

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Pipe Couplings

with type designation(s)
OPEN - FLEX

Issued to

Straub Werke AG Rohrverbindungen
Wangs SG, Switzerland

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 :

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

Temperature range: NBR: - 20 °C up to + 80 °C, EPDM: - 20 °C up to + 100 °C
Max. working press.: 6 bar
Sizes: Pipe outer diameter 219.1 mm up to 508 mm

This Certificate is valid until **2021-10-06**.

Issued at **Hamburg** on **2016-10-07**

for **DNV GL**

DNV GL local station: **Augsburg**

Approval Engineer: **Hagen Markus**

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.

Job Id: **262.1-021171-1**
Certificate No: **TAP00000JW**

Product description

Slip-on joint slip type coupling with NBR and EPDM gaskets.

Fire resistant type by application of additional fire sleeve of type Fire Fence (FF).

Materials

Pipe Coupling

Size	219.1 up to 406.4	232.9 up to 508
Type	3 LS	4 LV
Casing	W5 1.4404 / 1.4571 / 1.4162	W5 1.4162
Cylindrical screws	A4 - 80	A4 - 80
Bolts	1.4404 / 1.4435	1.4404 / 1.4435
Gasket material	NBR or EPDM	

Fire sleeve - Fire Fence

Type	According to specification
Fire Fence (FF)	7.1.2008

Overview

Sizes, Nominal pressure PN and Coupling types

Coupling types				
OPEN-FLEX 3 LS			OPEN-FLEX 3 LS Fire Fence	
Pipe O.D.	PN		Pipe O.D.	PN
219.1	6		219.1	5*
250	6		250	5*
267	6		267	5*
273	6		273	6
304	5		304	5
323.9	5		323.9	5
406.4	5		406.4	5
OPEN-FLEX 4 LV			OPEN-FLEX 4 LV Fire Fence	
Pipe O.D.	PN		Pipe O.D.	PN
232.9	6		232.9	6
355.6	6		355.6	6
406.4	6		406.4	6
457.2	6		457.2	6
508	6		508	6

Remarks:

* for services other than flammable fluids in this case PN 6 is approved

Application

The slip-on joint slip type coupling of type OPEN-FLEX are type approved for class II and III piping systems as listed in table below. In addition the limitations as specified on page 4 of this certificate and in the "Notes" column of the table below are to be observed.

Table - Approved applications

Piping systems	Notes
<i>Flammable fluids (flash point ≤ 60 °C)</i>	
Cargo oil lines	4)
Crude oil washing lines	4)
Vent lines	3)
<i>Inert gas</i>	
Water seal effluent lines	5)
Scrubber effluent lines	5)
Main lines	2), 4)
Distribution lines	4)
<i>Flammable fluids (flash point > 60 °C)</i>	
Cargo oil lines	4)
Fuel oil lines	2), 3)
Lubricating oil lines	2), 3)
Hydraulic oil lines	2), 3)
Thermal oil lines	2), 3)
<i>Sea water</i>	
Bilge lines	1)
Water filled fire extinguishing systems (e.g. sprinkler)	3)
Non water filled fire extinguishing systems (e.g. foam, drencher systems)	3)
Fire main (not permanently filled)	3)
Ballast systems	1)
Cooling water systems	1)
Tank cleaning services	5)
Non-essential systems	5)
<i>Fresh water</i>	
Cooling water systems	1)
Condensate return systems	1)
Non-essential piping systems	5)
<i>Sanitary/drains/scuppers</i>	
Deck drains (internal)	6)
Sanitary drains	5)
<i>Sounding/vent</i>	
Water tanks/dry spaces	5)
Oil tanks (flash point > 60 °C)	2), 3)
<i>Miscellaneous</i>	
Service air piping systems (non essential)	5)

Notes - Fire resistance

For applications where "fire resistance types" are required, the OPEN-FLEX coupling is to be provided with additional fire sleeve of type Fire Fence (FF).

- 1) Inside machinery spaces of category A - only approved fire resistant types.
- 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.
- 4) Only in pump rooms and open decks - only approved fire resistant types.
- 5) Non fire resistance types are approved.

Notes - General

- 6) Only above bulkhead deck of passenger ships and freeboard deck of cargo ships.

Limitations

Pipe couplings are not approved for:

- bilge lines inside ballast and fuel tanks.
- seawater and ballast lines including air and overflow pipes inside cargo holds and fuel tanks.
- fuel and oil lines including overflow pipes inside cargo holds and ballast tanks.
- scuppers and discharge (overboard), starting/control air and CO2 systems.
- piping sections directly connected to sea openings or tanks containing flammable liquids which in the event of damage could cause fire or flooding.
- systems containing oxygen (more than 25% by volume).

Slip-on joints inside tanks may be permitted only if the pipes and tanks contain a medium of the same nature.

Type Approval documentation

Drawings

Coupling assembly	Drawing	Issue
	5959	2015-08-27
	5625	2016-09-20
	3322	2016-09-21

Coupling casing	Drawing	Issue
	5754	2016-09-20
	5746	2016-09-20
	3323	2016-09-20

Fire sleeve Fire Fence (FF)	Drawing	Issue
	5002369	2016-09-17
	5002373	2016-09-20
	5002366	2016-09-20
	9000576	2016-09-21
	9000614	2016-09-20

Test reports

Pressure tests

- Z1 260721-e dated 2016-07-26

Fire resistance tests

- IHA test reports no.: 036 – 16, 051 – 16, 052 – 16

Miscellaneous documents

- Technical Manual, dated 2012/01

Tests carried out

Tightness test, Burst test, Vacuum test, Fire resistance test.

Marking of product

Pipe coupling / Fire sleeve

Each pipe coupling shall bear legible and durable marking on the body or on a plate fixed securely to the body. Scope of marking shall be at least as follows:

	Example
Manufacturer's mark	straub
Type	OPEN-FLEX4LV
Size in mm / inch	457.2 / 18.0
PN	6
Gasket material	NBR
Casing material	W5

Periodical assessment

For retention of the type approval certificate periodical assessments shall be carried out at production place.

The objective of the periodical assessment is to verify that the design and production conditions for the type approval have not been altered.

Main scope of the assessment:

- verification of the production and quality control system
- review of quality control documentation of recent deliveries
- review of drawings in production to verify any design changes which may have an impact on data specified in the type approval certificate, performance and range of application
- verification of the product marking