TYPE APPROVAL CERTIFICATE

Certificate No:
TAP000012R
Revision No:
2

This is to certify:

That the Pipe Couplings, Bite and Compression Type

with type designation(s)
STAUFF Connect - 24° Tube Fittings with Double Edge Cutting Ring - Metallic and Soft Sealing

Issued to
Walter Stauffenberg GmbH & Co. KG
Werdohl, 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 vessels classed by DNV GL.

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

Issued at **Hamburg** on **2020-11-05**

This Certificate is valid until **2024-05-13**.
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: 2020-11-05

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 STAUFF Connect - 24° Tube Fitting (Coupling) system includes pressure series L and S and is based on fitting body, union nut acc. to ISO 8434-1 / DIN 2353 and double edge cutting Ring made of carbon and stainless steel with metallic and soft sealing.
Extra-Light Series with single-edge cutting rings for application up to 100bar.

Corrosion protection of fitting bodies, nuts and cutting ring made of carbon steel by STAUFF Zinc/Nickel surface coating.

Reference "Catalogue 2 STAUFF Connect – English".

Scope of fitting types included in this type approval

Type designation	Type designation	Type STAUFF	Description
FI-DS	Double Edge Cutting Ring	FI-EGED-WD	Straight Male Stud Fitting with 24° Taper/ O-Ring
FI-WDDS	Soft-Sealing Cutting Ring	FI-SNV	Straight Fitting with 24° Taper/O-Ring
		FI-REDSD	Straight Reducer for Tube Ends with 24° Taper / O-Ring
FI-GE, FI-GE-WD	Straight Male Stud Fitting	FI-EWD	Adjustable Elbow (90°) with 24° Taper / O-Ring
FI-WE, FI-TE	Male Stud Elbow, Male Stud Branch Tee	FI-MA, FI-EMA, FI-EMAD	Gauge Fitting, Gauge Standpipe Fitting, Gauge Fitting with 24° Taper / O-Ring
FI-LE	Male Stud Barrel	FI-AS, FI-WAS	Straight Weld Fitting, Elbow Weld Fitting
FI-G	Straight Connector, Straight Reducer	FI-GA	Straight Female Stud Fitting
FI-M	Union Nut	FI-EGE, FI-REDS, FI-ET, FI-EW	Straight Male Stud Standpipe Fitting, Straight Standpipe Reducer, Adjustable Standpipe Elbow/Branch Tee
FI-W, FI-T	Equal Elbow, Equal Tee	FI-EL	Adjustable Standpipe Barrel Tee
FI-K	Equal Cross	FI-ETD, FI-ELD	Adjustable Branch/Barrel Tee with 24° Taper / O-Ring
FI-GS, FI-WS, FI-ES	Straight/Elbow Bulkhead Fitting, Straight Bulkhead Weld Fitting	FI-VSV, FI-VS, FI-VD, FI-VSK	Blanking Screw for Ports, Blanking Plug

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

Bulkhead and Deck pipe penetrations

Bulkhead fittings of types FI-GS, FI-WS are not approved through tank walls, watertight decks and bulkheads.
For application through fire divisions a separate type approval is required.

Straight Bulkhead weld fitting of type FI-ES is approved through tank walls, watertight decks and bulkheads.
Through fire divisions the fitting 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 fittings with limitations

Type designation	Description
FI-GE-…-R, - Rk -M, -Mk, -N, -U	Male stud fitting with Withworth tapered thread (BSPT), metric taper and NPT thread
FI-WE-….-R, -Rk, -M, Mk, - N	Male elbow fitting with tapered thread (BSPT), metric taper and NPT thread
FI-TE-…-R, -Rk, -M, Mk, - N	Male stud branch tee fitting with tapered thread (BSPT), metric taper and NPT thread
FI-LE-…-R, -Rk, -M, Mk, - N	Male stud barrel tee fitting with tapered thread (BSPT), metric taper and NPT thread
FI-GA-…-R, -M, - N	Female stud / gauge fittings with female BSPP, Female metric parallel thread, NPT thread
FI-EGE-…-R,-M, -N	Straight male stud standpipe fitting with NPT thread
FI-EGED-….-R, -M	Straight Male Stud Fitting

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

Materials

Component	Type designation	Material designation[1]
Double edge cutting ring	FI-DS (metallic sealing)	Carbon steel[2]
	FI-WDDS (with elastomeric sealing)	Carbon steel[2] Stainless steel FKM
Support sleeve	FI-VH	Brass
Fitting body	refer to overview	Carbon Steel[2] Stainless steel
Union nut	FI-M	
Profile sealing ring for Male Studs	WDG	FKM, NBR, PTFE
Sealing	O-Ring	FKM, NBR, PTFE

