

TYPE APPROVAL CERTIFICATE**This is to certify:****That the Rudder Bearing Bushing Material, Synthetic**with type designation(s)
NORDEN 788 MARINE

Issued to

NORDEN MARINE BEARINGS AS
Os, Norway

is found to comply with

DNV GL class programme DNVGL-CP-0081 – Type approval – Synthetic bearing bushing materials
DNV GL rules for classification – Ships**Application :****Maximum surface pressure 10 N/mm² for the synthetic rudder bearing bushing material against steel/metal, water/oil/grease lubricated or self-lubricated. The Type Approval is valid only when the installation/application of the product is according to the DNV GL Rules and the Manufacturer's specification.****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**This Certificate is valid until **2021-11-08**.Issued at **Høvik** on **2017-09-10**DNV GL local station: **Bergen**for **DNV GL**Approval Engineer: **Gisle Hersvik**

Martin Strande
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:
Certificate No: **TAS00000SR**
Revision No: **1**

Product description

NORDEN 788 MARINE; A fibre-reinforced thermosetting resin material with additional lubricant.

Place of Manufacture

Norden Marine Bearings AS, Industriveien 13, N-5210, Os, Norway

Application/Limitation

- Fields of Application:
- Rudder Neck Bearings
 - Rudder Pintle Bearings
 - Rudder Carriers
 - Fin stabilizers
- Lubricants;
- Water, grease, oil
 - Self-lubrication (dry running)
- Surface Pressure;
- 10.0 MPa, maximum (water- and self-lubricated)
- Installation;
- Press fit
 - Freeze fit
 - Adhesive bonded
- Dimensions;
- As per DNV GL Rules and Manufacturer's recommendations.
 - Min – max diameters (OD): 50 – 2500 mm
 - Min – max thicknesses (WT): 8 – 120 mm
 - Optimum wall thickness, Ref. Norden Marine Bearings' Engineering/Design Manual, Chapter 3.3.

The maximum surface pressure of 10 N/mm² will be subject to evaluation w.r.t. service experience etc. in connection with renewal of the certificate.

The Type Approval is valid only when the installation/application of the product is according to the specified DNV GL Rules and the Manufacturer's recommendations.

In accordance with DNV GL Rules for Ships, Pt.3 Ch.14, the bushing shall be effectively secured to the bearing.

Bushing fitted by means of shrink fitting alone is not considered effectively secured. Additional physical stoppers need to be arranged to prevent the bushing from accidentally rotating or shifting in vertical direction.

Any significant changes in design and/or quality of the material will render the approval invalid.


Type Approval documentation

Tests carried out

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

Marking of product

Product shall be marked with *manufacturer's name*; **Norden Marine Bearings AS, Os, Norway**, *type designation*; **NORDEN 788 MARINE**, *item number and dimensions*.



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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 GL 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 Assessment to be performed after 2.5 years (Certificate Retention) and at renewal after 5 years (Certificate Renewal).

The main elements of the Periodical Assessment are to:

- Ensure that **Type Approval documentation** is available.
- Review design, materials, production process, and performance with respect to possible changes, in order to ensure compliance with **Type Approval documentation** and/or referenced material specifications.
- Ensure traceability between manufacturer's product marking and DNV GL Type Approval Certificate.

END OF CERTIFICATE