TYPE APPROVAL CERTIFICATE

Certificate no.:
TAP00001U0
Revision No:
2

This is to certify:

that the Pipe Couplings, Flared or Welded Nipple Type

with type designation(s)
Flare fittings acc. to SAE J 514, ISO 8434-2

issued to
Danfoss Power Solutions II GmbH
Troisdorf, Nordrhein-Westfalen, Germany

is found to comply with
DNV rules for classification – Ships Pt.4 Ch.6 Piping systems
DNV-OS-D101 – Marine and machinery systems and equipment, Edition July 2021
DNV class programme DNV-CP-0185 – Type approval – Mechanical joints

Application:

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

Temperature range:	**Up to 400°C**
Max. working press.:	**Up to 630bar**
Sizes:	**6mm up to 42mm**

Issued at **Hamburg** on **2025-08-06**

This Certificate is valid until **2030-08-05**.
DNV local unit: **Essen**

Approval Engineer: **Hagen Markus**

for **DNV**

This document has been digitally signed and will therefore not have handwritten signature

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 Danfoss Waltech Flare fitting system is based on mechanically reshaped tube ends (37° SAE), a centre unit with O-rings and a loose collar for transition from 24° taper of the fitting body to the flared tube end, and a nut.

Surface protection of components, refer to Danfoss Power Solution GmbH; Danfoss Waltech tube fitting systems catalogue “AF403661682130en-000103”.

Tube flaring machines of types M-WF385X/BO (MEG-WF2/BO) as well as other machine types manufactured by Danfoss Waltech shall be used tube forming.

Tube fittings

Tube fittings acc. to DIN 2353 and DIN EN ISO 8434-1 and Danfoss Waltech specification.

Scope of type approval

This type approval includes the tube fittings , accessories machines and tools as specified in Danfoss Power Solution GmbH; Danfoss Waltech tube fitting systems catalogue “AF403661682130en-000103”, excluding:

- Banjo couplings, Swivel banjos, Double banjo coupling, Swivel elbow coupling
- Ball valves, non-return valves, shuttle valves, non-return valve with male stud
- Compopact diverter valve, three-way valve
- Flange fittings, Welding nipple

For the following pipe coupling types limitations are to be observed:
Bulkhead couplings
Bulkhead coupling types GSS and WSS are not approved through tank walls, watertight decks and bulkheads.
For application through fire divisions a separate type approval is required.

Welded bulkhead coupling type ESS is approved through tank walls, watertight decks and bulkheads.
Through fire divisions the coupling and connected pipe is to be provided with the same insulation material as used for the divisions with a total insulation length of 450mm.

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

Pipe connector design	Range of application[1]	
..with tapered or parallel thread	not approved for toxic or flammable media or services where fatigue, severe erosion or crevice corrosion is expected to occur	
..with parallel thread	approved for pipe class III	up to outside diameter 60.3mm
..with tapered thread	approved for pipe class I	up to outside diameter 33.7mm
	approved for pipe class II, III	up to outside diameter 60.3mm

Note
[1] Refer to DNV RU SHIP Rules Pt.4 Ch.6 Piping system – Section 9 – 5.2.6.

Overview of threaded pipe couplings with limitations

Type	Name
WES…RK/WES.MK/WES…NPT P-WEV..RK, P-WEV..MK, P-WEV..NPT	Male stud elbow
GES..RK/GES..MK/GES..NPT, P-GEV..RK/P-GEV..MK /P-GEV..NPT	Male stud coupling
EGESD….NPT	Stud standpipe adaptor

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

Materials

Component	Material designation and standards
Nut, centre unit, loose collar	Carbon steel DIN 3859-1 - Table 2 and Danfoss Waltech specification
	Stainless steel 1.4571
	Copper alloy CuNiFe1,6Mn
Flare fitting	Stainless steel 1.4571
	Copper alloy CuNiFe1.6Mn
	Carbon steel DIN 3859-1 - Table 2 and Danfoss Waltech specification
Soft seals	NBR, FPM, EPDM[1]

Tubes[2,3]

Seamless cold drawn tubes

Stainless steel 1.4541, 1.4571	DIN EN 10216-5
	Condition delivery: CFA
Stainless steel 1.4404, 1.4435, 1.4301	EN ISO 1127, ASTM A269/A213
	Tolerances: ISO 1127 D4/T3[4]
	Condition delivery: Dissolution annealed and deterred

