

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Rudder Bearing Bushing Material, Synthetic**with type designation(s)
THORDON SXL

Issued to

Thordon Bearings Inc.
Burlington ON, Canada

is found to comply with

Det Norske Veritas' Rules for Classification of Ships**Det Norske Veritas' Type Approval Programme 1-501.5, 2011, Synthetic Rudder Bearing Bushing Materials****Application :****Max. surface pressure 5.5 MPa for the synthetic bearing against steel, non-lubricated, max. 10 MPa water or oil lubricated. The Type Approval is valid only when the installation/application of the product is in accordance with DNV 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 **2017-12-31**.Issued at **Høvik** on **2015-07-29**DNV GL local station: **Montreal**Approval Engineer: **Gisle Hersvik**for **DNV GL**

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.



Job Id: **262.1-020137-1**
Certificate No: **TAS000002V**

The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

Product description

THORDON SXL: Elastomeric Rudder Bearing Bushing Material.

Manufactured by

Thordon Bearings Inc., 3225 Mainway, Burlington, Ontario L7M 1A6, Canada

DNV GL local office: Montreal

T-G DNALOP Sp. zo.o., Address: ul. Przemyslowa 11, 76-200 Redzikowo k., Slupsk, Poland

DNV GL local office: Gdansk

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

Maximum surface pressure:

- 10 N/mm² for the synthetic bearing against steel, water or oil lubricated.
- 5.5 N/mm² for the synthetic bearing against steel, non-lubricated (dry running).

Area of application will be evaluated during approval of classified objects if the surface pressure exceeds 5.5 N/mm².

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 Rules and the manufacturer's specification.

The thermal expansion coefficient is to be considered and compensated for.

Instruction for mounting of bushing with necessary pressfit to be supplied.

Single and multiple segment sleeve bush bearings (cylindrical form) are approved for upper, middle and lower rudderstock, pintle, carrier disk and steering gear.

Staves are approved for neck and pintle bearings, provided the lubrication and environmental conditions are kept stable.

Type Approval documentation

Tests carried out

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

Marking of product

Product shall be marked with *manufacturer's name, place of production and type designation*.

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.

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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 two (2) years (Certificate Retention) and at renewal after four (4) 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 the DNV GL Type Approval Certificate.

END OF CERTIFICATE