



CERTIFICATE NUMBER
18-LD1729449-PDA

DATE
02 May 2018

ABS TECHNICAL OFFICE
London Engineering Department

CERTIFICATE OF
Design Assessment

This is to certify that a representative of this Bureau did, at the request of

NORDEN MARINE BEARINGS AS

assess design plans and data for the below listed product. This assessment is a representation by the Bureau as to the degree of compliance the design exhibits with applicable sections of the Rules. This assessment does not waive unit certification or classification procedures required by ABS Rules for products to be installed in ABS classed vessels or facilities. This certificate, by itself, does not reflect that the product is Type Approved. The scope and limitations of this assessment are detailed on the pages attached to this certificate.

Product: **Bearing, Rudder Pintle, Rudder Stock Bushing (Neck Bearing)**
Model: **NORDEN 788 MARINE**

This Product Design Assessment (PDA) Certificate 18-LD1729449-PDA, dated 02/May/2018 remains valid until 01/May/2023 or until the Rules or specifications used in the assessment are revised (whichever occurs first).

This PDA is intended for a product to be installed on an ABS classed vessel, MODU or facility which is in existence or under contract for construction on the date of the ABS Rules or specifications used to evaluate the Product.

Use of the Product on an ABS classed vessel, MODU or facility which is contracted after the validity date of the ABS Rules and specifications used to evaluate the Product, will require re-evaluation of the PDA.

Use of the Product for non ABS classed vessels, MODUs or facilities is to be to an agreement between the manufacturer and intended client.

AMERICAN BUREAU OF SHIPPING

Nikolaos (Nikos Vrellos) Vrellos
Engineer/Consultant

NOTE: This certificate evidences compliance with one or more of the Rules, Guides, standards or other criteria of ABS or a statutory, industrial or manufacturer's standards. It is issued solely for the use of ABS, its committees, its clients or other authorized entities. Any significant changes to the aforementioned product without approval from ABS will result in this certificate becoming null and void. This certificate is governed by the terms and conditions as contained in ABS Rules 1-1-A3/5.9 Terms and Conditions of the Request for Product Type Approval and Agreement (2010).

NORDEN MARINE BEARINGS AS

INDUSTRIVEIEN 13

OS

Norway N-5210

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Email: post@nordenmarinebearings.no

Web: www.nordenmarinebearings.no

Tier: 2 - PDA Issued

Product: Bearing, Rudder Pintle, Rudder Stock Bushing (Neck Bearing)

Model: NORDEN 788 MARINE

Intended Service:

Bearings for rudder, rudder stocks and rudder pintles and fin stabilizers.

Description:

A Fibre-reinforced thermosetting resin material with additional lubricant.

Rating:

1. Surface bearing pressure up to 10 N/mm² with a length to diameter ratio for the rudder stock:
 - Rudder bearing max. length/ diameter ratio of the bearing bush: 1.2 unless calculations are submitted.
 - Pintle bearings typically, L=D.
2. Bearing diameter size range: Minimum Internal Diameter 8 mm - Maximum Outer Diameter 2000 mm.
3. Bearing clearance: not to be taken less than 1.5 mm (0.06 in.) unless calculations are submitted.
4. Water/ oil/ grease lubricated or self-lubricated.

Service Restriction:

- Unit Certification is not required for this product. If the manufacturer or purchaser request an ABS Certificate for compliance with a specification or standard, the specification or standard, including inspection standards and tolerances, must be clearly defined.
- This Certificate applies to the bearing material. Approved drawings of the actual bearing arrangement/dimensions and attached equipment, as applicable by the rules, should be submitted for each application.
- Acceptance on facilities with Ice Class Notations will be carried out on a case to case basis.
- The wall thicknesses, machining allowance and installation procedures are to be in accordance with the Manufacturer's guidelines, "Eng. Manual Rudder Bearings", and in accordance with the ABS Rules.

Comments:

- The Manufacturer has provided a declaration about the control of, or the lack of Asbestos in this product..
- The wall thicknesses, machining allowance and installation procedures are to be in accordance with the Manufacturer's recommendations as per the latest edition of the 'Rudder Bearing Engineering Manual (DPM-02).
- Rudder bearing diameter size range: Minimum ID 8 mm - Maximum OD 2000 mm.

Notes/Drawing/Documentation:

Drawing No. Element Report C4238-2 RevA, Norden Maritime-Material Qualification Programme October 2016

Drawing No. Eng. Manual Rudder Bearings - RELEASED, Installation Manual

Drawing No. ISO 9001 & IACS Certs, QA and IACS Certificates

Drawing No. Impact solutions IMP02855-LR, Material Properties Tests, January 2018

Drawing No. Statement of type approval testing DNV GL, DNVGL Survey Report

Terms of Validity:

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STANDARDS

ABS Rules:

2018 Steel Vessel Rules 1-1-4/7.7, 1-1-A3, 1-1-A4, 3-2-14/13.1, 3-2-14/15.1.1, 3-2-14/15.1.2, 3-2-14/15.3, 3-2-14/ Table 6

2018 Offshore Support Vessels Rules 1-1-4/7.7, 1-1-A3, 1-1-A4, 3-2-14/13.1, 3-2-14/15.1.1, 3-2-14/15.1.2, 3-2-14/15.1.3, 3-2-14/ Table 6

2018 Steel Vessels Under 90 Meters in Length Rules 1-1-4/7.7, 1-1-A3, 1-1-A4, 3-2-11/13.3, 3-2-11/15.1.1, 3-2-11/15.1.2, 3-2-11/15.1.3, 3-2-11/ Table 6

2018 High-Speed Craft Rules 1-1-4/11.9, 1-1-A3, 1-1-A4, 3-2-8/13.3, 3-2-8/15.1.1, 3-2-8/15.1.2, 3-2-8/15.1.3, 3-2-8/ Table 6

2018 Yachts Rules 1-1-4/7.7, 1-1-A3, 1-1-A4, 4-1-1/3.3&3.5, 3-2-9/13.1, 3-2-9/13.3, 3-2-9/15.1.1, 3-2-9/15.1.2, 3-2-9/15.1.3, 3-2-9/ Table 6

National:

N/A

International:

N/A

Government:

N/A

EUMED:

N/A

OTHERS:

Manufacturer Guidelines