C (carbon steel) and above 50°C (stainless steel) the pressure reductions factors specified in VOSS Fluid “Hydraulic connection technology, Edition 2018, Section 9” are to be observed.

Temperature range examples

Stainless steel pipe fitting with NBR sealing	- 35°C up to +100°C
Carbon steel pipe fitting with FKM sealing	- 20°C up to +200°C

Sizes and pressure range

Tube O.D. mm	Nominal pressure PN[1,2]	
	Light Series L	Heavy Series S
6, 8, 10	500	800
12	400	630
14	n.a.	630
15	400	n.a.
16	n.a.	630
18	400	n.a.
20	n.a.	420
22	250	n.a.
25	n.a.	420
28	250	n.a.
30	n.a.	420
35	250	n.a.
38	n.a.	420
42	250	n.a.

Notes
[1] For PN of individual fittings and ressure reductions factors for elevated service temperatures refer to VOSS Fluid catalogue “Hydraulic connection technology, Edition 2018 - Section 3 and 9”.
[2] Max working pressure of the piping system depend on the selected pipe material and wall thickness.

Assembling and Installation

For the assembling and installation, Section 8 of the VOSS Fluid catalogue “Hydraulic connection technology, Edition 2018” is to be observed.

Type Approval documentation

Previous type approval certificates

DNV P-14307

- Test reports AEL 214/061 1
- Report UB: EZV 078/92/1 dated 26.08.92
- Report UB: EZV 001/93/1 dated 12.01.93
- Report UB: AEL 225/05/1 dated 23.12.05
- Test report 12 0281 1 92 issued by Staatliches Materialprüfungsamt, Nordrhein-Westfalen, 29.06.1992

GL 44 386-07HH

- IMA Dresden test report C101/06
- WTD 71 Fire Test Report No.: 61070/105 to 108
- VOSS Fluid test report No.: 4522

Actual DNV GL type approval certificate TAP0000168
Test reports
- VOSS Test reports:
  2018_0267/1, 2018
  Leak tightness, repeat assembly, burst pressure test on ES-4, BV-10/DKO and 2SVA/ES-4VA/DKOVA couplings size 6, 16, 38 and 42
  2011_173/1, 2011_215/1, 2011_216/1, 2011
  Assembly, leak, bursting pressure, vacuum and pull out

Miscellaneous documents
- DNVGL Assessment report of VOSS Fluid GmbH, D-51688 Wipperfürth, 2018-03-13
- PH Industrie-Hydraulic GmbH & Co. KG type approval certificate TAP00000Z3 and confirmation letter dated 2018-11-19.
- VOSS Fluid catalogue “Hydraulic connection technology, Edition 2018

Tests carried out

Test sope in accordance with DNV Type Approval Programme No.5-792.20,
GL VI-7-8 – Part 6 Requirements for Mechanical Components and Equipment and DNV GL CP-0185.

Marking of product

Component	Scope	Example
Fitting body	Manufacturer sign Size, Series	VOSS, 1K 16S
O-Ring (FKM)	Color	Green
Nut	Size, suppliers mark	M24, 86

Periodical assessment

To maintain the validity of the type approval certificate, periodical assessments at manufacturing place or owner of the certificate will be carried out by a DNV GL surveyor.
The objective of the periodical assessment is to verify that the conditions for the type approval have not been altered.
For detailed information refer to DNVGL Class Programme CP-0338, Section 4.

It is further to be noted that the Society shall be informed in case of:
- Product modifications which have an impact on the design and function characteristics of the products specified in the type approval certificate.
- Shifting of the production site or any additional production site.

Renewal assessment
In connection with the renewal assessment, burst pressure tests on different types of pipe couplings are to be carried out in the presence of the DNV GL surveyor.
The selection of the pipe coupling types, sizes and quantity is to be determined prior to the assessment.

At least one of the test assembly is to be manufactured in the presence of the surveyor according to the manufacturers specification.

End of certificate