

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

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**Type dividing and class rating for commercial motor-vehicles of
passenger transport
(English Translation)**

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1 Scope

This document specifies the index form and value of the manoeuvability criteria for transport ships sailing on the main line of the Yangtze River, the principle of criterion value selection, the test method, the determination of the value.

This document is applicable to transport ships (except high-speed ships), which are sailing on the main line of the Yangtze River (Yunnan Shuifu to Wusongkou).

2 Normative references

There are no normative references in this document.

3 Terms and definitions

The following terms and definitions apply to this document.

3.1

Directional stability

The ability of the ship to automatically stabilize on a new course, without the need for steering equipment, such as steering and thrusters, after the interference is eliminated.

3.2

Straight line stability

The ability of the ship, to maintain the ability to navigate in a straight line, without the need for steering equipment, such as steering and thrusters, after the interference is eliminated.

3.3

Course-keeping ability

The ability of a ship to maintain its course, by relying on steering equipment, such as steering and thrusters.

4.1.1.1 The form of the manoeuvability criteria for a motorized single ship includes four performances: directional stability, course-changing ability, steady-turning ability, astern stopping ability.

4.1.1.2 The form of the manoeuvability criteria of the fleet includes five performances: directional stability, course-changing ability, steady-turning ability, astern stopping ability, astern stability.

4.1.2 The form of directional stability index

In the initial state of constant ship speed AND the heading direction is basically consistent with the water flow direction, use the course-changing amount (ΔC_0) of sailing for 3 minutes in the state of zero rudder angle OR the average steering angle ($\Delta \theta_0$) of maintaining the course for 5 minutes, as the criterion index.

4.1.3 The form of course-changing ability index

In the initial state of constant ship speed and stable heading, the single motor ship shall be subject to the Z-shaped test, according to the specified rudder angle; use the yawing index (P') as the criterion index.

In the initial state of constant speed and stable heading, the fleet steers according to the specified rudder angle AND changes direction by 15° ; take the average direction change angular velocity (ω), from the first move to the direction change of 15° , as the criterion index.

4.1.4 The form of steady-turning ability index

When the ship is in the state of constant driving, steady speed, full rudder, steady- turning, in wide and slow-flowing waters, use the ratio (λ) -- of the diameter (D_0) of the arc motion trajectory at the ship's center of gravity TO the length (L) of the ship, -- as the criterion index.

4.1.5 The form of astern stopping ability index

The ship is in a wide, slow-flowing water area, from the state of constant driving at a steady speed to the state of reversing at 70% of the rated speed of the main engine; take the ratio -- of the stroke (A_h) to the ship's length (L), -- from the start of the command to reverse to the stop of the ship's forward movement, as the criterion index.

4.1.6 The form of astern stability index

When the ship sails downstream, in the initial state of parking at a low speed and the heading is stable, it drives back and steer the ship in a steady direction for 3 minutes;

5.1.2.1 Test principle

The ship sails at 0° rudder angle for 3 minutes, to continuously measure the change of the heading direction. OR keep the heading direction for 5 min, to continuously measure the change of the steering angle, as relative to time.

5.1.2.2 Test requirements

5.1.2.2.1

The ship test is carried out, in a straight channel, which has smooth water flow and stable flow velocity. During the test, the forward and reverse wind force shall be less than Beaufort level 3; the cross wind force shall be less than Beaufort level 2.

5.1.2.2.2

Generally, driving against the current shall prevail. If necessary, two to three repeated tests can be carried out.

5.1.2.2.3

Before starting the test, the ship is to maintain a constant speed, a stable course, AND be parallel to the direction of the water flow.

5.1.2.2.4

The difference in rotational speed of each propeller in ships, which have two or more propellers, is to be less than 1% of the rated rotational speed.

5.1.3.1 Test principle

The motorized single ship and the fleet respectively conduct Z-shaped tests, according to the specified rudder angle, to completely measure the time-varying curve of the rudder angle and heading angle, including the overtaking angle, the delay time of turning, the position of the characteristic point.

5.1.3.2 Test requirements

5.1.3.2.1

The ship test is to be carried out in a wide and straight channel, which has smooth water flow and stable flow velocity. The wind force during the test shall be less than Beaufort level 3.

5.1.3.2.2

The test is generally based on reverse current driving. When conditions permit, it can be tested under two driving conditions: forward and reverse current.

5.1.3.2.3

Before starting the test, the ship is to maintain a constant speed, a stable course, AND be basically parallel to the direction of the water flow.

5.1.3.2.4

For a motorized single ship, during the test, firstly turn the rudder to $+10^\circ$ and keep it. When the heading angle changes to $+10^\circ$, immediately reverse the rudder angle to -10° and keep it. When the heading angle changes to -10° , turn the rudder to $+10^\circ$ and keep it. When the heading angle changes to $+10^\circ$, reverse the rudder angle to -10° and keep it, until the heading angle change to -10° .

5.1.3.2.5

For the fleet, during the test, firstly turn the rudder to $+20^\circ$ and keep it. When the heading angle changes to $+15^\circ$, immediately reverse the rudder angle to -20° and keep it. When the heading angle changes to -15° , turn the rudder to $+20^\circ$ and keep it.

When the heading angle changes to $+15^\circ$, reverse the rudder angle to -20° and keep it, until the heading angle changes to -15° .

5.1.3.2.6

The difference between the rotational speeds of each propeller, in ships which have two or more propellers, is to be less than 1% of the rated rotational speed.

5.1.4.1 Test principle

When the rudder is full, continuously measure the corresponding delay, ship position, course, ship speed at each moment after each 30° change, in the heading direction of 0° , 10° , 20° , 30° , until 540° .

5.1.4.2 Test requirements

5.1.4.2.1

The ship test is to be carried out in a wide slow-flow area, which has a water depth greater than 2 times the ship's draught; the wind force during the test is less than Beaufort level 3.

5.1.4.2.2

The initial speed of each turning test shall be the same, generally the speed of the