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NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

ICS 53.040.10

J 81

GB/T 10595-2017

Replacing GB/T 10595-2009

Belt Conveyors

带式输送机

Issued on: December 29, 2017 **Implemented on: July 1, 2018**

Issued by: General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China;

Standardization Administration of the People's Republic of China.

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Belt Conveyors

1 Scope

This Standard specifies the type and basic parameters, technical requirements, test methods, inspection rules, marking, packaging and storage of belt conveyors (hereinafter referred to as the conveyors).

This Standard is applicable to conveyors conveying bulk materials and finished articles.

For conveyors conveying toxic, harmful, flammable, explosive, highly corrosive and radioactive materials, and conveyors with special requirements and types, the general parts may also be taken as a reference.

2 Normative References

The following documents are indispensable to the application of this document. 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/T 191 Packaging - Pictorial Marking for Handling of Goods (GB/T 191-2008, ISO 780:1997, MOD)

GB/T 226 Test Method for Macrostructure and Defect of Steel by Etching

GB/T 700 Carbon Structural Steels

GB/T 985.1 Recommended Joint Preparation for Gas Welding, Manual Metal Arc Welding, Gas-shield Arc Welding and Beam Welding

GB/T 985.2 Recommended Joint Preparation for Submerged Arc Welding

GB/T 1184 Geometrical Tolerancing - Geometrical Tolerance for Features without Individual Tolerance Indications (GB/T 1184-1996, eqv ISO 2768-2:1989)

GB/T 1979 Standard Diagrams for Macrostructure and Defect of Structural Steels

GB/T 2828.1 Sampling Procedures for Inspection by Attributes - Part 1: Sampling Schemes Indexed by Acceptance Quality Limit (AQL) for Lot-by-lot Inspection

GB/T 3323 Radiographic Examination of Fusion Welded Joints in Metallic Materials

GB/T 3767 Acoustics - Determination of Sound Power Levels and Sound Energy Levels of Noise Sources Using Sound Pressure - Engineering Methods for an Essentially Free Field over

a Reflecting Plane (GB/T 3767-2016, ISO 3744:2010, IDT)

GB/T 4053 Safety Requirements for Fixed Steel Ladders and Platform

GB/T 4323 Pin Coupling with Elastic Sleeve

GB/T 4490 Conveyor Belts with Textile Carcass - Widths and Lengths

GB/T 5014 Pin Coupling Elastomer

GB/T 5015 Gear Coupling with Pin Elastomer

GB/T 5272 Coupling with Elastic Spider

GB/T 6069 Roller Chain Coupling

GB/T 6402 Steel Forgings - Method for Ultrasonic Testing

GB/T 7233.1-2009 Steel Castings - Ultrasonic Examination - Part 1: Steel Castings for General Purposes

GB/T 7324 General Purpose Lithium Lubricating Grease

GB/T 7984 Conveyor Belt of Textile Construction for General Use

GB/T 8923.1 Preparation of Steel Substrates before Application of Paints and Related Products - Visual Assessment of Surface Cleanliness - Part 1: Rust Grades and Preparation Grades of Uncoated Steel Substrates and of Steel Substrates after Overall Removal of Previous Coatings

GB/T 9239.1 Mechanical Vibration - Balance Quality Requirements for Rotors in a Constant (rigid) State - Part 1: Specification and Verification of Balance Tolerances

GB/T 9286 Paints and Varnishes - Cross-cut Test

GB/T 9443 Steel and Iron Castings - Liquid Penetrant Inspection

GB/T 9770 Steel Cord Conveyor Belts for General Use

GB/T 11345 Non-destructive Testing of Welds - Ultrasonic Testing - Techniques, Testing Levels, and Assessment

GB/T 11352 Carbon Steel Castings for General Engineering Purpose

GB/T 13306 Plate

GB/T 13384 General Specifications for Packing of Mechanical and Electrical Product

GB/T 13793 Straight Seam Welded Steel Pipe

comply with the stipulations of Grade-9 precision in GB/T 1184.

4.3.3 The backstop shall comply with the stipulations of JB/T 9015. After the backstop is installed, when the conveyor is in operation, the backstop shall flexibly operate; when the conveyor is in the backstop state, the backstop shall be safe and reliable.

4.3.4 After the elastic coupling is assembled, it shall comply with the stipulations of GB/T 4323, GB/T 5014, GB/T 5015 and GB/T 5272.

4.3.5 After the curved tooth coupling is assembled, it shall comply with the stipulations of GB/T 26103.1, GB/T 26103.3, GB/T 26103.4 and GB/T 26103.5.

