DNV·GL

Certificate No:
TAP000012R

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Pipe Couplings, Bite and Compression Type

with type designation(s)
FI-GE, FI-WE, FI-TE, FI-LE, FI-G, FI-W, FI-T, FI-K, FI-GS, FI-WS, FI-ES, FI-AS, FI-WAS, FI-SN, FI-GA, FI-MA, FI-EMA, FI-EMAD, FI-RSW, FI-RST, FI-EGED, FI-SNV, FI-REDSD, FI-EWD, FI-ETD, FI-ELD, FI-EGE, FI-REDS, FI-EW, FI-ET, FI-EL

Issued to
Walter Stauffenberg GmbH & Co. KG
Werdohl, **Germany**

is found to comply with
Det Norske Veritas' Rules for Classification of Ships Pt.4, Ch.6 "Piping Systems"

Application :

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

Temperature range:	**See certificate**
Max. working press.:	**100 to 800 bar (see certificate)**
Sizes:	**Tube OD: 4 mm to 42 mm**

Issued at **Høvik** on **2018-12-21**
This Certificate is valid until **2018-12-31**.
DNV GL local station: **Essen Business Support**

for **DNV GL**

Approval Engineer: **Maheshraja Venkatesan**

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

Cutting ring pipe couplings acc. to DIN 2353 / DIN EN ISO 8434. O-ring on stud ends for some types.

Materials:
Carbon steel: C15, C22, C35, S235JR and 11SMnPb30+C acc. to DIN 3859

Adaptors available with conical or cylindrical thread.

FI-GE	Straight Male Stud Connector	FI-MA	Gauge Connector
FI-WE	Male Stud Elbow	FI-EMA	Adjustable Gauge Standpipe Connector
FI-TE	Male Stud Branch Tee	FI-EMAD	Adjustable Gauge coupling DKO
FI-LE	Male Stud Barrel Tee	FI-RSW	Swivel Banjo Elbow
FI-G	Straight Connector Straight Reducer	FI-RST	Swivel Banjo Tee
FI-W	Equal Elbow	FI-EGED	Straight Male Stud Connector with 24° DKO
FI-T	Equal Tee Tee Reducer	FI-SNV	Straight Connector with 24° DKO Straight Reducer with 24° DKO
FI-K	Equal Cross	FI-REDSD	Straight Reducer for tube ends with 24° DKO
FI-GS	Straight Bulkhead Connector	FI-EWD	90° Adjustable Male Stud Standpipe Elbow with 24° DKO
FI-WS	Elbow Bulkhead Connector	FI-ETD	Adjustable Standpipe Tee with 24° DKO
FI-ES	Straight Weld Bulkhead Connector	FI-ELD	Adjustable Standpipe Barrel Tee with 24° DKO
FI-AS	Straight Weld Connector	FI-EGE	Straight Male Stud Standpipe Connector
FI-WAS	Elbow Weld Connector	FI-REDS	Straight Male Stud Standpipe Reducer
FI-SN	Welding Nipple	FI-EW	Adjustable Male Stud Standpipe Elbow
FI-GA	Straight Female Stud Connector	FI-ET	Adjustable Standpipe Tee
-	-	FI-EL	Adjustable Stand Pipe Barrel Tee

Application/Limitation

Couplings are approved to be used only in the following systems:

a. Flammable fluids (flash point ≤ 60°C)
   - Cargo oil lines(4)
   - Crude oil washing lines(4)
   - Vent lines(3)

b. Inert gas
   - Water seal effluent lines
   - Scrubber effluent lines
   - Main lines (2), (4)
   - Distributions lines (4)

c. Flammable fluids (flash point > 60°C)
   - Cargo oil lines(4)
   - Fuel oil lines(2),(3)
   - Lubricating oil lines(2),(3)
   - Hydraulic oil(2),(3)
   - Thermal oil(2),(3)

d. Sanitary/drains/scuppers
   - Deck drains (internal) (5)
   - Sanitary drains
   - Scuppers and discharge (overboard)

e. Fresh water
   - Cooling water system (1)
   - Condensate return (1)
   - Non-essential system

f. Sounding/vent
   - Water tanks/Dry spaces
   - Oil tanks (f.p.> 60°C) (2), (3)

g. Miscellaneous
   - Starting/Control air (1)
   - Service air (non-essential)
   - Brine
   - CO_2 system (1)
   - Steam

