

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Plastic Piping System, Thermoplastic

with type designation(s)
Nicoll FLUXO® Pipes

Issued to

REDI S.p.A.
Zola Predosa, BO, Italy

is found to comply with

DNV class programme DNV-CP-0072 – Type approval – Thermoplastic piping systems
DNV rules for classification – Ships

Application :

Non-essential systems for hot and cold fresh and sea water up to 10 bar. Service temperature range 0°C to 80°C. For installation in accordance with DNV Rules and Manufacturer's recommendations. The piping system is tested to Low Flame Spread in accordance with ASTM D635. The piping system is not tested with respect to Fire Endurance characteristics.

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

Issued at **Hamburg** on **2023-07-05**

for **DNV**

This Certificate is valid until **2028-07-04**.

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

Approval Engineer: **Gisle Hersvik**

Thorsten Lohmann
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.

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

Nicoll FLUXO® Pipes: PE-Xb/Al/PE-X) in compliance with UNI EN ISO 21003-8.

The pipe consists of an inner and outer PE-Xb layer and a laser welded functional Aluminium 8006 layer, glued together with an adhesive.

Legends:

PE-Xb: PolyEthylene, crosslinked

Al: Aluminium

- Nominal Internal Pressure (PN): 10 bar
- Nominal External Pressure (EP): None

Dimensions: Ø16 to Ø75 as per Nicoll FLUXO® Product Specification.

	Nominal diameters (OD) and minimum wall thickness (t)							
OD [mm]	16	20	26	32	40	50	63	75
t [mm]	2,0	2,0	3,0	3,0	3,5	4,0	4,5	5,0

Fittings: Press fittings and Mechanical compression fittings as per Nicoll FLUXO® Product Specification.

Joining techniques:

Press fit, Mechanical compression fit

Manufactured by

REDI S.p.A., Loc. Ischia di Crociano, 57025 Piombino (LI), Italy

DNV local station: Genoa

Responsibility

The Company (stated on the front page of this Certificate) takes the responsibility that both design and production are in compliance with Rules, Standards and/or Regulations listed on page 1 of this certificate.

Application/Limitation

The plastic piping system is type approved for application in piping systems as listed in "Table 1 - Fire endurance requirements matrix" of DNV Rules Pt.4, Ch.6, Sec.2 where "0" is specified. Appropriate footnotes are to be observed.

The approval covers application such as hot and cold water systems chilled and brine water systems, cooling systems (air condition), black and grey water systems, water treatment, fresh and waste water, osmosis systems and evaporation, fresh water bunker lines, etc.

The piping system is not approved for:

- installation within tanks and vacuum applications, and
- installation open decks.

For installation in accordance with DNV Rules for Classification and Manufacturer's recommendations.

Maximum service pressure: see table below.

Service temperature range: 0°C to 80°C

Long-term permissible service pressure at lower and elevated temperatures ⁱ

Non-essential systems ⁱⁱ

Temperature	Pressure class	0°C up to +20°C	30°C	40°C	50°C	60°C	70°C	80°C
Maximum allowable working pressure (bar)	Class 2, 4, 5 (PN10)	10	10	10	10	10	10	10

Notes

- ⁱ Refer to Manufacturer's product catalogue:
- ⁱⁱ Reference: 'design standard' UNI EN ISO 21003-8, Safety Factor SF 1.5/50 years.
 Other reference standards: ISO 17456, ISO 15875-2, ISO 10508

Fire Endurance

The piping system is not tested with respect to Fire Endurance characteristics.

Low Flame Spread

The piping system is approved to Low Flame Spread in accordance with ASTM D635 (accepted as an alternative to IMO FTP Code, Annex 1, Part 5).

Smoke Generation & Toxicity

The piping system is not tested with respect to capability of producing excessive quantities of smoke and toxic products as defined in IMO FTP Code, Annex 1: Part 2.

Electrical conductivity

The piping system is non-conductive, not for installation in gas hazardous area, or used with non-conductive fluids.

Passenger vessels

For application on passenger vessels additional requirements specified in the Rules and Regulations of the appropriate flag State authority may have to be observed.

Bulkhead and deck penetration

General

In general, pipe penetrations through watertight bulkheads or decks as well as through fire divisions shall be Type Approved unless the pipe is welded into the bulkhead/deck.

When plastic pipes pass through watertight bulkheads or decks which are also a fire division and a fire may cause flooding of watertight compartments, the watertight integrity of the bulkhead or deck is to be maintained by a metallic shut-off valve fitted at the bulkhead or deck. The operation of this valve shall be provided from above the freeboard deck. Refer to DNV Rules Pt.4 Ch.6 Sec.3 – 1.4 Fittings on watertight bulkheads.

Pipes with no external pressure capacity

The **Nicoll FLUXO® Pipes** are not approved for penetrating watertight subdivisions, unless:

- a) a steel spool piece of 900 mm in length, preferable 450 mm on each side, with thickness according to DNV Rules Pt.4 Ch.6 Sec.9 [1.2.1] is arranged at the watertight penetration. A remote operated emergency shut off valve shall be arranged between the steel spool piece and the pipe on one side. This valve shall be of safe to close type, or else the control including hydraulic piping and electric cables shall be routed inboard of B/5, and preferably to center line, before being routed longitudinally.
 On the opposite side should the pipe be flanged or similar to the steel spool piece, or
- b) two manual valves, one on each side of the steel spool piece in a) are arranged, under the provision that these valves are easily accessible.
 Refer to DNV Rules Pt.4 Ch.6 Sec.2 – [1.7.6].

Passenger vessels – SOLAS Ch. II-1 – Reg. 13.2.3

On passenger vessels, where the watertight bulkhead is also a fire division, pipe penetration design shall comply to MSC.429(98). Section 'Regulation 13.2.3'.

Refer to DNV-CP-0165, Section 2 - 5 Watertightness and gas tightness - particular cases.

Type Approval documentation

1. Assessment Report from DNV Italy of 2023-03-31.
2. RINA Test Report No. 2022CS013229 (ASTM D635:18).
3. KIWA Report No. 190400758 of 2021-01-25.

4. KIWA Report No. LC 17269-2 "Long-term hydrostatic strength evaluation" of 2021-01-06 (including interim report).
5. KIWA Report No. LC 17269-1 "Long-term hydrostatic strength evaluation" of 2021-02-15.
6. Aliaxis Piombino reports, pressure tests 95°C, 2023-04-06 (75x5) and 2023-03-31 (16x2 / 32x3).
7. Nicoll's FLUXO Product Specification.
8. Nicoll's FLUXO Technical Data Sheet (IT-ENG-NUDO).
9. Metallic fittings made by Idrosanitaria Bonomi.
10. ISO 9001—certificate.
11. Application for Type Approval of 2022-07-10.

Tests carried out

Type Testing carried out in accordance with **Type Approval documentation**.

Marking of product

The pipes and fittings are to be marked. The marking shall at least include the following information:

- *Manufacturer's name:* **REDI S.p.A.** and/or
- *Trademark / type designation:* **Nicoll FLUXO**
- *Place of manufacture:*
- *Dimensions*
- *Pressure rating*
- *Temperature rating*

The marking is to be carried out in such a way that it is visible, legible and indelible. The marking of product is to enable traceability to the DNV Type Approval Certificate.

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.

Periodical assessments (for Certificate Retention / Certificate Renewal) shall be performed according to DNV-CP-0338.

This certificate is only valid if required Periodical assessments are carried out with satisfactory results. To check the validity of this certificate, please look it up in <https://approvalfinder.dnv.com>

END OF CERTIFICATE