

TYPE APPROVAL CERTIFICATE

Certificate no.:
TAP00000JO
Revision No:
3

This is to certify:

that the **Flexible hoses of metallic material with permanently fitted couplings**

with type designation(s)
Model D12

issued to

OLEODINAMICA TOSCANA S.r.l.
Serravalle Pistoiese PT, Italy

is found to comply with

DNV rules for classification – Ships Pt.4 Ch.6 Piping systems
DNV-OS-D101 – Marine and machinery systems and equipment, Edition July 2021
DNV class programme DNV-CP-0184 – Type approval – Flexible hoses with permanently fitted couplings

Application:

Product(s) approved by this certificate is/are accepted for installation on vessels classed by DNV.

Temperature range: -20°C to +350°C
Max. working press.: 25 bar to 180 bar size dependent
Sizes: 3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2", 2", 2 1/2", 3", 4", 5" and 6"

Issued at **Høvik** on **2023-11-28**

for **DNV**

This Certificate is valid until **2025-12-31**.

DNV local unit: **Italy/Malta CMC**

Approval Engineer: **Sarah Miller**

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

Corrugated flexible metal hoses with 2 wire braids as reinforcement

Specification of the materials:

Hose: AISI316L/1.4436 according to EN10216-5 or EN10217-7
 AISI321/1.4541 according to EN10216-5 or EN10217-7

Two reinforcement braids: AISI316L/AISI304/1.4301 according to EN10216-5 or EN10217-7

Couplings: AISI304/1.4301 according to EN10222-5 or EN 10253-3
 AISI316/1.4404 according to EN10222-5 or EN 10253-3
 AISI321/1.4541 according to EN10222-5 or EN 10253-3
 ASTM B179-82 A413.1
 A105/A283/S355JR/S235JR

Manufacturing location: OLEODINAMICA TOSCANA SRL. Serravalle Pistoiese PT, Italy

Application/Limitation

This certificate is valid for the specific assembly of hose and coupling type as specified, assembled and delivered by the holder (named as manufacturer) of this certificate.

Hose assemblies covered by this certificate may be used in Lube oil, Cargo oil and Fuel oil, Compressed air and gas services, Steam and Condensate, Freon R22, Fresh water, Sanitary , fire fighting systems (with medium: Novec 1230, FM-200, Inergen, Halotron, CO2, NAF S 125) with the following working pressures:

| DN | Code | O.D. (mm) | Max. working pressure, bar |
|--------|--------|-----------|----------------------------|
| 3/8" | D12010 | 16 | 180 |
| 1/2" | D12012 | 22 | 180 |
| 3/4" | D12020 | 31 | 125 |
| 1" | D12025 | 37 | 100 |
| 1 1/4" | D12032 | 46 | 100 |
| 1 1/2" | D12040 | 54 | 80 |

| DN | Code | O.D. (mm) | Max. working pressure, bar |
|--------|--------|-----------|----------------------------|
| 2" | D12050 | 65 | 62 |
| 2 1/2" | D12065 | 85 | 50 |
| 3" | D12080 | 98 | 40 |
| 4" | D12100 | 124 | 30 |
| 5" | D12125 | 156 | 30 |
| 6" | D12150 | 179 | 25 |

Pressure reduction factors due to high temperatures:

| Maximum temperature | -20°C | 20°C | 50°C | 100°C | 150°C | 200°C | 250° | 300°C | 350°C |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Correction factor, (K) | 1,000 | 1,000 | 0,950 | 0,880 | 0,835 | 0,785 | 0,735 | 0,680 | 0,650 |

Flexible hoses are only to be used in short lengths where it is necessary due to vibrations or flexible mounting of the machinery. The hoses shall not replace/be used where fixed piping is possible/required.

The scope of approval does not cover double walled hoses used in gas fuel ship's propulsion systems where the secondary enclosure is required. In such cases, the hose arrangement is subject to case-by-case approval.

The hoses assemblies must only be fitted in places where they are always accessible for inspection.

Coupling made of aluminium may be used under the same restrictions as for plastic pipes (Reference is made to DNV ship rules Pt.4 Ch.6 Sec.2 [1.1.2] and Table 1). Hoses made of steel can be considered fire safe.

Hoses made of austenitic stainless steel are not approved to be used in seawater systems.

Means shall be provided to isolate flexible hoses used in systems for fuel oil, lubricating oil and compressed air.

The hoses are to be mounted according to the manufacturer's instructions, and the hoses are to be supplied with end couplings from the manufacturer.

Production testing

Each hose assembly shall be hydrostatically tested at a pressure of 1.5 times the maximum working pressure and shall be delivered with the pressure test report with reference to this type approval certificate.

Type Approval documentation

- Manufacturers brochure: "Project documentation" D12 Rev 1 and "Attachment of Project Documentation"
- Manufacturers impulse test reports nos 20110202-01/02/03 and 04 dated 2011-02-02
- Burst test report witnessed by DNV surveyor dated 2011-01-26
- Bend test report witnessed by DNV dated 2011-01-26
- Survey report number NCert A0304720 dated 2016-06-21
- Burst test report number 160301B1 dated 2016-04-01 witnessed by DNV surveyor
- Bend test report number 160301A dated 2016-04-01 witnessed by DNV surveyor
- Impulse test report numbers 2016-06-08-01/02/03/04/05/06/07/08 dated 2016-06-08
- Report number NCert A0304720 dated 2016-06-17
- Burst test report number 201112B1 dated 2020-12-11 witnessed by DNV surveyor
- Type approval assessment report signed by DNV Surveyor, dated 2020-12-11
- Burst test report number 230411B1 and 230411B2 dated 2023-04-11 witnessed by DNV

Tests carried out

Bend and fatigue test, burst test, impulse test

Marking of product

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

- hose manufacturer's name or trademark
- date of manufacture (month and year)
- designation type reference
- nominal diameter
- pressure rating
- temperature rating.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment after two years (+/- 90 days) and after 3.5 years (+/- 90 days) to verify that the conditions for the approval are complied with. Reference is made to DNV-CP-0338.