Underwater Noise from the Perspective of a Classification Society

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Our purpose

Safeguarding life, property and the environment
Improve safety and quality

- As a class society, we assist in making shipping safer through active involvement in all phases of a ship’s life
- We establish and apply technical requirements, known as DNV GL Class Rules, for the design, construction and operational maintenance of ships and marine structures
- We certify materials, components, management and systems relevant to safe operation and quality of ships
- We benchmark and support ship owners to improve safety culture and environmental performance
International Maritime Law – An overview

United Nations

International Maritime Organization (IMO)


International Labour Organization (ILO)

Develop and update Conventions

Maritime Safety and Pollution Conventions

Develop and update Conventions

Vote on UN Resolutions and Conventions

Maritime States

As Flag State

Registers ships and enforce state’s law

Merchant ships (102,000 ships > 100 GT)

As Coastal State

Port State Control – enforce laws on ships in coastal waters

Class Societies

IACS submits advisory documents to IMO

Makes design rules and issue certificates

Maritime Human Resources Conventions

Ratify IMO Conventions

Ratify ILO Conventions

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Noise & Vibration Activities at DNV GL

- Noise & Vibration Consultancy and Research since 1950

- Noise
- Hydro acoustics
- Propeller
- Vibration

NV Class

SILENT notation

Measurements

Calculations

Troubleshooting

Comfort Class
**DNV GL Silent – a World’s first (2010)!**

- Optional voluntary class notation
- Covers complete sets of criteria and rules for verification
- Ensuring Operational Capability for four different types of ships
- Environmental conscious owners may demonstrate environmental compliance through “Environment Notation”
IMO activity on underwater noise

- The Marine Environmental Protection Committee (MEPC) of the International Maritime Organization (IMO):
  “GUIDELINES FOR THE REDUCTION OF UNDERWATER NOISE FROM COMMERCIAL SHIPPING TO ADDRESS ADVERSE IMPACTS ON MARINE LIFE”. Non mandatory.

- IFAW estimates that the noisiest 10% of vessels seem to contribute between 50% and 90% of the overall noise pollution
Silent Sub-notation (E) – Environmental

- Voluntary class requirements ensuring a ship with verified “moderate” noise emission possible to achieve without increasing costs beyond that caused by seeking good engineering advice with regard to propeller design and propulsion machinery installation

- Two levels: Transit and silent passage
Silent Sub-notation (E) – Environmental

- Port of Vancouver allows a reduction in harbour fees
- Developed from typical medium size cruise vessels
- Noise controlled propellers
- Resiliently mounted diesel generators (not too challenging in this respect)
- Simplified measuring methodology have been introduced to save cost for large vessels and make noise rating of vessels practically feasible
Noise and vibration sources

- Propellers, thrusters
- Diesel engines, generators, electric motors, gears
- Acoustic transducers
- Water flow
Usually most important noise and vibration source
Propeller noise development with power

Frequency Hz

Run 011 4.3 kts
Run 012 6.4 kts
Run 013 8.4 kts
Run 014 9.5 kts
Run 015 10.1 kts
Run 016 7.5 kts
Run 017 7.7 kts
Propeller/Wake optimization = reduced noise +/- efficiency

Wake with vortex generators

Original wake
Antrophogenic underwater noise: Roles of a Classification society

- Realistic and practical requirements and measuring methodology ensuring that excessive noise radiation from ships is avoided
- Advice on noise control and quiet construction methods
- Verifying and influencing other organizations
Global impact for a safe and sustainable future