GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

ICS 53.020.20

CCS J 80

GB/T 6068-2021

Replacing GB/T 6068-2008

Test Code for Truck Crane and Tyre Crane

汽车起重机和轮胎起重机试验规范

Issued on: May 21, 2021 **Implemented on: December 1, 2021**

Issued by: State Administration for Market Regulation;

Standardization Administration of the People's Republic of China.

Table of Contents

Test Code for Truck Crane and Tyre Crane

1 Scope

This document specifies the test conditions, chassis running-in, preparatory test, performance test, reliability test, structural test, industrial test and inspection rules of truck cranes (including all-terrain cranes) and tyre cranes (hereinafter referred to as cranes).

This document is applicable to truck cranes and tyre cranes.

2 Normative References

The contents of the following documents constitute indispensable clauses of this document through normative references in the text. In terms of references with a specified date, only versions with a specified date are applicable to this document. In terms of references without a specified date, the latest version (including all the modifications) is applicable to this document.

GB 1495 Limits and Measurement Methods for Noise Emitted by Accelerating Motor Vehicles

GB/T 3730.3 Motor Vehicles and Towed Vehicles - Dimensions of Vehicles - Terms and Definitions

GB/T 3811 Design Rules for Cranes

GB 3847 Limits and Measurement Methods for Emissions from Diesel Vehicles under Free Acceleration and Lug down Cycle

GB 4094 Motor Vehicles - Symbols for Controls, Indicators and Tell-tales

GB 4785 Prescription for Installation of the External Lighting and Light-signaling Devices for Motor Vehicles and Their Trailers

GB/T 5905 Cranes - Test Code and Procedures

GB 7258 Technical Specifications for Safety of Power-driven Vehicles Operating on Roads

GB/T 6974.1 Cranes - Vocabulary - Part 1: General

GB/T 6974.2 Cranes - Vocabulary - Part 2: Mobile Cranes

is in the driving state.

3.3 Maximum Boom Length

Maximum boom length refers to the boom with the maximum length that is composed of the main boom and the jib and can be used for operation.

NOTE: the maximum boom length is the distance from the center of the hinge point of the main boom tail to the center of the fixed pulley on the longest jib head along the axis of the boom when the included angle between the main boom and the jib is the minimum and the main boom is the longest.

4 Test Conditions

4.1 The driving performance test conditions of truck cranes shall comply with the stipulations of GB/T 12534.

4.2 The cranes shall be equipped with working devices corresponding to the test conditions.

4.3 There shall be 1/3 ~ 2/3 fuel volume in the fuel tank. The oil level of the hydraulic oil tank shall be within the specified scale range of the fuel level indicator, and the water tank shall be full.

4.4 During the test of the cranes, the tyre inflation pressure shall comply with the stipulations of the tyre and crane manufacturer, with a tolerance of ± 3%.

4.5 The ground shall be level and solid, with an inclination not greater than 1%.

4.6 The wind speed shall satisfy the following requirements:

a) During the operating performance test, the wind speed shall be not greater than 8.3 m/s;

b) During the structural test, the wind speed shall be not greater than 4 m/s;

c) During the driving reliability test, the wind speed is not restricted by the above-mentioned conditions.

4.7 Ambient temperature: -20 °C ~ + 40 °C.

4.8 The test load shall be accurately calibrated, and its tolerance:

a) ± 1% for vertical load;

b) ± 3% for horizontal load.

4.9 Under the condition of not affecting the test effect, the test items may be

interspersed or combined in accordance with the test content and load condition. Tests are only carried out when the crane has the corresponding mechanisms and functions (such as: jib, boom extension and retraction with load and travel with load, etc.), and if there are no such mechanisms or functions, this is not required.

4.10 Cranes with special requirements shall be tested in accordance with the conditions required by the contract.

5 Chassis Running-in

5.1 The cranes shall be subject to chassis running-in before the type test, and the running-in mileage is:

---Not less than 50 km for truck cranes;

---Not less than 20 km for tyre cranes.