1) Inside machinery spaces of category A - only approved fire resistant types. Couplings with O-ring sealing shall not be considered as fire resistant.
2) Not inside machinery spaces of category A or accommodation spaces. May be accepted in other machinery spaces provided the joints are located in easily visible and accessible positions.
3) Approved fire resistant types except in cases where such mechanical joints are installed 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. Couplings with O-ring sealing shall not be considered as fire resistant.
4) Only in pump rooms and open decks - only approved fire resistant types. Couplings with O-ring sealing shall not be considered as fire resistant.
5) Only above bulkhead deck of passenger ships and freeboard deck of cargo ships.

Maximum working pressures defined at 20°C:

Product line	Tube O.D. (mm)	Pressure (Bar)
LL	4 – 8	100
L	6 - 10 12 – 18 22 – 42	500 400 250
S	6 – 10 12 – 16 20 - 38	800 630 420

At elevated temperatures, the maximum pressures are to be reduced according to following:

Temperature	20°C	50°C	100°C	150°C	200°C	250°C	300°C	400°C	450°C
Unalloyed Carbon steels	1,00	1,00	1,00	0,89	0,81	0,72	0,65	0,59	0,54

Temperature range depending on sealing ring materials:

FPM (Viton)	-25 to 200°C
PTFE (Teflon)	-60 to 200°C
NBR	-30 to 120°C

Coupling series L and S may be used for gases having an oxygen content exceeding 21% at working pressure 250 bar and 360 bar respectively.

Couplings used for low temperature gas may only be used for accessory lines and instrumentation lines with external diameters of 25 mm and less. DNV Rules Pt.5, Ch.5, Sec.6, C509.

Threaded bulkhead couplings type FI-GS and FI-WS may not be used on watertight bulkheads.

Threaded joints for direct connectors of pipe lengths with tapered thread shall be allowed for:
- class I, outside diameter not more than 33.7 mm
- class II and class III, outside diameter not more than 60.3 mm.

Threaded joints with parallel thread shall be allowed for class I, outside diameter not more than 60.3 mm.

Couplings with non-metallic components are not to be used for fire safe applications.

The approval is only valid when the couplings are assembled with tubing of correct temper and tolerances as recommended by the manufacturer.

Ferritic steel for low temperature services shall fulfill impact test requirement stated in DNV Rules Pt.2 Ch.2 Sec.5 Table G2

These couplings are not to be used on tubes in cold fabricated (hard temper) conditions.

No product certificate will be required.

Type Approval documentation

- STAUFF Connect Tube Fitting Technology Product catalogue
- Test witnessed by DNV, 1995-03-02

Tests carried out

Leakage, Burst Pressure, Vacuum test, Pull-Out, Repeated assembly test, Vibration, Pressure Pulsation Test, Oxygen shock test
(Type tests done according to TAP 5-792.20)

Marking of product

For traceability to this type approval, each coupling is at least to be marked with:

- Manufacturer's trade mark
- Type designation
- Size

Periodical assessment

For retention of the Type Approval, a DNVGL Surveyor shall perform a survey - before the expiry date of this certificate - to verify that the conditions for the type approval are complied with. The Surveyor shall perform the following tasks on samples selected at random from stock or from the running production:

- Verify that the dimensions of the couplings comply with Type Approved documentation.
- Verify that the material composition complies with Type Approved documentation.
- Witness burst testing.