High-strength Materials used for Intermediate Shafts

Amended Rules and Guidance

Rules for the Survey and Construction of Steel Ships Part D
Guidance for the Survey and Construction of Steel Ships Part D

Reason for Amendment

Formulae for the required diameters of intermediate shafts are stipulated by IACS in Unified Requirement (UR) M68 and these formulae have already been incorporated into the ClassNK Rules. The formulae specify that if high-strength low alloy steel forgings are used for intermediate shafts, the upper limit of specified tensile strength is to be 800 N/mm^2, even for material whose specified tensile strengths are greater than 800 N/mm^2, because of concerns that non-metallic inclusions may decrease fatigue strength.

In recent years, however, improvements in manufacturing technology of intermediate shafts has led to the development of highly clean steel, which possess high fatigue strength and high strength. IACS, therefore, established an evaluation method for using materials which have specified tensile strengths greater than the upper limit specified in UR M68 and reviewed the formulae for the required diameters of intermediate shafts.

As a result of above, IACS specified new evaluation criteria for cases where high-strength materials are used for intermediate shafts. In addition, IACS also reviewed UR M68 and amented the formulae for the required diameters of intermediate shafts. This amendment was adopted as UR M68(Rev.2) in April 2015.

Accordingly, relevant requirements were amended in accordance with IACS UR M68(Rev.2).

Outline of Amendment

(1) Specified that 950 N/mm^2 may be used as the upper limit of specified tensile strength when calculating the required diameters of intermediate shafts manufactured from low alloy steel forgings whose specified tensile strengths exceed 800 N/mm^2 in cases where the use of said materials for intermediate shafts has been approved by the Society.
(2) Specified that only low alloy steel forgings which have passed torsional fatigue tests, microscopic examinations for non-metallic inclusions and ultrasonic tests can be used as described in (1) above.

Amended Requirements

Rules for the Survey and Construction of Steel Ships
Part D: 6.2.2, 8.2.2
Guidance for the Survey and Construction of Steel Ships
Part D: D6.2.2, D8.2.2, Annex D6.2.2