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Belt Conveyors

带式输送机

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Foreword

This Standard replaces GB/T 987-1991 *"Belt Conveyors - Basic Parameters and Dimensions"*, GB/T 988-1991 *"Belt Conveyor Pulleys - Basic Parameters and Dimensions"*, GB/T 990-1991 *"Belt Conveyor Idlers - Basic Parameters and Dimensions"* and GB/T 10595-1989 *"General Specification for Belt Conveyors"*.

Compared with GB/T 987-1991, GB/T 988-1991, GB/T 990-1991 and GB/T 10595-1989, the main changes of this Standard are as follows:

- ADD technical requirements of the packing of belt conveyors;
- ADD requirements of the designed life of roller shaft;
- ADD requirements of belt conveyors;
- ADD property test for the surface rubber and bottom rubber of rubber-covered rollers;
- ADD requirements and determination of conveying capacity;
- MODIFY the premises for dustproof and waterproof property of idler rollers;
- RE-SPECIFY the physical and mechanical properties of surface rubber;
- MODIFY requirements for the fault detection quality of roller shaft;
- SUPPLEMENT the static balancing test method for roller;
- MODIFY the linearity of conveyor belt;
- MODIFY the service life of idler rollers;
- MODIFY the radial circular run-out of the idler rollers' top circle;
- MODIFY the test method for the rotation resistance of idler rollers;
- MODIFY the rotating speed in the dustproof and waterproof test of rollers.

Appendix A of this Standard is normative.

This Standard was proposed by China Machinery Industry Federation.

This Standard shall be under the jurisdiction of National Technical Committee on Continuous Mechanical Handling Equipment of Standardization Administration of China.

Responsible drafting organization of this Standard: Beijing Elevating Machinery Institute.

Participating drafting organizations of this Standard: Sichuan Zigong Conveying Machine Co., Ltd, Shenyang Mining Machinery (Group) Co., Ltd, Beijing Yueji Tongli Machinery Manufacturing Co., Ltd, Hengyang Hoisting and Conveying Machinery Co., Ltd, Tongling Miracle Mechanical Equipment Co., Ltd, Shandong Shankuang Machinery Co., Ltd, Tangshan Mining & Metallurgical Machinery Plant, Jiaozuo Creation Machinery Co., Ltd, Shanghai Qingpu Lifting Transport C., Ltd, Anhui Pandeng Machinery joint Stock Co., Ltd, Conveying Machinery Equipment Manufacturing Company of Magang Corporation, Dongguan Loti Industrial Co., Ltd.

The main drafters of this Standard: Zhang Zunjing, Zhang Qiang, Huang Wenlin, Yang MInghua, Gong Xinrong, Huang Xiliang, Zhang Xiaohua, Zhou Shichang, Yu Chuncheng, Meng Fanbo, Hou Tiancheng, Li Ping, Li Tianguo, Zhang Yong.

The historical versions replaced by this Standard are as follows:

- GB 987-1967, GB 987-1977, GB/T 987-1991;
- GB 988-1967, GB 988-1977, GB/T 988-1991;
- GB 989-1967, GB 989-1977;
- GB 990-1967, GB 990-1977, GB/T 990-1991;
- GB 991-1967, GB 991-1977;
- GB 992-1967, GB 992-1977;
- GB 993-1967, GB 993-1977;
- GB 994-1967, GB 994-1977;
- GB 995-1967, GB 995-1977;
- GB 996-1967, GB 996-1977;
- GB/T 10595-1989.

Belt Conveyors

1 Scope

This Standard specifies the technical requirements, test methods, test rules, mark, packaging and storage of the belt conveyor (hereafter referred to as conveyor).

This Standard is applicable to the transportation of different kinds of massive, granular bulk materials and conveyors.

For conveyors with special requirements and patterns, the general part shall also be referred to.

