



CERTIFICATE NUMBER 21-2198637-PDA
EFFECTIVE DATE 14-Dec-2021
EXPIRATION DATE 13-Dec-2026
ABS TECHNICAL OFFICE Singapore Engineering Services

CERTIFICATE OF Product Design Assessment

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

Trelleborg Sealing Solutions Rotherham

located at

Bradmarsh Business Park, Rotherham, United Kingdom S60 1BX

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 and Rudder Carrier Bearings, Water Lubricated Stern Tube Bearings

Model TLMM

This Product Design Assessment (PDA) Certificate remains valid until 13-Dec-2026 or until the Rules and/or Standards used in the assessment are revised or until there is a design modification warranting design reassessment (whichever occurs first).

Acceptance of product is limited to the "Intended Service" details prescribed in the certificate and as per applicable Rules and Standards.

This Certificate is valid for installation of the listed product on ABS units which exist or are under contract for construction on or previous to the effective date of the ABS Rules and standards applied at the time of PDA issuance. Use of the Product for non-ABS units is subject to agreement between the manufacturer and intended client.

American Bureau of Shipping

Vibin Chandrabose, Senior Engineer

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 ABS Rules 1-1-A3/5.9 Terms and Conditions of the Request for Product Type Approval and Agreement

Product	Bearing, Rudder and Rudder Carrier Bearings, Water Lubricated Stern Tube Bearings
Model	TLMM
Intended Service	<p>Dry or water / grease lubricated rudder stock bearings</p> <p>Dry or grease lubricated rudder carriers, bushes and discs</p> <p>Water rudder pintle bushes</p> <p>Water / grease lubricated stabiliser fin bearings</p> <p>Water lubricated stern tube bearings</p> <p>No axial grooves are required with lubricated rudder bearings.</p>
Description	Marine bearing material.
Ratings	<p>Shaft diameter size range: 50 – 2500 mm</p> <p>Bearing length: 250 – 1250 mm</p> <p>For all applications: Static bearing pressure up to 10 MPa</p>
Service Restrictions	<p>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.</p> <p>Acceptance on facilities with Ice Class Notations will be carried out on a case to case basis.</p>
Comments	<p>The Manufacturer has provided a declaration about the control of, or the lack of Asbestos in this product.</p> <p>Bearings are to be installed in accordance with the manufacturer's recommendations and following points.</p> <p>For rudder bearings: The bearing length is to be not greater than 1.2 times the bearing outer diameter. For length/diameter ratios greater than 1.2 will be specially considered upon submission of calculations showing acceptable clearances at both ends of the bearing.</p> <p>In general, clearances are to be not less than 1.5 mm on diameter. Request of clearances less than 1.5 mm will be specially considered with the submission of documented evidence, such as manufacturer's recommendation on acceptable clearance, expansion allowance and satisfactory service history with reduced clearances.</p> <p>The bearing length of the rudder pintle is to be not less than 1.0 times the bearing outer diameter.</p> <p>For aft (the next to and supporting the propeller) stern tube bearings: Minimum bearing length to diameter ratio of 2:1 for propeller shaft bearing applications.</p>

Notes, Drawing and Documentation	<p>Drawing No. Orkot Marine Bearings Engineering manual (TLMM), Engineering manual, Revision: -, Pages: 28;</p> <p>Drawing No. Orkot TLMM Datasheet, TLMM Physical, Mechanical and Thermal Properties, Revision: 4, Pages: 1;</p> <p>Drawing No. Orkot TLMM Friction and Wear Testing (Wet and Dry), Trelleborg Test Report dated September 2010 , Revision: 1, Pages: 10;</p> <p>Drawing No. TSS-0014536 (TLMM), TSS-0014536 Issue A, Revision: A, Pages: 1;</p>
ABS Rules	<p>ABS Rules for Conditions of Classification (2021) 1-1-4/7.7, 1-1-A3 and 1-1-A4, which covers the following :</p> <p>Rules for Building and Classing Marine Vessels (2021) : 3-2-14/13.1, 3-2-14/15.1, 3-2-14/15.3 and 4-3-2/5.15.1</p> <p>Guide for Building and Classing Yachts (2021) : 4-1-1/3.3, 3-2-9/13.1, 3-2-9/15.1, 3-2-9/15.3 and 4-3-1/13.1.2</p> <p>Rules for Building and Classing Steel Vessels for Service on Rivers and Intracoastal Waterways (2021): 4-2-1/11.1</p> <p>ABS Rules for Conditions of Classification – High Speed Craft (2021) 1-1-4/11.9, 1-1-A2 and A3, which covers the following:</p> <p>Rules for Building and Classing High Speed Craft (2021) : 3-2-8/13.1, 3-2-8/15.1, 3-2-8/15.3 and 4-3-1/13.1.2</p>
National Standard	NA
International Standard	NA
Government Standard	NA
EUMED Standard	NA
Others Standard	NA