Thordon Recommendations to Fulfil New ABS Rules for TCM-W for Water Lubricated Bearings

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ABS RULES FOR BUILDING AND CLASSING MARINE VESSELS • 2020

Part	**4**	**Vessel Systems and Machinery**
Chapter	**3**	**Propulsion and Maneuvering Machinery**
Section	**2**	**Propulsion Shafting**

15.1 Notation

Where requested by the Owner, the class notation TCM-W (Tailshaft Condition Monitoring - Water Lubricated) may be assigned to a vessel with tailshafts specifically arranged with closed or opened type waterlubricated stern tube bearings, provided the following requirements are complied with.

Exposed open water-lubricated bearings installed in an I or V shaped shaft struts without forced lubricating systems are not within the scope of this notation.

15.3 System Requirements

15.3.1 General

15.3.1(a) Bearing Material

The bearing material is to be approved by ABS.

Thordon bearing materials are approved by ABS.

15.3.1(b) Corrosion Protection

Approved corrosion-resistant material or a corrosion protection coating are to be used for propeller shaft, stern tube and all seal components (exposed to seawater) of the shaft including other metal structures exposed to the lubricant.

Use Thordon ThorShield coating system.

15.3.1(c) Pumping and Piping

The requirements listed in 4-3-2/15.3 for pumping and piping systems associated with the water lubricated system are in addition to those listed in Part 4, Chapter 6 of these Rules.

i. Pumps

- A minimum of two pumps, with an auto change over system, is to be provided for each propeller shaft.
- In case of multi-propeller shafts, at least one pump for each shaft is to be provided and one additional stand-by pump for the combined arrangement.
- Each pump is to be able to operate the system independently.
- Pumps should be able to operate from both local and main control stations.

Use Thordon Water Quality Package. Number as required above.

ii. Lubricant Piping

- Independent lubricating piping systems are to be provided for each propeller shaft so as to maintain continuous operation of the vessel.
- Interconnection of lubricating piping systems will be acceptable where multi- propeller shafts are used, provided appropriate isolation valves are fitted at both sides of the piping system.
- Non-metallic piping is allowed in this essential system provided it meets the requirements of category A and other machinery space. See 4-6-3/21 TABLE 1.
- In addition to above, an emergency supply of lubricating water is to be provided in case of failure of the primary lubricating system.

Use a cross-connection from another seawater source – *example fire-main.*

iii. Lubricant Tank (if applicable)

Section Not Applicable.

iv. Water Filtration System

- The normal operational condition is to be displayed and any failures are to be alarmed as indicated in 4-3-2/15.3.1(d) TABLE 5.
- Two independent water filtration systems are to be provided to maintain continuous operation of the vessel.
- An auto change-over system is to be provided in case of failure.

Use 2off single Thordon Water Quality Packages. *NOTE auto change-over controlled by vessel computer system.*

15.3.1(d) Control and Instrument

Instruments for monitoring the water lubricating stern tube system are to be provided, as indicated in 4-3-2/15.3.1(d) TABLE 5. All alarms are to be audible and visual and are to be of the self-monitoring type so that a circuit failure will cause an alarm condition.

There are to be provisions for testing alarms.

TABLE 5 : Instrumentation and Alarm

MONITORED PARAMETER	THORDON COMMENTS	ALARM CONDITION	DISPLAY	LOCAL	MAIN CONTROL STATION(2)	NAVIGATION BRIDGE(1,4)
Flow	Low-flow alarm from WQP	Low/High	X	X	X	X
Pressure	Pressure sensor mounted in pipework	Low/High	X	X	X	X
Diff. Pressure (Filter)	Not Applicable	High	X	X	X	X
Bearing Temperature	PT1OO(s) mounted in bearing	High	X	X	X	X
Wear Down(3)	If BCM system installed	High	X	X	X	X
Water Filtration System	Alarm signal from WQP	Failure	X	X	X	X
Pump	Alarm signal from WQP	Failure	X	X	X	X
Power Circuit	Alarm signal from WQP	Failure	X	X	X	X

Most alarms provided by Thordon Water Quality Package, PT1OO sensor(s) in bearing, and BCM if fitted.
NOTE Pressure sensor is additional – not from Thordon Bearings Inc.

15.3.1(e) Lubricant Sampling and Testing

Sampling and testing procedures are to be available on board as follows:

- A sampling point is to be provided after the water filtration system for periodical testing.
- Suitable test kits are to be provided onboard.
- Testing is to be conducted as per manufacturer's recommendations.
- For closed loop systems, an additional sampling system is to be provided in the return lubricant line, after bearing lubrication.

Thordon Bearings Inc. has sampling procedure developed.
Thordon Bearings Inc. offers sampling kits for sale.

15.3.1(f) Shaft Alignment Calculations

- The calculations, alignment procedures, and stern tube inclination details for these shafting arrangements are to comply with 4-3-2/7.3.
- Additionally, the shaft alignment calculations are to be analyzed for both initial conditions and conditions of manufacturer's maximum allowable wear down limits.
- All calculations and data are to be submitted to and reviewed by ABS.

Submitted by shipyard/designer at Plan-Approval Stage.

15.3.1(g) Wear Down

- A manual gauge (i.e., poker gauge) is to be provided for measuring the bearing wear down.

Thordon Bearings Inc. sells poker gauges

- The bearing wear down monitoring system may be provided in addition to the manual system to monitor wear down from ship control system.

Thordon Bearings Inc. sells Bearing Condition Monitoring Systems

- The maximum permitted wear down is to be indicated by the manufacturer.
  See 7-5- 2/1.1 and 7-5-2/1.3 of the ABS Rules for Survey After Construction (Part 7)

Refer to Thordon's Marine Bearing Installation Manual v2008.1

- The measurement history is to be recorded and documented on board.

15.3.2 Closed Loop System

Section Not Applicable

15.3.3 Opened Loop System

15.3.3(a) Lubricant Source

Primarily, sea water is to be taken from the sea water main/ sea chest. Other sources may be used in case of emergency and where appropriate quality of lubricant is not available when vessel is operating in unclean water.

Self explanatory

15.3.3(b) Shaft Turning System

Propeller shafts are to be equipped with a turning system, providing for rotation.

Turning gear fitted to vessel machinery.

15.5 Management of the Monitored Data

The following management of the monitored data is to be implemented.

15.5.1 Lubricant Sampling (Closed Loop System)

Section Not Applicable

15.5.2 Wear Down Measurement

Wear down is to be continuously monitored or measured using manual device at least twice in five years (not to exceed 36 month intervals) and recorded. Records are to be made available to the attending Surveyor.

Poker gauge or feeler gauge measurements.

15.5.3 Bearings Operating Condition

Stern tube bearing temperatures are to be continuously monitored and recorded. Where bearing material properties or bearing arrangements do not require temperature monitoring, consideration may be given by ABS on a case-by-case basis.

PT100 temperature sensor(s) can be mounted in bearing.

15.5.4 Lubricant Operating Condition

Lubricant flow is to be continuously monitored and recorded.

Flowmeter with low-flow alarm incorporated in Thordon Water Quality Package.
Alarm monitored by vessel computer system.

15.5.5 Recording and Analysis

The chief engineer is responsible for recording and maintaining a file of the shipboard-performed lubricant sampling and analysis results, as well as stern tube bearings operating condition. The results of the laboratory analysis are to be stored within the file onboard. All documentation is to be made available to the Surveyor to allow for trend assessment of the measured parameters.

Self Explanatory