2 Normative Reference

The provisions in following documents become the provisions of this Standard through reference in this Standard. For dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this Standard, however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB/T 191 Pictorial marking for handling of goods (GB 191-2008, ISO 780:1997, MOD)

GB/T 528 Rubber, Vulcanized or thermoplastic - Determination of tensile stress-strain properties (GB/T 528-1998, eqv ISO 37:1994)

GB/T 531 Rubber - Determination of indentation hardness by means of pocket hardness meters

GB/T 985 Basic Forms and sizes of weld grooves for gas welding, manual arc welding and gas-shielded arc welding

GB/T 986 Basic Forms and sizes of submerged arc weld grooves

GB/T 1184-1996 Geometrical tolerancing - Geometrical tolerances for features without individual tolerance indications

GB/T 2828.1-2003 Sampling procedures for inspection by attributes - Part 1: sampling scheme indexed by acceptance quality limit (AQL) for lot-by-lot inspection (ISO 2859-1:1999, IDT)

GB/T 3323-2005 Radiographic examination of fusion welded joints in metallic materials

GB/T 3512 Rubber, Vulcanized or thermoplastic - Accelerated ageing and heat resistance tests-air-oven method

GB/T 3767-1996 Acoustics - Determination of sound power levels of noise sources using sound pressure - Engineering method in an essentially free field over a reflecting plane (eqv ISO 3744:1994)

GB/T 4323 Pin coupling with elastic sleeve

GB/T 4490 Conveyor belts - Dimensions

GB/T 5014 Elastic pin coupling

GB/T 5015 Gear coupling with elastic pin

GB/T 5272 Coupling with elastic spider

GB/T 6402 Steel forgings - Method for ultrasonic examination

GB/T 7324-1994 General purpose lithium lubricating grease

GB/T 7984 Conveyor belts - Specification for rubber or plastics covered conveyor belts of textile construction for general use

GB/T 8923-1988 Rusting rating and derusting rating of steel surface before application (eqv ISO 8501-1:1988)

GB/T 9239.1-2006 Mechanical vibration - Balance quality requirements for rotors in a constant (rigid) state - Part 1: Specification and verification of balance tolerances

GB/T 9286-1998 Paints and varnishes - Cross cut test for films (eqv ISO 2409:1992)

GB/T 9770 Steel cord conveyor belts for general use

GB/T 9867 Rubber - Determination of abrasion resistance

GB 11211 Rubber vulcanized - Determination of adhesion to metal - Tension method

GB/T 11345-1989 Method for manual ultrasonic testing and classification of testing results for ferritic steel welds

GB/T 13306 Nameplate

GB/T 13384 General specifications for packing of mechanical and electrical

product

GB/T 13792 Welded steel pipe for supporting roller of belt conveyor

GB 14784 Safety regulations of belt conveyor

JB/T 6406 Electro-hydraulic drum brakes

JB/T 7020 Electro-hydraulic disc brakes

JB/T 7330 Motorized pulley

JB/T 8869 Steel flex couplings

JB/T 9000 Fluid couplings - General specification

JB/T 9002 Gearboxes for transportation machinery

JB/T 10064 General technical specifications for A-type pulse-echo supersonic flaw detector

3 Basic parameters

3.1 Belt width

The belt width of the conveyor shall meet the requirements of Table 1.

Table 1 mm

Belt width	300, 400, 500, 650, 800, 1000, 1200, 1400, 1600, 1800, 2000, 2200, 2600, 2800

3.2 Nominal belt speed

The nominal belt speed of the conveyor shall meet the requirements of Table 2.

Table 2 mm/s

Nominal belt speed	0.2, 0.25 0.315, 0.4, 0.5, 0.63, 0.8, 1.0, 1.25, 1.6, 2.0, 2.5, 3.15, 3.55, 4.0, 4.5, 5.0, 5.6, 6.3, 7.1

3.3 Roller

3.3.1 The roller diameter of the conveyor shall meet the requirements of Table 3.

Table 3 mm

Roller diameter	200, 250, 315, 400, 500, 630, 800, 1000, 1250, 1400, 1600, 1800

4.3.1 The driving device shall not have oil leakage.

4.3.2 After brake wheel in installed, the ex-circle radial circular run-out shall comply with the level-9 precision in GB/T 1184-1996.

4.3.3 After backstop is installed, the conveyor shall run smoothly; in backstop state, it shall be reliably and safely.

4.3.4 The installation of the elastic coupling shall comply with the requirements of GB/T 4323, GB/T 5014, GB/T 5015 and GB/T 5272.

4.3.5 Radial displacement of the Oldham coupling shall be not more than 1.0 mm; the angle between two axes shall be not more than 0°30'.

4.3.6 The installed serpentine coupling shall comply with the requirements of JB/T 8869.

4.3.7 Surface run-out and radial run-out of the chain coupling shall be 0.10 mm.

4.3.8 The assembled disk brake shall comply with the requirements of JB/T 6404.

4.3.9 The assembled disk brake shall comply with the requirements of JB/T 7020. At braking, the contact area between the brake block and brake disc shall be not less than 80%.

