Technical and Regulatory News  No. 01/2016 – Technical

Avoid Withdrawal of Tail Shafts for Surveys of Water Lubricated Systems

Relevant for existing vessels and newbuildings as well as for design offices, shipyards, suppliers, owners/managers and flag states.

January 2016

DNV GL has published new rules for voluntary class notations governing the design and follow-up monitoring of water-lubricated stern tubes which waives the requirement to withdraw and inspect the tail shaft and bearing every five years. A condition monitoring system which predominantly uses a sensor that measures stern tube bearing wear each time the propeller shaft stops turning allows the crew to monitor the condition of the bearings.

The class notations for water lubricated tail shafts - TMON (closed loop water) and TMON (open loop water) - now allow unlimited intervals between tail shaft withdrawal surveys based on condition monitoring of the tail shaft, bearings and lubricant system.

The new class notations are available for both existing vessels and new builds.

As long as DNV GL requirements are complied with in the design and operational phase, the tail shaft withdrawal survey will not have a pre-determined interval.

The condition-monitoring-based survey process (no withdrawal of shaft) also enables operators to consider water lubricated systems as a compatible alternative to meet increasing industry focus on environmentally friendly systems (eg, the US Environmental Protection Agency’s Vessel General Permit [VGP] requirements).

Technical considerations

Main design criteria for the new rules (more details in the rules; see below)

Corrosion

- Approved corrosion protection of the shafting and system
- Passivating properties of the lubricant system for closed loop systems have been defined
- A salinometer for closed loop systems as a warning against sea water contamination
- Alternative means of inspection for some open loop system designs (low-grade stainless steel and liner/coating combinations)

Bearing-shaft interaction

- Remote sensors for trending the wear down of the aft tail shaft bearing
- Approval requirements for bearings, shaft coatings and wear-down sensors
- Stringent lubricant quality, flow and monitoring requirements in all the shaft’s operating conditions (including stopped mode)
- A stringent focus on shaft alignment irrespective of shaft size

Non-toxic nature of closed loop system lubricants

- Tested in accordance with selected ISO standards, when exposed to aquatic organisms
Pre-defined acceptance criteria

- For follow-up in service

System integrity

- In-place replacement provisions for shaft sealing elements for the respective systems (closed or open)

Predominant follow-up criteria in operation

The factors below represent the main considerations for follow-up in operation:

- Periodic trending of the aft tail shaft bearing wear-down measurements
- Periodical testing and analysis of the lubricant system quality and trending of corrosion/wear elements (for closed loop systems)
- Annual DNV GL surveys for the class notations
- Alternative means of inspection during scheduled bottom surveys in dry dock (for low-grade stainless steel shafts [pitting resistance equivalent number (PREN) of less than 34] and shafts protected by a coating and/or multi-liner combination)

Recommendation

We recommend that operators consider the condition-based notations for water lubricated tail shafts. It would also be worthwhile considering this notation at your next dry-docking.

Besides the unlimited tail shaft withdrawal survey intervals, shipowners can also benefit from optimum component and system condition, early identification of deterioration within safety margins as well as environmentally friendly systems.

References

Design and periodical follow-up rules related to the class notations are included in Pt.6 Ch.9 Sec 5 and Pt.7 Ch.1 Sec 6(17), respectively, of the DNV GL rules (January 2016 edition).