

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Expansion Joint for Pipe, Slide Type and Flexible Type**

with type designation(s)

NORMA FLEX GRIP / NORMA FLEX GRIP E / +GF+ FLEXGRIP / +GF+ FLEX GRIP E, and fireproof versions FP or RFP

Issued to

**NORMA Germany GmbH
Maintal-Dörnigheim, Germany**

is found to comply with

Det Norske Veritas' Standards for Certification 2.9 No. 5-792.20**Det Norske Veritas' Rules for Classification of Ships****Offshore Standard DNV-OS-D101, Marine and Machinery Systems and Equipment****Application :****May be used for metal pipes in piping systems as mentioned in the certificate.**

| | |
|-----------------------------|---------------------------------|
| Temperature range: | dep. sealing, see cert. |
| Max. working press.: | 16 bar |
| Sizes: | Ø26,9 - 168,3 mm pipe OD |

This Certificate is valid until **2018-06-30**.Issued at **Høvik** on **2015-04-30**for **DNV GL**DNV GL local station: **Essen**Approval Engineer: **Adel Samiei**

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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.

Certificate No: **P-15214**
 File No: **792.40**
 Job Id: **262.1-000442-6**

Product description

Slip-on joint FlexGrip / FlexGrip E (with Grip ring one side, and fire proof versions FP or RFP)

Materials:

| Material combination | W2 | | W4 | | W5 | |
|------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | DIN | AISI | DIN | AISI | DIN | AISI |
| Housing | 1.4301 | 304 | 1.4301 | 304 | 1.4571 | 316 Ti |
| Bolts | 1.7220 / 1.4404 | 4140H / 316L | 1.4404 | 316 L | 1.4404 | 316 L |
| Massive trunnion | 1.0737 | 12 L 14 | 1.4301 | 304 | 1.4401 | 316 |
| Hollow trunnion | - | - | 1.4571 | 316 Ti | 1.4571 | 316 Ti |
| Formed hollow trunnion | 1.0580 | 1024 | 1.4571 | 316 Ti | 1.4571 | 316 Ti |
| Grip ring | 1.4310 | 301 | 1.4310 | 301 | 1.4310 | 301 |
| Protection Ring | 1.4571 | 316 Ti | 1.4571 | 316 Ti | 1.4571 | 316 Ti |
| Band insert | 1.4571/ plastic | 316 Ti/ plastic | 1.4571/ plastic | 316 Ti/ plastic | 1.4571/ plastic | 316 Ti/ plastic |

Application/Limitation

The joints can be used in class II and III piping systems for the following pipelines according to IACS P2:

Slip-on joints allowed for systems marked + with limitations/remarks),
 not allowed marked ÷ (no).

| Systems | | | Systems | | |
|--|---------------------------|---------|--------------------------|------------------------------------|--------|
| Flammable fluids (Flash point ≤ 60 °C) | | | Fresh water | | |
| 1 | Cargo oil lines | + 5) | 21 | Cooling water system | + 1) |
| 2 | Crude oil washing lines | + 5) | 22 | Condensate return | + 1) |
| 3 | Vent lines | ÷(no) | 23 | Non-essential system | + |
| Inert gas | | | Sanitary/Drains/Scuppers | | |
| 4 | Water seal effluent lines | + | 24 | Deck drains (internal) | + 4) |
| 5 | Scrubber effluent lines | + | 25 | Sanitary drains | + |
| 6 | Main lines | + 2) 5) | 26 | Scuppers and discharge (overboard) | ÷ (no) |
| 7 | Distribution lines | + 5) | | | |
| Flammable fluids (Flash point > 60°C) | | | Sounding/ vent | | |
| 8 | Cargo oil lines | + 5) | 27 | Water tanks/Dry spaces | + |
| 9 | Fuel oil lines | ÷(no) | 28 | Oil tanks (flash point > 60°C) | ÷(no) |
| 10 | Lubrication oil lines | ÷(no) | | | |
| 11 | Hydraulic oil | ÷(no) | | | |
| 12 | Thermal oil | ÷(no) | | | |
| Sea Water | | | Miscellaneous | | |
| 13 | Bilge lines | + 1) | 29 | Starting/control air | ÷(no) |
| 14 | Fire main and water spray | ÷(no) | 30 | Service air (non-essential) | + |
| 15 | Foam systems | ÷(no) | 31 | Brine | + |
| 16 | Sprinkler system | ÷(no) | 32 | C02 system | ÷(no) |
| 17 | Ballast system | + 1) | 33 | Steam | ÷(no) |
| 18 | Cooling water system | + 1) | | | |
| 19 | Tank cleaning services | + | | | |

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| | | | | |
|----|----------------------|---|--|--|
| 20 | Non-essential system | + | | |
|----|----------------------|---|--|--|

Limitations/remarks:

- 1) Inside machinery spaces of category A - only approved fire resistant type FP or RFP, max. size 219,1 mm.
- 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 type FP or RFP only, max. size 219,1 mm.
- 4) Above free board deck only.
- 5) In pump rooms and open decks – only approved fire resistant type FP or RFP, max. size 219,1 mm.

Temperature range depending upon the sealing material:

| Sealing | Temperature |
|---------|---------------|
| EPDM | -30 to 125 °C |
| NBR | -20 to 80 °C |

The slip-on joints are not to be used in cargo holds, tanks, and other spaces which are not easily accessible.

EPDM is not to be used for hydrocarbon applications.

Each joint is to be hydraulic pressure tested to 1.5 times the working pressure.

The joints are to be installed with minimum applied stud torque as stated in the manufacturer's installation manual and be mounted according to the manufacturer's written instructions.

Type Approval documentation

- Manufacturer's catalogue no. 4.4 "Normaconnect® High Performance Pipe Couplings"
- NORMACONNECT Type Grip / Grip E Fitting Instruction dated IX/98
- Test reports on tests performed from 13th to 15th November 1996 witnessed by DNV.
- Test reports: 61/99, 54/99 65/99, 57/99 58/99, 60/99 dated February 17, 1999.
- Drawings received with letter dated 1999-03-23
- Fire test statement BWB Kiel, dated 2008-08-05.
- Test reports done for FlexGrip couplings refer to type approval certificates P-15212 & P-15213

Tests carried out

Burst test / Type FP and RFP fire tested according to IACS P2.11 (corr. 1 2007 and ISO 19921, First Edition 2005-10-01; Tests done on FlexGrip couplings.

Marking of product

For traceability with this type approval the couplings are at least to be marked with:

- Manufacturer's name or trade mark
- Type designation

Periodical assessment

For retention of the Type Approval, a DNV GL Surveyor shall perform a periodical assessment – every second year and before the expiry date of this certificate - to verify that the conditions for the type approval are complied with and to witness burst testing of samples of couplings selected at random from stock or from the running production.

END OF CERTIFICATE