



Certificate no.:
TAP00002YY

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Pipeline Repair Clamps

with type designation(s)
Pipeline Structural and Sealing Repair Clamps

issued to

IK-Norway AS
Stavanger, Norway

is found to comply with

DNV standard DNV-ST-F101 – Submarine pipeline systems
DNV recommended practice DNV-RP-F113 – Pipeline subsea repair

Application:

For use as pipeline repair clamp for carbon steel subsea pipelines, sweet service, with/without corrosion allowance. Is used to contain leakage for damaged/corroded sections of carbon steel subsea pipelines within the following main design envelope:

- Size range 4.5" to 14"
- Maximum water depth 2000 m
- Temperature range -18 °C - +121 °C.
- Carbon Steel Subsea Pipelines, material grade X65
- Water injection, MEG and hydrocarbons (Sweet Service) - subsea pipelines

Conditions and limitations are given below and in referenced documents.

Design to follow approved design documentation and test procedures given in the reference documents.

Issued at **Høvik** on **2025-01-16**

This Certificate is valid until **2030-01-15**.

for **DNV**

DNV local unit: **Oslo Pipeline Verification**

Approval Engineer: **Liam Farrell**

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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.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.

Product description

The IK Norway Pipeline Repair Clamp (Structural and Sealing) is a remotely installed subsea pipeline repair clamp for sweet service, X65 carbon steel pipelines, with/without corrosion allowance, further detailed in [1].

Application/Limitation

This Type Approval Certificate (TAC) testifies that the methodology of the presented design documentation meets the requirements given in the specified codes.

The IK Norway Pipeline Repair Clamp;

- is used for pipeline local repair of leakage and to provide structural reinforcement, up to 2000 m water depth, in temperature range -18°C – +121°C.
- 4.5", 6", 10" and 14" sizes used as basis for this TA are limited to max design pressures of 383 bar, 280 bar, 126 bar and 126 bar, respectively. For new clamps designed according to this TA, the maximum design pressure will be governed by the approved calculation methods and acceptance criteria.
- is designed to carry full pipeline end cap load.
- pipeline capacity to withstand clamp activation loads combined with pipeline design loads to be assessed considering pipeline condition at installation location with reduced WT based on corrosion allowance.
- max extrusion gap at max design temp limited to 0.2mm.

Further design limitations outlined in [3].

Design standards

The governing design standard for the repair connector is:

1. DNV-ST-F101 "Submarine Pipeline Systems" - providing general requirements related to design, fabrication, installation, commissioning and operation for the pipeline system
2. DNV-RP-F113 "Subsea Pipeline Repair", which is harmonized with the requirements given in DNV-ST-F101, covering local pipe wall utilization from clamp interference loads, functional requirements related to gripping capacity and sealing performance
3. DNV-SE-0284 "Type Approval Scheme – Oil and Gas, specifying the process, conditions and requirements for issuing the DNV Type Approval Certificate
4. EN 13445 "Unfired Pressure Vessels" Parts 1-5 – providing requirements to material selection, repair clamp structural capacity calculations and testing

Type Approval documentation

The DNV Type Approval certificate is based on the reference documents specified below:

#	DOC.NO / UID	REV	TITLE
[1]	22445-IK-Z-SA-0001	01	Design Specification – Diverless Pipeline Repair Clamps
[2]	22445-IK-Z-SA-0002	01	Strength Approach
[3]	10494984-001	01	DNV Design Verification report 4.5", 6", 10" and 14" Repair Clamps
[4]	22445-IK-Z-RA-0008	01	Material selection report
[5]	22445-IK-Z-KA-0001	01	PAG FAT procedure
[6]	22445-IK-Z-RA-0002	03	FAT Test Report
[8]	22445-IK-Z-RA-0001	01	4.5 in Diver less Repair Clamp Design Report
[9]	22445-IK-Z-RA-0004	01	6 in Diver less Repair Clamp Design Report
[10]	22445-IK-Z-RA-0005	01	10 in Diver less Repair Clamp Design Report
[11]	22445-IK-Z-RA-0006	01	14in Diver less Repair Clamp Design Report
[12]	22445-IK-R-XD-0001	Z1	PAG Offshore ROV Clamps 4,5in Clamp General Arrangement
[13]	22445-IK-R-XD-0002	Z1	PAG Offshore 6in clamp General Arrangement
[14]	22445-IK-R-XD-0003	Z1	PAG Offshore ROV Clamps 10in Clamp General Arrangement

