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Standard for Hull Roughness Measurements on Ship Hulls in Dry Dock

ABSTRACT

This standard defines the methodology of measuring hull roughness of vessels in dry-dock. This standard does not mention the type of instrument/gauge for such measurements. This standard is limited to a methodology—no interpretation of the results obtained is presented.

One of the factors affecting a ship's performance and fuel consumption is the roughness of its foul-free underwater hull. The condition and type of paint system used may have a major influence on hull roughness and ship performance. Hull roughness has a major impact on vessel fuel efficiency and exhaust emissions. This standard focuses on the mechanical roughness of the hull. A roughness survey is used to arrive at a measured value to determine the added friction drag caused by the roughened, but foul-free, coated surface.

KEYWORDS

Ship hull vessel roughness measurement gauge survey dry-dock, TG 461

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Foreword

In NACE standards, the terms shall, must, should, and may are used in accordance with the definitions of these terms in the NACE Publications Style Manual. The terms shall and must are used to state a requirement, and are considered mandatory. The term should is used to state something good and is recommended, but is not considered mandatory. The term may is used to state something considered optional.

This NACE International standard practice provides a standardized method of measuring hull roughness to enable reproducible and comparable readings from similar gauges regardless of geographical location.

One of the factors affecting a ship's performance and fuel consumption is the roughness of its foul-free underwater hull. The condition and type of paint system used may have a major influence on hull roughness and ship performance. Hull roughness has a major impact on vessel fuel efficiency and exhaust emissions. This standard focuses on the mechanical roughness of the hull.

A roughness survey is used to arrive at a measured value to determine the added friction drag caused by the roughened, but foul-free, coated surface. This is the principal reason for establishing the following standardized procedure.

The directly affected stakeholders are ship owners/operators and their customers, suppliers of various solutions with the potential to improve hull and ship performance. The standard, as presented, is expected to enable these stakeholders to work more closely together toward improving the quality of the hull roughness data gathered—offering economic benefits as well as considerable benefits to the global environment.

This standard was prepared by NACE TG 461, which is administered by Specific Technology Group (STG) 44, "Marine Corrosion: Ships and Structures," and is also sponsored by STG 03, "Coatings and Linings, Protective: Immersion and Buried Service," and STG 04, "Coatings and Linings, Protective: Surface Preparation." The TG is composed of manufacturers, users, consulting engineers, and other interested parties, and this standard represents a consensus of those members. This standard is issued by NACE under the auspices of STG 44.

Standard for Hull Roughness Measurements on Ship Hulls in Dry Dock

Section 1: General

1.1 This standard defines the methodology of measuring hull roughness of vessels in dry-dock. This standard does not mention the type of instrument/gauge for such measurements. This standard is limited to a methodology—no interpretation of the results obtained is presented.

1.1.1 Cautionary statement: Instruments using differing measurement techniques may not provide comparable results.

1.1.2 This standard does not refer to biological roughness, or structural issues such as weld lines, hull plate distortion, etc.

1.2 If an out-docking survey of a particular vessel is compared with the next in-docking survey, the average hull roughness will probably have increased. This is usually because mechanical damage has occurred in service, or the coating system has degraded partially, causing increased roughness. The mean hull roughness (MHR) value measures the roughness of the hull surface covered in one pass of the instrument/gauge, whereas the average hull roughness (AHR) measurement gives an indication of the overall hull roughness including areas of mechanical damage and/or paint defects.

1.3 Some coating systems (such as “foul-release” coatings) may not render themselves well suited for some instruments/gauges used for hull roughness measuring.

1.3.1 Caution should be used in instrument/gauge selection and operation.The instrument/gauge manufacturer’s instructions shall be followed.

Section 2: Definitions

Adjustment: Resetting the instrument/gauge against a known roughness to ensure it gives the correct reading.

Analyzer, Gauge, or Instrument: All refer to the tool used to obtain hull roughness readings.

Biological roughness: Roughness on the hull in the form of barnacle bases, sea weed, tube worms and slime, etc.

Calibration: Certification of an instrument/gauge by the manufacturer and/or accredited laboratory.

Distortion: Long wave roughness of the hull surface—of the steel plate not being perfectly smooth and the presence of welds beads, etc.

In-Docking Survey: Survey of hull upon entering dry-dock after fresh water wash to remove all fouling growth but before commencement of any other hull work.

Out-Docking Survey: Survey after all hull work is complete and the final coat of antifouling has had sufficient drying time as defined by the manufacturer’s product data sheet.

Roughness: Roughness derived from surface irregularities in the coating itself, or from damages in the coating. It is the roughness of the ship’s hull, excluding structural issues such as weld line protrusions, plate distortion, appendages, etc.

Verification: Checking of accuracy of an instrument/gauge against a known roughness benchmark without altering the settings.