The running-in is carried out in two stages, and the running-in mileage of each stage accounts for 50% of the total mileage, in which:

---During the first stage of running-in, the engine speed is 50% of the rated speed;

---During the second stage of running-in, the engine speed is 75% of the rated speed.

5.2 If excessive impurities or deterioration of lubricating oil are found during the running-in period, the lubricating oil shall be replaced in time.

6 Preparatory Test

6.1 Materials

6.1.1 Test schedule

The main contents of the test schedule shall include: test conditions, test items, cyclic operation content, test methods and qualification determination principles, etc.

6.1.2 Test record

The test record shall generally include the following contents:

---Model and name of sample crane;

---Engine model and serial No., maximum net power;

---Test date, ambient temperature, wind power and wind direction;

c) The appearance and operating state of all hydraulic and pneumatic components and pipelines;

d) The installation of all hydraulic and pneumatic components; the operating performance of operating handles and pedals, etc.;

e) The range corresponding to the installation of the pressure sensor;

f) The correctness and reliability of the installation of electrical circuits and components;

g) The reliability of hooks and connectors; wire ropes and pulleys shall not be defective;

h) The volume of cooling water, hydraulic oil and fuel, etc.;

i) The dangerous parts and signs shall comply with the stipulations of GB/T 15052;

j) The marking of lifting hooks shall comply with the stipulations of GB/T 10051.1 ~ GB/T 10051.5;

k) The wire rope anti-drop device shall effectively prevent the wire rope from falling off;

l) Cranes with a lifting height greater than 50 m shall be equipped with an anemometer; the real-time wind speed parameters shall be able to be displayed in the control device;

m) The accuracy of the pressure gauge is not lower than Level 1.5.

6.4.3 Chassis part

In addition to 6.4.2, truck cranes shall also be inspected for all the following items; tyre cranes shall be selectively inspected for the following related items:

a) The vehicle logo, vehicle body reflective logo and safety protection devices shall comply with the stipulations of GB 7258;

b) The quantity, location and light color of the lighting and signal devices shall comply with the stipulations of GB 4785;

c) The installation of rearview mirrors shall comply with the stipulations of GB 15084;

d) Compulsory certification components required by the state, such as: vehicle safety glass and automobile tyres, shall have certification marks;

e) The shape, size, location and strength requirements of the license plate shall

to the maximum elevation angle:

---When the elevation angle reaches 90% ~ 100% of the elevation angle limit, the amplitude limiter shall send a distinct and continuous early warning signal of sound or light;

---When the elevation angle exceeds 100% of the elevation angle limit, the amplitude limiter shall issue a distinct alarm signal of sound or light that is clearly different from the early warning signal and cut off the amplitude-varying mechanism's action of running towards a dangerous direction.

6.5.5 Torque limiter

Under the rated load test conditions, carry out the test on the torque limiter.

The cranes are respectively under the operating conditions of basic jib, mid-length jib and the longest jib. The hook firstly lifts the test load of 80% of the corresponding rated lifting capacity, which is gradually increased to 100% of the test load:

---When the actual lifting torque reaches 90% ~ 100% of the rated lifting torque value under the corresponding operating conditions, the torque limiter shall issue a distinct and continuous early warning signal of sound or light;

---When the actual lifting torque exceeds 100% of the rated lifting torque value under the corresponding operating conditions, the torque limiter shall issue a distinct alarm signal of sound or light that is clearly different from the early warning signal and cut off all actions of running towards a dangerous direction.

6.5.6 Lifting capacity limiter

Under the rated load test conditions, carry out the test on the lifting capacity limiter.