Welded tubes

Carbon steel E235, E355	DIN EN 10305-4
	Condition delivery: +N
Copper alloy CuNiFe1,6Mn[5]	NES 780, Part 3
	Tolerances: DIN EN 10305-4
TUNGUM®[5]	CW700R
	Tolerances: DIN EN 10305-4

Notes

[1] EPDM soft seals are not suitable for piping systems containing hydrocarbon-based fluids.
[2] For selection of tubes and detailed material designation refer to Danfoss Power Solution GmbH; Danfoss Waltech tube fitting systems catalogue "AF403661682130en-000103",
[3] Minimum tube wall thickness acc. to DNV RU Ship Rules Pt.4 Ch.6 Piping systems, Section 9, 1.2 Wall thickness. Dimension tolerances acc. to DIN EN 10305-4 or tolerances ISO 1127D4/T3 see table above. Regarding material certificates Section 2, Table 3 Material certificates are to be observed.
[4] Applicable to pipes up to O.D. 20mm. Above O.D. 20mm tolerances acc. to DIN EN 10305-4 applies.
[5] In combination with pipe couplings and nuts made of CuNiFe1,6Mn and WALPRO-X profile ring P-R.

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 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.

Sea water application

The term sea water application includes piping systems conveying sea water and piping systems installed on the open deck.
The stainless-steel materials 1.4571 (AISI 316Ti), 1.4404(AISI 316L) or 1.4401(AISI 316) are approved for sea water application.

Even the stainless-steel grade specified above cannot be considered immune to attack under all situations, avoidance of stagnant seawater conditions and removal of welding oxides after welding are some of the important factors to the successful use in piping systems for sea water and installation on open deck.

References:
- DNV-RU-SHIP Rules Pt.4 Ch.6 Piping systems – Section 2 – Materials, Table 1 and DNV-OS-D101 Ch.2 – Sec. 2 – Materials
- DNV-CG-0288 Corrosion protection of ships.

Application/Limitation

The Danfoss Waltech Flare fitting system is type approved for application in pipe systems of pipe class I, II and III.
Reference: DNV-RU-SHIP Pt. 4 Ch. 6 Piping system, Sec. 9, Table 8 - Compression couplings - Flared type.
Fire endurance test condition “30 min. wet”.
Flare fittings made of CuNiFe1.6 Mn for connection of pipe made of CuNiFe and CW700R (TUNGUM®) are limited to piping systems with static load. In general compression couplings are not approved for application in high pressure fuel injection systems of combustion engines.

Piping systems		Application/ Limitation
Flammable fluids (flash point ≤ 60°C)		
1	Cargo oil lines	Not approved for installation in pump rooms and open decks.
2	Crude oil washing lines	
3	Vent lines	Installation limited to on exposed open decks, as defined in SOLAS II-2/Reg. 9.2.3.3.2.2(10) and not used for fuel oil lines.
Inert gas		
4	Water seal effluent lines	Approved
5	Scrubber effluent lines	
6	Main lines	Not approved for installation in pump rooms and open decks.
7	Distribution lines	
Flammable fluids (flash point > 60 °C)		
8	Cargo oil lines	Not approved in pump rooms and open decks.
9	Fuel oil line.	Approved.
		Not approved for installation in high pressure fuel injection systems of combustion engines.
10	Lubricating oil lines	Approved
11	Hydraulic oil	
12	Thermal oil	
Seawater		
13	Bilge lines	Not approved for installation in machinery spaces of category A.
14	Water filled fire extinguishing systems (e.g., fire main, sprinkler)	Approved
15	Non water filled fire extinguishing systems, e.g., foam, drencher systems	Installation limited to on exposed open decks, as defined in SOLAS II-2/Reg. 9.2.3.3.2.2(10) and not used for fuel oil lines.
16	Fire main (not permanently filled)	
17	Ballast systems	Approved
18	Cooling water systems	
19	Tank cleaning services	
20	Non-essential systems	
Fresh water		
21	Cooling water systems (ensuring main function)	Approved
22	Condensate return systems	
23	Non-essential piping systems, e.g. cooling water for air condition, sanitary, technical water systems	
Sanitary/drains/scuppers		
24	Deck drains (internal)	Approved for installation above bulkhead deck of passenger ships and freeboard deck of cargo ships.
25	Sanitary drains	Approved
26	Scuppers and discharge (overboard)	
Sounding/vent		
27	Water tanks/dry spaces	Approved
28	Oil tanks (flash point > 60 °C)	
Miscellaneous		
29	Starting/control air	Not approved in machinery spaces of category A.
30	Service air piping systems (non-essential), e.g., sounding system	Approved
31	Brine	Approved
32	CO_2 Systems (outside protected space)	Not approved
33	CO_2 Systems CO_2 system (inside protected space)	Not approved.
34	Steam	Approved with FKM sealing.
35	Gases having an oxygen content exceeding 25%	Not approved

