

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Stern Tube Bearing Material**

with type designation(s)

Wärtsilä Envirosafe - WCS-N-M, WCS-P-M and WCS-F-M

Issued to

Wartsila UK Ltd.**Havant, Hampshire, 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 **2019-02-22**This Certificate is valid until **2024-02-21**.DNV GL local station: **Southampton**for **DNV GL**Approval Engineer: **Gisle Hersvik**

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Rikard Törnqvist
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

Wärtsilä EnviroSAFE, water lubricated composite (reinforced resin) bearings;
WCS-N-M (un-split),
WCS-P-M (partially split), and
WCS-F-M (fully split housing)

Place of manufacture

Wärtsilä UK Ltd., 810 Oxford Avenue, Slough Trading Estate, Berkshire, SL1 4LN, United Kingdom

DNV GL local station: Southampton

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

Fields of Application:	- Stern Tube/Propeller Shaft Bearings - Propeller Shaft Bracket Bearings
Lubricants;	- Water
Surface Pressure;	- 0.6 MPa, maximum, for minimum length to diameter (L/D) ratio of 2:1 for the bearing next to propeller. For all the other positions, L/D ratio as per Manufacturer's recommendations.
Max. service temperature;	- +150°C for WCS material
Installation;	- Press fit - Interference freeze fit - Adhesive bonded (with adhesive type: Araldite 2014, Belzona 1321)
Dimensions;	- As per DNV GL Rules and Manufacturer's recommendations - Min – max diameters (OD): 70 – 1100 mm - Min – max thicknesses (WT): $[(0.03 \times D_s) + 4]$ – 80 mm - Optimum wall thickness: $[(0.045 \times D_s) + 10]$ mm, ref. EnviroSAFE – WCS01, Design & Procedures Manual, DPM-01, Issue 6 – 14/09/2016.

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 EnviroSAFE – WCS01, Design & Procedures Manual, DPM-01, Issue 6 – 14/09/2016.

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

Type Approval documentation

Tests carried out

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

Marking of product

The product to be marked with *manufacturer's name or trademark* and *type number identification*.

Job Id: **262.1-009736-5**
Certificate No: **TAM000011V**

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 the DNV GL Type Approval Certificate.

END OF CERTIFICATE