4.3.6 After the steelflex coupling is assembled, it shall comply with the stipulations of JB/T 8869.

4.3.7 After the roller chain coupling is assembled, it shall comply with the stipulations of JB/T 6069.

4.3.8 After the electro-hydraulic drum brakes are assembled, they shall comply with the stipulations of JB/T 6406.

4.3.9 The caliper-type electro-hydraulic disc brakes shall comply with the stipulations of JB/T 7020. During braking, the working contact area between the brake block and the brake disc shall not be less than 80%.

4.3.10 When fluid coupling is adopted for the high-speed shaft, it shall comply with the stipulations of JB/T 9000.

4.3.11 Motorized driving pulley shall comply with the stipulations of JB/T 7330.

4.3.12 The speed reducers for the conveyors shall comply with the requirements for starting with full load.

4.4 Steel Castings for the Conveyors

4.4.1 The carbon steel castings shall comply with the stipulations of GB/T 11352. Large-sized low-alloy steel castings shall comply with the stipulations of JB/T 6402.

4.4.2 The sticky sand, sand inclusions, flashes, burrs, casting heads and oxide scales on the surface of the castings shall be eliminated, and there shall be no cracks, cold insulation, shrinkages, slag inclusions or pores that may affect the performance of the castings.

4.4.3 The non-destructive testing of the steel castings shall comply with the stipulations of JB/T 5000.14.

4.5 Steel Forgings for the Conveyors

4.5.1 The forgings shall not manifest any cracks, folds, interlayers, white spots or residual

shrinkage cavities.

4.5.2 The ultrasonic testing shall comply with the stipulations of GB/T 6402, GB/T 226 and GB/T 1979.

4.5.3 The acceptance inspection rules and test methods of the forgings shall comply with the stipulations of JB/T 5000.8.

4.6 Pulley

4.6.1 The minimum wall thickness b_1 of the pulley body shall comply with the stipulations of Formula (1).

4.6.2 In addition to satisfying the above-mentioned requirements of 4.4.2, the pulley steel casting plates shall also be subjected to the surface and internal inspections.

The external quality shall comply with the requirements of penetrant inspection in GB/T 9443; the surface quality shall be “smooth”; the inspection quality level shall be Level-2.

The internal quality shall comply with the requirements of GB/T 7233.1; the preparation of the surface for the ultrasonic testing of steel castings shall comply with the requirements of 5.4 in GB/T 7233.1-2009. The ready-to-weld area and special outer layers shall comply with the requirements of quality level 1 in Table 1 of GB/T 7233.1-2009; the overall non-destructive testing method for the pulley is shown in Appendix A.

4.6.3 The quality classification limit of the defects of the pulley body and the welding seam of the plate shall comply with the requirements of Level-B in GB/T 19418. When ultrasonic testing is adopted, the inspection level shall not be lower than Level-B in GB/T 11345; the acceptance inspection level shall comply with the requirements of Level-2 in GB/T 29712. Alternatively, when radiographic inspection is adopted, its quality level shall not be lower than the requirements of Level-2 in GB/T 3323.

4.6.4 The internal stress of the pulley body with the resultant force greater than 80 kN shall be eliminated.

4.6.5 The diameter deviation of the outer circle of the pulley shall comply with the stipulations of Table 8.

the centerline of the conveyor frame shall not be greater than 3.0 mm.

4.12.6 The coaxiality between the axis of the drive pulley and the axis of the low-speed shaft of the speed reducer shall comply with the stipulations of the coupling used.

4.12.7 The parallelism of the axes of the two drive pulleys on the same frame shall not be greater than 0.4 mm.

4.12.8 The upper surface of the idler (except the self-aligning roller and the transition roller) shall be located on the same plane (horizontal or inclined surface), or on the arc surface of a common radius (the idler on the concave arc section or the convex arc section of the conveyor). The height difference among the upper surfaces of the three adjacent sets of idler rollers shall not exceed 2.0 mm.

4.12.9 The working surfaces of the rails shall be within the same plane, and the elevation difference of the rail top of each section of the rail shall not exceed 2.0 mm. The straightness limit of the rail is 1.0 mm within the length of 1 m, 4.0 mm within the length of 25 m and 15 mm within the full length. The height difference of the working surface at the rail joint shall not exceed 0.5 mm. The gap of the rail joints shall not be greater than 3.0 mm. The gauge deviation shall not be greater than ± 2.0 mm.

4.12.10 The perpendicularity of the weight guide frame of the vertical weight tensioning device to the horizontal plane is 1/1,000 of the length of the axis of the tensioning pulley.