The cranes are respectively under the operating conditions of basic jib, mid-length jib and the longest jib. The hook firstly lifts the test load of 80% of the corresponding rated lifting capacity, which is gradually increased to 100% of the test load:

---When the lifting capacity reaches 90% ~ 100% of the rated lifting capacity under the corresponding operating conditions, the lifting capacity limiter shall issue a distinct and continuous early warning signal of sound or light;

---When the lifting capacity exceeds 100% of the rated lifting capacity under the corresponding operating conditions, the lifting capacity limiter shall issue a distinct alarm signal of sound or light that is clearly different from the early warning signal and cut off all actions of running towards a dangerous direction.

6.5.7 Spray-suppression system

The spray-suppression system of the truck cranes shall comply with the stipulations of

GB 34659.

6.5.8 Safety monitoring and management system

The safety monitoring and management system of the cranes shall comply with the stipulations of GB/T 28264.

7 Measurement of Mass Parameters

7.1 Measurement Items

The measurement items include:

a) The total mass and axle load of the complete crane in the driving state;

b) For cranes that are disassembled and transported, the mass of the main components to be disassembled shall also be measured, such as: jibs, additional counterweights and spare parts, etc.

7.2 Measurement Method

The measurement method shall comply with the stipulations of GB/T 12674. The error of the measurement result relative to the nominal value shall be not greater than 3%.

8 Measurement of Geometric Parameters

8.1 Measurement Items

8.1.1 The measurement of the geometric parameters of truck cranes in the driving state (see Figure 1) includes all the following items; tyre cranes (see Figure 2) shall selectively measure the following related items:

a) Length L, width B and height H of the complete crane;

b) Wheelbase Z_1, Z_2, Z_3……;

c) Wheel track (single-side single-tyre or single-side double-tyre) A_1, A_2……;

d) The minimum ground clearance δ;

e) Approach angle α and departure angle β;

f) Front suspension C_1 and rear suspension C_2;

g) Front extent C_3 and rear extent C_4.

a) Basic jib length and longest main boom length;

b) Maximum elevation angle and minimum elevation angle of the boom;

c) Maximum lifting height of basic jib and longest main boom;

d) Longitudinal span L_1 and lateral span L_2 of outriggers;

e) Turning radius W of the tail.

8.2 Measurement Methods

The measurement of the geometric parameters shall comply with the stipulations of GB/T 12673.

The allowable error of the result of geometric parameter measurement relative to the nominal value is as follows:

---Not greater than 1% for dimensions;

---Not greater than 1° for angles.

9 Driving Performance Test

9.1 Speedometer Check

The cranes shall be subject to speedometer check in accordance with the stipulations of GB 15082.

9.2 Driving Test

9.2.1 Road surface for driving

Before exiting factory, the cranes shall be subject to the driving test on a road surface that complies with the conditions of first and secondary highways, or a special test track.

9.2.2 Driving mileage

The mileage of the driving test of truck cranes and tyre cranes shall be not less than 20 km.

9.2.3 Inspection items

During the driving test, the inspection items shall at least include:

a) The technical state of the assembly of the complete crane, including the fastening state, mechanism stroke and free gap, etc.;

b) Whether the temperature of each assembly (including engine water temperature and engine oil temperature, transmission and drive axle oil temperature, etc.) is normal; check the operating performance and operating state;

c) Pay close attention to the functions of steering, braking and other mechanisms. If an abnormality is found, stop and check to find out the cause and troubleshoot;

d) The operating state of external lighting and signal devices of the crane;

e) Leakage.

9.3 Braking Performance Test

9.3.1 Truck cranes

The braking system of truck cranes shall comply with the stipulations of GB 7258 and GB 12676.

9.3.2 Tyre cranes

9.3.2.1 Service brake

Tyre cranes shall be subject to the service brake test under the driving state specified by the manufacturer.

The service brake performance of tyre cranes shall be tested on a flat, solid, clean and dry concrete or asphalt road surface.