4.3.10 The assembled liquid coupling shall comply with the requirements of JB/T 9000.

4.3.11 The assembled retarder of conveying machinery shall comply with the requirements of JB/T 9002; other retarders shall comply with the requirements of relevant standard.

4.3.12 The electric roller shall comply with the requirements of JB/T 7330.

4.4 Roller

4.4.1 The minimum wall thickness b_1 of the roller skin shall comply with requirements of formula (1).

$$b_1 \geq b - 1 \quad \text{.....(1)}$$

Where:

b - nominal wall thickness of the roller skin, in mm.

4.4.2 Steel casting flanges of the roller shall comply with the following requirements:

GB/T 7984 and GB/T 9770.

4.7 Steel casting for conveyor

The important positions of the steel casting for conveyor shall be free from influential gas cavity and pores. The total area of the gas cavity and pores at secondary positions shall not exceed 5% of the defected area; the recessed depth shall not exceed 1/5 of the wall thickness and there shall be not more than 3 defects on each casting.

4.8 Forging steel for conveyor

The major forging steel of the conveyor shall be free from lamination, folding, crack and scar etc.

4.9 Metal structure for conveyors

4.9.1 The metal structure shall be welded according to the requirements of GB/T 985 and GB/T 986. There shall no burn-through, crack or incomplete fusion on the welded joint.

4.9.2 The two corresponding planes on the head and tailstock of the conveyor for installing bearing block shall be at grade. The planeness, deviation of the corresponding spacing between holes and difference of the diagonal length shall comply with the requirements of Table 16.

4.9.3 The straightness of the conveyor's intermediate rack is equal to 1/1000 of the full length. The difference of diagonal length shall be not more than 3/1000 of the mean value of two diagonal lengths.

4.9.4 The outside surface of the hopper and shield of the conveyor shall be smooth without obvious hammer trace or scar.

Table 16

Band width	≤800	>800
Planeness of corresponding planes	1.0	1.5
Deviation of corresponding spacing between holes	±1.5	±2.0
Difference of the diagonal length of hole	≤3.0	≤4.0

4.10 Safety protection system

4.10.1 The safety protection system of conveyor shall comply with the requirements of GB 14784.

4.10.2 Install emergency stop switch near the transfer station where the operators work. Set up the stay guard along the sidewalk of the conveyor. If there are sidewalks at both sides of the conveyor, set up the stay guard along the sidewalk as well.

4.10.3 Install off tracking detection device symmetrically at the head, tail and racks on both sides of the convex arc section. For long distance conveyors, add the off tracking detection device symmetrically on the intermediate section of the conveyor.

4.11 External coating

4.11.1 Derusting

The derusting grade shall comply with grade-Sa $2\frac{1}{2}$ or grade-St3 in GB/T 8923-1988.

4.11.2 Coating

4.11.2.1 Use the priming to coat the derusted surface within 6h. In the process of painting, select a clean place withe the ambient temperature at above 5°C, humidity at below 85% and working surface temperature not exceeds 60°C.

4.11.2.2 With no special requirements, paint the conveyor components with priming once (exclusive of maintenance primer) and finish coat twice. There shall no lacquer leakage. Each oil paint layer shall be different from others. Thickness of the coating dry film of each oil paint shall be 25μm~35μm; the total thickness of the coating dry film shall be not less than 75μm.

Paint the anti-rust paint or finish coat on the smooth roller and working face of idler roller. Use the anticorrosive paint to paint the inner wall of the idler roller.

Paint the protective grease on the exerted matching iris surface; paint the exerted non-matching iris surface (including the rack) with finish coat or prim

4.11.2.3 The coating of the first layer intermediate layer shall be free from pinhole, bubble, crack, shed, sagging and miss-coating etc.; the finishing coat shall be uniform, bright and integral.

4.12 Assembling and Installation

4.12.1 General assembly may not be done in the manufactory, while the driving device shall be assembled or trial assembled before leaving factory.

4.12.2 Floating amplitude of the floating-type driving device shall not be more than 2.0 mm.

4.12.3 Central line linearity of the conveyor rack shall comply with the requirements of Table 17; it shall guarantee that the linearity is 5 mm within any 25m.