4.12.11 The wheel treads of the take-up car shall be on the same plane, and the flatness limit is 2.0 mm.

4.12.12 After the assembly of the take-up car, the inner and outer declination angles of the tensioning steel rope and the centerline of the pulley rope groove and the vertical line of the reel shaft shall be less than 6°.

4.12.13 After the cleaner is installed, the contact length between its scraper or brush and the conveyor belt in the direction of the pulley axis shall not be less than 85%.

4.12.14 The connection joint of the conveyor belt shall be flat and straight, and the straightness on the 10 m length with the joint as the center shall not be greater than 15 mm.

5 Test Methods

5.1 Visual Inspection

Visual inspection includes whether the working condition of the whole machine and all important parts satisfies the requirements, and whether the appearance quality, safety signs and plates satisfy the technical requirements.

5.2 Dynamic Rotation Resistance Test of Idler Roller

5.15 Testing of Paint Film Adhesion

The measurement method for paint film adhesion shall comply with the requirements of GB/T 9286.

6 Inspection Rules

6.1 General

The inspection of the conveyors is divided into exit-factory inspection and type inspection.

6.2 Exit-factory Inspection

Each conveyor can only be allowed to exit the factory after passing the inspection. See Table 19 for the exit-factory inspection items.

6.3 Type Inspection

6.3.1 Under one of the following circumstances, type inspection shall be carried out:

a) Trial-type appraisal of new products or old products transferred to another factory for production;

b) After formal production, when there are major changes in structure, materials and processes that may affect product performance;

c) When production is resumed after being suspended for more than one year;

d) When there are major differences between the exit-factory inspection results and the previous type inspection;

e) When the national quality supervision and inspection institution puts forward a request for the type inspection.

6.3.2 The type inspection items are shown in Table 19.

7.1.1 Each conveyor shall have a product plate fixed at a prominent position on any head frame where the drive pulley is installed, and the plate shall at least include the following contents:

a) product name;

b) model;

c) main technical parameters (belt breadth, belt speed, conveying capacity and installed power);

d) date of manufacture (serial No.);

e) name of the manufacturer.

7.1.2 The sizes and technical requirements of the plate shall comply with the stipulations of GB/T 13306.

7.2 Packaging

7.2.1 Basic requirements

The packaging of the conveyors shall comply with the stipulations of GB/T 13384. The pictorial marking for handling of goods shall comply with the relevant stipulations of GB/T 191.

7.2.2 Packaging of parts

When placing the parts of the conveyors in the box, the center of gravity shall be as centered and lower as possible. If the center of gravity is obviously high, corresponding balancing measures shall be taken.

7.2.3 Idler

All idler rollers shall be packaged to prevent bumping; the brackets are allowed to be bundled and shipped naked.

7.2.4 Pulley

Anti-rust and protective measures shall be taken on the shaft head of the drive pulley. Protective measures shall be taken on the surface of the pulley. When the pulleys are separately shipped, measures shall be taken to prevent the pulleys from rolling.

7.2.5 Tensioning device

7.2.5.1 The screw tensioning device (including the bend pulley) is installed on the frame for shipment.

7.2.5.2 Wire ropes, rope clips, bend pulleys and long screws of the tensioning device are packed in a box for shipment.

method, and if necessary, the transverse wave method can be adopted to facilitate the determination.

A.2.1.3 For intensive defects, the diameter of ϕ6 mm flat-bottomed hole shall be taken as the quantitative sensitivity, and the half-wave height method shall be adopted for detection.

A.2.1.4 Within the 50 mm width of the welded end, the dense pores and inclusions shall be less than 20% of the wall thickness. Detection can be performed from the outer circular surface with a dual element probe.

A.2.2 Non-destructive testing method for butt longitudinal welds and annular welds of pulley body

A.2.2.1 During radiographic inspection, the amount of each weld being inspected shall not be less than 20% of the weld length. Ultrasonic inspection shall be carried out in the full range.

A.2.2.2 The non-destructive testing method shall comply with the stipulations of GB/T 3323 or GB/T 11345.

A.2.3 Non-destructive testing method for annular fillet welds of pulley body and receiving plate

A.2.3.1 Along the circumference direction of the pulley body and at an adjacent interval of 90°, perform the non-destructive testing on 4 welds with a length of not less than 100 mm. If one of the welds is disqualified, then, 100% non-destructive testing shall be performed.

A.2.3.2 Use the vertical detection method with a straight probe; at "▽", the detection depth is slightly greater than *a*, as it is shown in Figure A.2:

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