Tyre cranes shall brake when the initial braking speed is stabilized. The braking start signal is based on the moment when the brake pedal is fully pressed down. Measure the sliding distance of the tyre crane from the time that the signal is sent to the complete stop of the crane. When the initial braking speed is 24 km/h, the braking distance shall be not greater than 9 m. If the maximum vehicle speed is less than 24 km/h, then, the maximum vehicle speed specified by the manufacturer shall be used for the test, and the braking distance shall be not greater than 9 m.

During the test, the initial braking speed shall be stabilized within 10% of the specified value and corrected by Formula (1):

$$L_x = L_S(v/v_1)^2 \qquad \cdots\cdots(1)$$

Where,

L_x---the corrected braking distance, expressed in (m);

expressed in (km/h);

S_n---the length of the measurement section, expressed in (m);

t---the average time of passing the measurement area, expressed in (s).

9.5 Measurement of Minimum Stable Vehicle Speed

9.5.1 Truck cranes

Truck cranes shall be subject to the measurement of minimum stable vehicle speed in accordance with the test method specified in GB/T 12547.

For cranes with load-carrying driving function, the minimum stable vehicle speed shall also be measured when the drive system is in the lowest gear and 50% of the allowable maximum lifting capacity for load-carrying driving.

9.5.2 Tyre cranes

The road section in the vehicle speed measurement area shall be a flat, dry, clean, solid asphalt or concrete road surface; the longitudinal gradient shall be not greater than 0.1% and the lateral gradient shall be not greater than 3%. Preparatory road sections shall be set at both ends of the measurement area, the length of which shall enable the sample crane to reach the minimum stable speed before entering the measurement area. During the test, there shall be no rain, and the wind speed shall not exceed 3 m/s.

Under the driving state specified by the manufacturer, the tyre crane passes a measurement section of 50 m at the minimum stable speed.

The tyre crane is tested respectively for 3 times in the back and forth direction; take the average value. The actual minimum stable vehicle speed is calculated in accordance with Formula (3):

$$v_{min} = 3.6 S_n / t \qquad \cdots\cdots (3)$$

Where,

v_{min}---the actual minimum vehicle speed (or actual minimum stable vehicle speed), expressed in (km/h);

S_n---the length of the measurement section, expressed in (m);

t---the average time of passing the measurement area, expressed in (s).

9.6 Acceleration Performance Test

9.6.1 Truck cranes

Truck cranes shall be subject to the acceleration performance test in accordance with the method specified in GB/T 12543.

9.6.2 Tyre cranes

The road section in the vehicle speed measurement area shall be a flat, dry, clean, solid asphalt or concrete road surface; the longitudinal gradient shall be not greater than 0.1% and the lateral gradient shall be not greater than 3%. Preparatory road sections shall be set at both ends of the measurement area, the length of which shall enable the sample crane to reach the minimum stable speed before entering the measurement area.

Under the driving state specified by the manufacturer, the tyre crane takes the minimum stable vehicle speed of the test gear as the initial speed to pass the preparatory section and reach the starting point of the acceleration test section at a constant speed; quickly press down the accelerator to the end to accelerate to 90% of the maximum speed; record the acceleration process. Perform the test back and forth for 3 times; take the average value. In addition, draw the relation curve between the acceleration time and the acceleration stroke of the tyre crane.

9.7 Steep Hill Climbing Test

9.7.1 Truck cranes

Truck cranes shall be subject to the measurement of the maximum steep hill climbing in accordance with the test method specified in GB/T 12539.

9.7.2 Tyre cranes

The test section for the steep hill climbing test shall be a natural ramp (asphalt pavement or concrete pavement) with a flat, dry, clean, solid surface and a uniform ramp. The length of the ramp exceeds three times the length of the tyre crane. There are gradually changing sections in the front and back of the test section; the length of the ramp of the test section shall not be less than 1.5 times the length of the tyre crane (see Figure 3).

The longitudinal gradient of the test section is not greater than 0.1%; the lateral gradient is not greater than 3%.

This is an excerpt of the PDF (Some pages are marked off intentionally)

------ The End ------