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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

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Environmental noise emitted by vessels

船舶环境噪声

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3 Terms and definitions

The equivalent continuous A-weighted sound pressure level is the energy average of the A-weighted level over the stated measuring time. The maximum AS-weighted sound pressure level is the highest sound pressure level, with A frequency weighting and S time weighting, measured on the vessel under the stated operating condition.

Background noise is the noise from every source other than the vessel under test. The day-time sound level and the night-time sound level are the maximum AS-weighted level or the equivalent continuous A-weighted level measured in the day-time and in the night-time period respectively. Day-time runs from 06:00 to 22:00 and night-time from 22:00 to 06:00 the following day.

4 Noise limits

Limits are set over the range from 31.5 Hz to 8000 Hz for two operating conditions. For a vessel under way in a fairway the quantity is the maximum AS-weighted sound pressure level, limited to 60 dB(A) by day and 55 dB(A) by night. For a vessel lying at a port berth the quantity is the equivalent continuous A-weighted sound pressure level, limited to 55 dB(A) by day and 50 dB(A) by night.

5 Measuring equipment

The equipment takes in a precision sound level meter, a microphone, a sound calibrator

and a windscreen. The sound level meter is to meet class 1 of GB/T 3785.1-2023, the free field microphone is to meet GB/T 20441.4, the sound calibrator class 1 of GB/T 15173-2010 and the filter class 1 of GB/T 3241-2010.

The microphone is calibrated with the sound calibrator before and after each measurement. The distance from the microphone to the vessel may be measured with an optical instrument or another range finder, the error not passing 5 m horizontally and 0.5 m vertically. All measuring instruments and calibrators are to have been verified and to be within their period of validity.

6 Measurement conditions

No large sound reflecting body is to stand within 30 m of the microphone, and nothing that would affect the result is to lie between the microphone and the vessel. Noise from other sources is to be avoided; where it cannot be, it is recorded in the report. The water in the fairway is to be deep enough for the vessel to proceed normally.

The sea state during the measurement is to be no worse than 3 and the wind speed is not to pass 7 m/s; no measurement is made in rain or snow. Where the air is moving noticeably a windscreen is used.

The measurement is made with the vessel making 5 knots or lying at a port berth. Main engine, generators, engine room fans and the rest are to run at the output the operating condition calls for, and every piece of machinery that might be running at the same time in that condition is to be switched on together. Movement of people is to be kept from affecting the result, only those needed for the measurement being present, and passenger entertainment systems are switched off.

Background noise from outside sources is not to affect the level at the measuring position. When background noise is measured, the equipment that would affect the result is switched off. The background noise is to lie at least 3 dB(A) below the measured vessel noise.

7 Arrangement of measuring positions

Vessel environmental noise is measured 100 m from the outer contour of the vessel; for any other distance the result is corrected.

For the fairway condition one measuring position is set on the side of the vessel, 3.5 m or more above the sea surface.

For the berth condition three positions are set on each side, one of them amidships and the other two a quarter of the vessel length forward and aft of it, and one position each at the bow and the stern on the centreline. Where the level differs noticeably along the length of the vessel, further positions are added. All microphones stand 100 m from the outer contour of the vessel and 3.5 m or more above the sea surface.

8 Measurement procedure

The microphone may stand on a suitable platform, within ± 0.5 m of the edge of the mounting plane and at least 1.2 m above the platform surface, and is pointed at the track or at the side of the vessel as its instructions direct.

In the fairway condition the background noise is measured before the run starts and after it ends, the vessel drifting with engines stopped well away from the microphone, and each background record lasts at least 30 s. The vessel holds as straight a course as it can along the prescribed track and its heading is recorded. A perpendicular is dropped from the microphone to the track; recording begins when the bow is two vessel lengths from the foot of that perpendicular and stops when the stern is two vessel lengths beyond it, the vessel having reached the prescribed condition before recording begins. The distance between vessel and microphone is recorded continuously at 2 s intervals throughout each complete run, and the speed of the vessel is recorded for each run, normally from equipment fitted on board. Sound pressure levels are measured from 31.5 Hz to 8000 Hz through octave filters over the same range and the maximum AS-weighted level is recorded. Both sides of the vessel are measured and the energy average of the two taken.

In the berth condition the vessel lies alongside in port or drifts with engines stopped in calm open water. Background noise is again measured before and after, each record lasting at least 30 s. Sound pressure levels are measured from 31.5 Hz to 8000 Hz through octave filters over the same range and the equivalent continuous A-weighted level is recorded, over not less than 30 s.

9 Post-processing of measurement results

The background noise is taken as the arithmetic mean of the level measured before the run and the level measured after it. The difference between the raw measured level, background noise included, and that mean is then formed. Where the difference passes 10 dB no correction is made. Where it lies above 3 dB and up to 10 dB, and is steady enough, the background is subtracted on an energy basis. Where it is 3 dB or less the measurement is void and has to be repeated.

Where the microphone stood at other than 100 m from the vessel, a distance correction of twenty times the logarithm of the ratio of the actual distance to the 100 m reference distance is applied to the level already corrected for background.

For the fairway condition the final figure is the energy average of the corrected maximum AS-weighted levels from the two sides. For the berth condition it is the energy average of the corrected equivalent continuous A-weighted levels of all eight measuring positions.

10 Report

The report gives the number of this document; basic information on the vessel, such as its principal dimensions and its machinery; the test equipment, with names, models and calibration dates; the environmental conditions, such as draught, sea state, wind speed and the measuring site; the state of the vessel, such as the power and speed of main and auxiliary engines, the speed of the vessel and which equipment was running; the arrangement of the measuring positions; and the results, such as the maximum AS-weighted level and the equivalent continuous A-weighted level.

An informative annex sets out a model report form. It runs from an overview of purpose and method, through vessel particulars, principal dimensions, main engine, propeller and other vibration and noise sources, test equipment, environmental conditions and loading, and the running state of the machinery, to the results themselves: background noise before and after, the readings at each position with the background corrected and distance corrected figures beside them, and the combined figure for each of the two operating conditions.