

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Propeller Shaft Bearing Material**

with type designation(s)

Orkot® TLM Marine,**Orkot® TXM Marine**

Issued to

**Trelleborg Sealing Solutions Rotherham
Rotherham, United Kingdom**

is found to comply with

DNV GL class programme DNVGL-CP-0081 – Type approval – Synthetic bearing bushing materials**DNV GL rules for classification – Ships****DNV GL rules for classification – High speed and light craft****Application :**

The bearing material is approved for use as water lubricated propeller shaft bearing material. The Type Approval is valid only when the installation/application of the product is according to the DNV GL Rules and the Manufacturer's recommendations. Length/breadth ratio of not less than 2:1 for the aft most bearing. Maximum nominal bearing pressure: 6 bar.

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

Issued at **Høvik** on **2017-04-25**for **DNV GL**This Certificate is valid until **2022-04-24**.DNV GL local station: **Manchester**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.



Product description

Orkot® TLM Marine & Orkot® TXM Marine: Synthetic stern tube bearing material for water-lubricated tailshafts.

- **Orkot® TLM Marine:** A fibre reinforced thermosetting resin composite material with molybdenum disulphide and PTFE as additional lubricants.
- **Orkot® TXM Marine:** A fibre reinforced thermosetting resin composite material with additional lubricant.

Place of manufacture

Trelleborg Sealing Solutions Rotherham, Dodds Close, Badmarsh Business Park, Rotherham, South Yorkshire, S60 1BX, United Kingdom

Application/Limitation

Fields of Application;	- Propeller shaft bearings
Lubricants;	- Water, grease - Dry, for limited periods
Surface Pressure;	- 0.6 MPa, maximum, for minimum length to diameter (L/D) ratio of 2:1 for the aft most bearing
Max. service temperature;	- 65°C
Installation;	- Press fit - Freeze fit - Adhesive bonded - Keyed interference
Dimensions;	- As per DNV GL Rules and Manufacturer's recommendations.

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. Reference is made to Trelleborg Sealing Solutions' "Orkot® Marine Bearings Engineering Manual", Edition December 2016.

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

Type Approval documentation

1. Previous Type Approval Certificate No. M-12107 and KBZ 1197 HH/KBZ 1198 HH.
2. Type Approval Assessment Report from DNV GL Manchester of 2016-12-05 and Type Approval Renewal Assessment Appendix – Trelleborg from DNV GL Manchester of 2016-12-05.
3. "Marine type approval documentation" for "Orkot TLM Marine" (V.2.0 – 13/03/2017).
4. "Marine type approval documentation" for "Orkot TXM Marine" (V.2.0 – 13/03/2017).
5. Trelleborg Sealing Solutions' "Orkot® Marine Bearings Engineering Manual", Edition December 2016.
6. Application for Type Approval of 2012-09-25.
7. Email from Trelleborg Sealing Solutions of 2012-09-20, incl. TXMM Friction and Wear Testing Report (40 MPa, Wet & Dry).
8. Survey Report from DNV Sheffield of 2012-09-20 and attachment dated 2012-09-19.
9. Orkot Limited "TLM Marine" Engineering Manual.
10. BMT Test Report JD 113.
11. Orkot "TLM Marine" Bearings, Brochure (b-orkot-timm-aug02).
12. Orkot "TXM Marine" Bearings, Brochure.

Job Id: **262.1-013899-2**
Certificate No: **TAM00000GD**

Tests carried out

Type Testing carried out according to **Type Approval documentation**.

Marking of product

Product/package shall be marked with *manufacturer's name*; **Trelleborg Sealing Solutions Rotherham, UK** or trademark and *type designation or type number identification*.

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 and 3.5 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