Notes
[1] Detailed material designation acc. to STAUFF Parts List V0200 (carbon steel), V0201 (stainless steel).
[2] Zinc/Nickel coating

For selection of the tubes the following references are to be observed:
- STAUFF "Catalogue 2 STAUFF Connect – Technical Appendix – Selection Criteria for Tube"
- DNV GL Ship Rules Pt.4, Ch.6:
  Section 9, Tables 3 and 4: Minimum Tube wall thickness.
  Section 2, Table 3: Material certificates

Application / Limitation
The STAUFF Connect – 24° Tube Fitting system is type approved for joining of tubes intended to be used in piping systems of pipe class I, II and III.
Reference DNV GL Ship Rules Pt. 4, Ch. 6, Sec. 9 -5.2 Pipe couplings other than flanges, para. 5.2.1 and Table 8 Examples of mechanical joints – Compression coupling – Bite type.

Approved scope of application according to Table 9 and 10 - Compression coupling – Fire resistant type.

Oxygen application
Double edge cutting ring FI-DS in combination with fittings with metallic seal of series L and S may be used for gases having an oxygen content exceeding 21% up to working pressure 250 bar and 360 bar respectively.

The STAUFF Connect – 24° Tube Fitting system is 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 and installation area of the piping system.

In particular, the resistance to corrosion, erosion, oxidation and other deterioration during projected service life is to be considered. Reference is made to DNVGL Rules Pt.4, Ch.6 – Section 2 – Materials.

Sea water application

The standard stainless-steel materials 1.4571, 1.4404, or 1.4401 are not approved for application in sea water systems or unprotected installation on the open deck.

Sizes and pressure range

The specified pressure values are applicable on straight fittings made of carbon and stainless steel. For other fitting types such as elbows or tees the PN may be less.

Reference "Catalogue 2 STAUFF Connect - Technical Appendix – Pressure and Temperature Ratings" are to be observed.

Tube O.D. mm	Nominal pressure PN[1]	
	Light Series	Heavy Series
6, 8, 10	500	800
12	400	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] Max working pressure of the piping system depend on the selected pipe material and wall thickness.

Temperature range

The temperature range of the STAUFF Connect – 24° Tube Fitting system is limited by the fitting and soft seal material.

Material	Temperature Range
Un-alloyed Carbon Steel	-20°C[1] to +250°C
Stainless Steel	-55°C to +400°C
FKM	-25°C to +200°C
NBR	-30°C to +100°C (short term +120°C)
PTFE	-60°C to +200°C

Notes
[1] Lowest Environmental temperature -40°C and lowest medium temperature -20°C, refer to DIN 3859-1

Service pressure reduction at elevated temperatures

Un-alloyed Carbon Steel

Temperature	-20°C to +120°C	+150°C	+175°C	+200°C	+250°C
Pressure Reduction	0%	-11%	-15%	-19%	-28%

Stainless steel

Temperature	-55°C to +20°C	+50°C	+100°C	+200°C	+300°C	+400°C
Pressure Reduction	0%	-4,5%	-11%	-20%	-29%	-33%

Temperature range examples

Fitting material	Soft sealing	Temperature range
Carbon steel	NBR	-20°C up to +100°C
	none	-20°C up to +250°C
Stainless steel	FKM	-25°C up to +200°C

Assembly Instructions

To ensure the performance of the mechanical joint connection, the assembly instructions of the manufacturer are to be observed.
Reference "Catalogue 2 STAUFF Connect", Section Assembly Instructions.
Regarding Stainless Steel Fittings it shall be noted that the thread of the 45° cone of the nut and the thread of the fitting body must be greased with special anti-seize grease for stainless steel fittings.

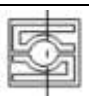
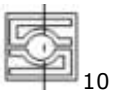
This type approval certificate is valid for tube connections using tube fittings manufactured by Walter Stauffenberg solely.

Type Approval documentation

Tests carried out

Tightness test, Repeated assembly test, Burst pressure test, Pull-out test,
Combined Vibration (endurance) test and Pressure impulse test, Fire resistance test, Oxygen shock test, Vacuum test.

Marking of product

Component	Scope	Example
Fitting body	Manufacturer short sign, Size	
Cutting ring FI-DS, FI-WDDS	Manufacturer short sign, Size,	 10
Soft seal	Colour	NBR: Black, FKM: Green, PTFE: White
Nut	Manufacturer short sign, Size, Series	

Periodical assessment

For retention of the Type Approval, a DNV GL Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNVGL-CP-0338, Sec.4.
To check the validity of this certificate, please look it up in https://approvalfinder.dnvgl.com

End of certificate