Certificate No:
TAP00002DU

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Pipe Couplings, Bite and Compression Type

with type designation(s)
STAUFF Form EVO Tube Forming System

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

is found to comply with
DNV 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.

Temperature range:	**Refer to certificate**
Max. working press.:	**up to 800bar**
Sizes:	**6mm up to 38mm**

Issued at **Hamburg** on **2021-09-27**

This Certificate is valid until **2026-09-26**.
DNV local station: **Essen**

Approval Engineer: **Hagen Markus**

for **DNV**
Digitally Signed By: Drews, Olaf
Location: DNV GL SE Hamburg, Germany
Signing Date: 2021-09-27

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 Form EVO Tube Forming System consists of four key components:

- 24° Tube Fitting Bodies and Union Nut acc. to ISO 8434-1, made of carbon steel and stainless steel
- Form EVO Sealing Ring
- Formed Tube End

Reference “Catalogue 2 STAUFF Connect – English”.

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

Scope of fitting types included in this type approval

Type designation	Description	Type designation	Description
FI-FD	Sealing 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 Tee	FI-AS, FI-WAS	Straight Weld Fitting, Elbow Weld Fitting
FI-G	Straight Union, 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-GS, FI-WS, FI-ES	Straight/Elbow Bulkhead Fitting, Straight Bulkhead Weld Fitting	FI-ETD, FI-ELD	Adjustable Branch/Barrel Tee with 24° Taper / O-Ring
FI-K	Equal Cross	FI-VSV, FI-VS, FI-VD, FI-VSK	Blanking Screw for Ports, Blanking Plug
FI-EGED-WD	Straight Male Stud Fitting with 24° Taper/ O-Ring	FI-SNV	Straight Fitting with 24° Taper/O-Ring

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

Bulkhead and Deck pipe penetrations

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

Weld Bulkhead Couplings FI-ES 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 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 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 tapered thread BSPT, Metric and NPT
FI-WE-…-R, -Rk, -M, Mk, - N	Male elbow fitting with tapered thread BSPT, Metric and NPT
FI-TE-…-R, -Rk, -M, Mk, - N	Male stud branch tee fitting with tapered thread BSPT, Metric and NPT
FI-LE-…-R, -Rk, -M, Mk, - N	Male stud barrel tee fitting with tapered thread BSPT, Metric and NPT
FI-GA-…-R, -M, - N	Female stud / gauge fittings with female BSPT, Female Metric parallel thread and 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	Material[1]
Sealing ring	FI-FD	FKM
Fitting body	refer to overview	Carbon Steel[2] Stainless steel
Union nut	FI-M	
Profile elastomeric sealing ring for Male Studs	WDG	NBR (Standard), PTFE, FKM, EPDM
Elastomeric O-Ring	O-Ring	

Notes
[1] Detailed material designation acc. to STAUFF Parts List V0323 (carbon steel), V0324 (stainless steel).
[2] Zinc/Nickel coating

Tubes

For selection of the tubes the following references are to be observed:

- STAUFF “Catalogue 2 STAUFF Connect – Technical Appendix – Tube Fitting Materials and Surface Finishing”

- DNV Ship Rules Pt.4 Ch.6 Piping Systems:
  Section 9, Table 3 and Table 4: Minimum Tube wall thickness.
  Section 2, Table 3: Material certificates

Application/Limitation

The STAUFF Form EVO Tube Forming 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.

The STAUFF Form EVO Tube Forming 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 below table is applicable to fittings made of carbon and stainless steel.
The specified pressure values are applicable on straight fittings. 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 Form EVO Tube Forming 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 specified in the “Catalogue 2 STAUFF Connect”, Section Assembly Instructions” are to be observed.

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.

For the forming of the tubes, the following tools are to be used:

- STAUFF Form EVO Tube Forming Machine Type SFO-F-A-A in connection with FI-FST tube shaper and FI-FB clamping jaws

- STAUFF Form EVO Oil (type SFO-FO-1L) for stainless steel tubes

This type approval certificate is valid for tube connections using tube fittings and forming machines 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, Vacuum test.

Marking of product

Component	Scope	Examples
Fitting body	Manufacturer short sign	
Nut	Manufacturer short sign, Size, Series	
Sealing Ring	Colour	Green
Soft seals		NBR: Black, FKM: Green, PTFE: White

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