Sizes and pressure range[1]

Carbon steel				Stainless steel				CuNiFe	
L Series		S Series		L Series		S Series			
Pipe O.D. mm	PN bar	Pipe O.D. mm	PN bar	Pipe O.D. mm	PN bar	Pipe O.D. mm	PN bar	Pipe O.D. mm	PN bar
6-10	500	6-16	630	6, 8, 10, 12	400	6, 8, 10, 12, 16	630	10S	400
12-18	400	20-38	400	15, 18	315	20, 25, 30	400	12S, 16S, 20S, 25S	250
22-42	250	--	--	22, 28, 35, 42	250	38	330	30S	200

Notes
[1] Max. working pressure of the piping system depend on selected pipe material, pipe wall thickness and individual PN of the selected tube fittings.

Temperature range[1]

The temperature range for the fittings are limited by the selected soft seal material and/or fitting material.

Metallic materials

Carbon steel	-20ºC[1] to +120ºC
Stainless steel	-55ºC to + 400ºC
CuNiFe, TUNGUM®	-55ºC to + 200°C

Rubber materials

NBR	-35ºC to +100ºC
FPM	-25ºC to +200ºC
EPDM	-45ºC to +150ºC

Notes
[1] For service temperatures above 120°C (Carbon steel) and above 50°C (Stainless steel) the pressure reductions factors specified in Danfoss Power Solution GmbH; Danfoss Wal tech tube fitting systems catalogue “AF403661682130en-000103” are to be observed.
[2] Lowest medium temperature - 20°C , lowest environmental temperature -40°C. Refer to DIN 3859-1.

Temperature range examples

Stainless steel pipe fitting with NBR sealing	- 35°C up to +100°C
CuNiFe pipe fitting with FPM sealing	- 25°C up to +200°C

Assembling and Installation

For the assembling and installation, the instructions specified in Danfoss Power Solution GmbH; Danfoss Waltech tube fitting systems catalogue “AF403661682130en-000103”, are to be observed.

This certificate is valid for pipe connections using pipe couplings and Tube flaring machines manufactured by Danfoss Power Solution GmbH.

Type Approval documentation

TAP00001UO, Revision 2

Work scope:

Standard renewal without technical modifications, editorial update.

Documents:

DNV Assessment reports

Holder of Certificate Danfoss Power Solutions II GmbH, Troisdorf dated 2024.11.22
Production site DANFOSS, spol. s.r.o., Areal ZTS a.s.c 924, 018 41 Dubnica and Vahom, 2025.01.27 Slovak Republic

DNV Management System Certificate ISO 9001:2025, Site certificate No.: 278231-2018-AQ-DEN-DANAK-CC32

Test reports

Burst pressure tests on selected sizes and types

Test laboratory Danfoss Power Solutions II GmbH Test centre Troisdorf, Germany, dated 15.05.2025.
Report number: Doc00068761
Flare fitting TAP00001UO: 12L (stst), 18L (stst), 20S(stst)
WalformPlus / M: 10L(stst), 16S (cst), 38S(stst)
Wal-X Pro: 12L(stst), 20S(stst)

Tests carried out

DNV CP-0185
Repeated Assembly Test, Tightness Test, Burst Pressure Test, Pull-out Test, Vacuum Test, Combined Impulse and Vibration Test, fire resistance test according to ISO 19921/22 (wet condition).

Marking of product

Component	Marking	Example
Fitting body, Loose collar	Danfoss sign, material[1], supplier code.	D ,13
Nut	Danfoss sign, size, series	D ,30 S
O-rings	Colour	NBR: black, EPDM: purple FPM: green

Note
[1] Carbon steel components without material marking. Stainless steel components marked with „71“ or „1.4571“

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Section 4.

In addition, burst pressure testing on selected sizes to be carried out during renewal of the certificate.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

Manufactured by:

DANFOSS Power Solutions II GmbH, Troisdorf, Germany
DANFOSS, spol. S.r.o. Dubnica, Slovak Republic

End of certificate