Table 17

Conveyor length S/m	S≤100	100<S≤300	300<S≤500	500<S≤1000	1000<S≤2000	S>2000
Linearity/mm	10	30	50	80	150	200

Where:

F - rotation resistance of roller, in N;

F_{RL} - arithmetic mean value of the dynamometer reading when the roller rotates around, in N;

l - length of the force arm, in mm;

d - roller diameter, in mm.

5.2 Dustproof and Waterproof test of idler roller

5.2.1 Dustproof test

Place one end of the roller into a smut-with seal box whose granularity is less than 0.634mm, the smut quantity shall be 20% of the dust room cubage.

The electric motor drives the roller operate continuously for 200h at a rotational speed of 600r/min, the watch whether there is smut in the shaft bearing or lubricating grease.

5.2.2 Waterproof test

5.2.2.1 Dustproof idler roller

Install a simulated rain device on the water proof test platform (flow rate 0.45L/min).

The electric motor drives the roller operate continuously for 72h at rotation speed of 600L/min; inspect whether there is water in the shaft bearing and seal cavity; and inspect the water inflow.

5.2.2.2 Waterproof idler roller

Install a water tank on the waterproof test platform; the surface height of the water tank shall be the same as the centre height of horizontal roller.

The electric motor drives the roller operation continuously for 24h at a rotational speed of 600 r/min; watch there is water in the shaft bearing cavity.

5.2.2.3 Roller inflow

Calculate the roller inflow according to Formula (4):

$$m = m_1 - m_0 \quad \text{.....(4)}$$

Where:

m - roller inflow, in g;

e) inspect the adhesion and thickness of paint film.

6.2 Type test

6.2.1 Carry out the type test if any of the following occasions occurs:

a) trial prototype verification of new product or old product that is transferred to another factor;

b) property of the products may be influenced by the structure, material, production process etc. after formal production;

c) products went out production one year ago and production is resumed;

d) The exit-factory test results has significant difference with the last type test;

e) The state quality supervision organization raises a requirement for type test.

6.2.2 The type test items are as follow:

a) All of exit-factory inspection items;

b) overall performance inspection;

c) dynamic rotation resistance test of the idler roller;

d) dustproof and water proof test of the idler roller;

e) axial carrying capacity test of the idler roller;

f) drop test of the idler roller.

6.3 Random test method

6.3.1 Inspect the idler rollers randomly according to the general inspection (level II) of GB/T 2828.1-2003 and AQL=10 in the sampling scheme of first normal inspection.

6.3.2 Select any three kinds of rack of the conveyor; inspect the thickness and adhesion of the paint film.

6.3.3 The type test items to be tested can be corresponding to the quality of components for a piece of complete machine; as for idler and supports with large quantity, it may test any 20 randomly.

7 Mark, packing and storage

7.1 Nameplate

7.1.1 Fix the product nameplate on the transmission roller of each conveyor; it shall

7.2.6 Tension device

7.2.6.1 Deliver the spiral tension device (including turnabout roller) after being assembled on the tailstock.

7.2.6.2 The hanging steel wire rope, twine keeper, turnabout pulley and long bolt etc. of the tension device shall be delivered in cases.

7.2.6.3 As for the car-type tension device, its hoisting equipment shall be delivered after being assemble. The winding drum, support, pulley and support shall be delivered after being assemble. While fore the hydraulic ram, sensor, tension display, hanging steel wire rope and twins keeper etc. They shall be delivered in cases.

7.2.7 Various protection device

All classes of protection devices shall be delivered in case.

7.2.8 Conveyor belt

The conveyor belt shall be winded up tidily on the pivot, covered and fixed firmly.

7.2.9 Exit-factory files

7.2.9.1 Conveyor cannot be delivered before being tested qualitied by technical inspection department of the manufacturer.

7.2.9.2 Generally, the technical documents for production of each conveyor shall include the following items (other items can also be added according to the specific circumstances):

a) packing list;

b) quality certificate of product;

c) product description;

d) installation diagram of product;

e) others.

7.3 Storage

7.3.1 Rain-resistant measures shall be adopted during the maintaining period of the conveyor. For open-air storage, well ventilated and non water-logged package shall be adopted; rust protection shall be adopted for long-time storage.

7.3.2 Idler rollers shall be sealed in storage. All racks hall be kept on even ground with covers so as to prevent distortion and rustiness.

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