

Thordon Bearings

Recommendations to fulfil new LR rules for SCM for water lubricated bearings

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Lloyd's Register Rulefinder 2013 – Version 9.19

Rulefinder Version 9.19 (January 2013) - Lloyd's Register Rules and Regulations - Rules and Regulations for the Classification of Ships, July 2012, incorporating Notice No. 1, 2, 3, 4 & 5 - Regulations - Periodical Survey Regulations - Screwshafts, tube shafts and propellers

Section 17 Screwshafts, tube shafts and propellers

17.3 Screwshaft Condition Monitoring (SCM)

17.3.3. Water lubricated bearings:

(a). A means of monitoring and recording variations in the flow rate of lubricating water using two independent sensors is to be provided.

Thordon recommendation: Two flow sensors required. Thordon Water Quality Package (WQP) currently has one flow sensor activating a low flow alarm. A second sensor will need to be installed downstream from the WQP in close proximity to the stern tube. Like the WQP flow sensor, the second flow sensor must be connected to the ships automated control system. It is envisaged that alarms will suffice.

(b). A means of monitoring and recording variation in the shaft power transmission is to be provided.

Thordon recommendation: Assumed this is already covered by engine monitoring system.

(c). A maximum permitted wear of the sternbush is to be established and approved wear monitoring equipment is to be fitted. The wear allowance is to include both the absolute maximum allowable wear and the wear at which it is recommended to carry out an inspection and maintenance. An alignment analysis considering both the newly installed clearance and the proposed absolute maximum allowable wear, demonstrating that the system will operate satisfactorily within these two limits, is to be submitted and approved.

Thordon recommendation: Continue using the maximum clearances as indicated in Thordon Marine Bearing Installation Manual v2008.1. For wear monitoring, recommend annual or bi-annual poker gauge measurements and/or bearing clearances to be recorded. Poker gauge points should be robust and dependable. Where a recommended 'inspect & maintain' point is required – suggest when is worn to 75% of the clearance above. Alignment analyses for new and worn bearings would be responsibility of shaftline designer/supplier.

(d). For open loop systems the manufacturer is to submit information regarding the required standard of lubricating water filtration and lubricating water filters or separators are to be fitted which are able to achieve this requirement:

- The lubricating water supply is to be fitted with continuous water sediment measuring or turbidity monitoring equipment. The results are to be recorded and retained on board and made available to LR on request, alternatively, there is to be a LR approved extractive sampling and testing procedure with the records held on board and made available to LR on request.

Records of cleaning and replacement of lubrication filters/separators are to be maintained on board. The pumping and water filtration system is to be considered part of the continuous survey cycle and is to be subject to a Periodical Survey.

Thordon recommendation: The Thordon Water Quality Package conditions the seawater by removing suspended solids larger than 100 microns (0.004") and with a specific gravity of 1.2 or higher; separation to 80 microns (0.003") is achievable using the 75-150 l/min (20-40 GPM) unit. Per continuous measurement & monitoring of turbidity, Thordon will investigate possible sources and economics of such equipment. For the "alternative option", Thordon has developed a water sampling regime and on-board filtration of that sample with photo record of filter paper. A sampling point will be required before water entry to sterntube (or other).

Note: the water supply equipment becomes subject to periodical inspection/survey per the vessel Continuous Survey Cycle.

(e). Where a closed cycle water system is used, the pumping and water filtration systems are to be considered part of the continuous survey cycle and are to be subject to a Periodical Survey. Water analysis is to be carried out regularly at intervals not exceeding six months. Samples are to be taken under service conditions and are to be representative of the water circulating within the sterntube. Analysis results are to be retained on board and made available to LR on request. The analysis is to include the following parameters:

- (i). Chloride content
- (ii). Bearing material and metal particles content.

Thordon recommendation: Thordon is currently investigating a test method to quantitatively determine the required analysis including bearing particles in water samples.

(f). The shaft is to either be constructed of corrosion resistant material or protected with a corrosion resistant protective liner or coating approved by LR. Where a protective liner or coating is used, this is to meet the requirements of Pt 5, Ch, 6,3.9 and a means of assessing the condition of this liner is to be submitted and approved.

Thordon recommendation: Thordon recommends corrosion resistant liners (i.e. bronze, Inconel®) Liners & ThorShield shaft coating. Currently, visual inspection (stern tube inspection hatch, borescoping) used for assessing condition of liner and ThorShield.

(g). Glands are to be capable of being replaced without withdrawal of the screwshaft.

Thordon recommendation: Existing shaft seals on the market can meet this requirement

(h). There is to be a shaft starting/clutch engagement block to inhibit starting the shaft until lubricating water flow has been established. This is to only act as a starting block; for lubricating water flow alarm see Table 3.17.1.

Thordon recommendation: Low flow indication is provided per para. (a) recommendation. This signal could be integrated into the ships automated control system as a start-inhibit interlock.

(j). Alternative arrangements are subject to special consideration.

17.3.5. Where the requirements for the descriptive note SCM have been complied with, the screwshaft need not be withdrawn at surveys as required by 17.2.1, provided all condition monitoring data are found to be within permissible limits and all exposed areas of the shaft are examined by a magnetic particle crack detection method or an alternative approved means for shafts with a protective liner or coating (17.3.3(f)). The remaining requirements of 17.2.1 are to be complied with. Where the Attending Surveyor considers that the data presented is not sufficient to determine the condition of the shaft, the shaft may be required to be withdrawn in accordance with 17.2.1. **For water lubricated bearings, the screwshaft is to be withdrawn for examination, as 17.2.1, when the ship reaches 18 years from the date of build or the third Special Survey, whichever comes first.**