#	DOC.NO / UID	REV	TITLE
[15]	22445-IK-R-XD-0004	Z1	PAG Offshore 14in clamp General Arrangement

Documentation

Documentation for each repair clamp size that shall be available at the manufacturer:

- Design premises;
- Description;
- Assembly drawing with parts list;
- Calculations;
- Machine drawings;
- Materials specifications;
- Pipeline exposure from the connector interference loads;
- Inspection and test plan;
- Test reports containing compliance with test procedures.

Conditions

1. The use of the repair clamps in riser- and topside applications are not covered by this Type Approval Certificate (TAC).
2. Each repair clamp shall be subjected to hydrostatic pressure test prior to operation (i.e., strength test). The test pressure shall be specified by the relevant design code, typically 1.5 times the pipeline incidental pressure.
3. Seal test pressure, as defined in the design manual, is to be applied via external ports to the cavity between the test- and the primary sealing elements. The back-seal test pressure shall be minimum 1.1 times the pipeline incidental pressure. Verification of the seal integrity shall be performed after installation either by annulus seal test or pipeline system test.
4. Extension of the repair clamps design envelope (e.g., temperature, size) can be done on a case-by-case basis. Upon successful completion of a case specific study or project, this TAC will be updated accordingly.
5. External loads to be evaluated on a project specific basis.

This Type Approval covers the design methodology only. Activities related to manufacturing/ fabrication are not covered by this certificate but can be covered by DNV product certification. A DNV Product Certificate can be based on this Type Approval, provided that DNV has been involved in the manufacturing activities as detailed in DNV-SE-0499 "Certification of Pipeline Components" with the requirements as specified in either DNV-ST-F101 "Submarine Pipeline Systems" or DNV-RP-0034 "Steel forgings for subsea applications - technical requirements".

Tests carried out

The functional performance of the structural repair clamps is documented through the qualification tests reported in [6].

The following tests were performed for DNV to issue a Type Approval certificate for the repair clamp range 4.5"- 14":

Type test program

- Hydrostatic strength test @ 1.5 x clamp design pressure (4.5", 6", 10", 14")
- Back seal test @ 1.1 x clamp design pressure (4.5", 6", 10", 14")
- Back seal test @ 1.1 x clamp design pressure combined with cyclic tensile load (4.5").

Marking of product

For traceability to this Type Approval, the final products are to be marked with:

- Manufacturer's name and trademark
- Type designation
- Serial/ Part No.
- Nominal internal and external pressure
- Maximum and minimum working temperature.

Periodical assessment

The scope of the Periodical Assessment is to verify that the conditions stipulated for the Type Approval is complied with and that no alterations are made to the product design or choice of materials.



Job ID: **262.1-043122-1**
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Periodical assessments (for Certificate Retention / Certificate Renewal) shall be performed according to DNV-SE-0284.

This certificate is only valid if required Periodical assessments are carried out with satisfactory results. To check the validity of this certificate, valid certificates are found at "DNV Approval Finder": <https://approvalfinder.dnv.com>.

Product Certificate

Each structural repair clamp shall be subject to DNV witness during manufacturing and FAT according to DNV-SE-0499, as well as check of the actual documentation corresponding to the type approved documentation as listed above. This forms the basis for the 'Product Certificate' issued by DNV, including marking of the product.

Revision Record

- First issue dated 2025.01.16

END OF CERTIFICATE