JB

INDUSTRY STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

ICS 53.080
J 83
Record No.: 34936-2012

JB/T 11270-2011

Assembled steel rack structure for high-bay warehouse - Technical requirements

立体仓库组合式钢结构货架 技术条件

Issued on: December 20, 2011 **Implemented on: April 01, 2012**

Issued by: Ministry of Industry and Information Technology of the People's Republic of China

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Foreword

This Standard is drafted in accordance with the rules given GB/T 1.1-2009.

This Standard is proposed by China Machinery Industry Federation.

This Standard is proposed by Technical Committee on Machinery Industry Logistics Storage Equipment of Standardization Administration of China (CMIF/TC 10).

Responsible drafting organizations of this Standard: Beijing Materials Handling Research Institute Co., Ltd., Jingxing Logistics Equipment Engineering Co., Ltd.

Participating drafting organizations of this Standard: Nanjing Inform Logistics Equipment Engineering Co., Ltd., Shanghai Top Tiger Industrial Equipment Co., Ltd.

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This Standard is issued for the first time.

Assembled steel rack structure for high-bay warehouse - Technical requirements

1 Scope

This Standard specifies the technical requirements, test methods, testing rules, markings, packaging, transportation and storage of assembled steel rack structure for high-bay warehouse.

This Standard applies to the assembled rack for high-bay warehouse using storage/retrieval machines to store and retrieve cargos through roadways, and the load carrying capacity of unit location does not exceed 3 000 kg.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the dated edition cited applies. For undated references, the latest edition of the referenced document (including all amendments) applies.

GB/T 700-2006 Carbon structural steels

GB/T 1231 Specifications of high strength bolts with large hexagon head, large hexagon nuts, plain washers for steel structures

GB/T 1591-2008 High strength low alloy structural steels

GB/T 3098.1-2010 Mechanical properties of fasteners - Bolts, screws and studs

GB/T 3632 Sets of torshear type high strength bolt hexagon nut and plain washer for steel structures

GB/T 5117 Carbon steel covered electrodes

GB/T 5118 Low alloy steel covered electrodes

GB/T 8110 Welding electrodes and rods for gas shielding arc welding of carbon and low alloy steel

GB/T 9286-1998 Paints and varnishes - Cross cut test for films

GB/T 10045 Carbon steel flux cored electrodes for arc welding

3.6

diagonal brace

Diagonal member installed in upright frames.

3.7

beam

Main component vertically connected to uprights, directly bearing the vertical load of the cargos in the cell, generally arranged along the *X*-direction.

3.8

beam connector

Connector fixed to the end of beams, and connected to uprights.

3.9

horizontal bracing

Paired diagonal members horizontally arranged at every certain height, so as to connect the adjacent upright frames together, in order to increase the overall rigidity of the rack structure in the horizontal plane.

3.10

back bracing

Paired diagonal members arranged on the cell back of suitable location, so as to connect the adjacent upright frames together, in order to increase the overall rigidity of the rack structure in the vertical plane.

3.11

bracket

Overhang connector connected to uprights, with pallet rails installed at its end.

3.12

pallet rail

Rail connected to brackets, used to place pallets, along the storage/retrieval direction of storage/retrieval machine folks.

3.13

4.2 Materials

4.2.1 Requirements for main material

4.2.1.1 The main load-bearing structure of racking shall be made of steel with the mechanical properties not less than those of Q235 steel in GB/T 700-2006.

4.2.1.2 The rack structure for ambient temperature equal to or lower than -20 °C shall be made of steel with the mechanical properties not less than those of 16Mn steel in GB/T 1591 2008 or Q235-D grade steel in GB/T 700- 2006, and 16Mn steel shall have qualification guarantee of -40 °C Charpy impact test.

4.2.2 Requirements for steel surface

The depth of rust, pitting or scratches on the steel surface shall not exceed half the negative deviation of the steel thickness, and there shall be no delamination fault at the fracture.

4.2.3 Requirements for bolts

4.2.3.1 High strength bolts for racking assembly shall comply with the provisions of GB/T 1231, GB/T 3098.1-2010 (Class 8.8) or GB/T 3632.

4.2.3.2 Anchor bolts should use expansion anchor bolts or chemical bolts.

4.3 Manufacture

4.3.1 Requirements for upright punching

The upright punching spacing should be 50 mm, 75 mm and 100 mm.

4.3.2 Requirements for rolling

4.3.2.1 After the rolling of components, there shall be no cracks on the steel surface.

4.3.2.2 After the rolling of cross-type beams, the outer edge of the joint shall be tightly closed.

4.3.3 Requirements for cutting of components

The cutting of components shall strictly guarantee the component precision and the incision shall be neat; there shall be no flashes and burrs; the cross-section shall not be significantly deformed.

4.3.4 Requirements for straightness of components

After the component is cut, its straightness is $L/1\,000$ (L is the cutting length).

4.3.5 Manufacture of bolt holes

Measure at the joints of running rails, guide rails with a levelling ruler and feeler gauge.

5.3.4 Testing on the installation precision of running rails and guide rails

5.3.4.1 Distance between running rails and guide rails

Directly measure at the top tie of guide rails with a steel tape.

5.3.4.2 Horizontal dislocation

Measure at the top tie of guide rails by plumb bob method.

5.3.5 Testing on the height deviation of bracket pallet rails or beams in the same level of the racking

Directly measure on the top of bracket pallet rails or beams with a levelling ruler and feeler gauge.

5.3.6 Verticality deviation of upright frames

Measure at the highest point of upright frames by plumb bob method.

5.3.7 Testing on the deviation of the center-to-center distance at the bottom of uprights of adjacent upright frames

Directly measure at the bottom of racking with steel tapes or rulers.

5.3.8 Testing on the deviation of the dimension of B_1, B_2 (see Figure 6) with the center line of running rail as datum

Measure at the bottom of uprights of upright frames with rulers.

5.3.9 Testing on the deviation of the dislocation of upright frames in the same ray and in the same roadway

Measure with squares, rulers, with the center line of the running rail as the datum.

5.3.10 Testing on surface spraying quality

5.3.10.1 Testing on appearance quality

The surface spray quality shall be tested by visual inspection method.

5.3.10.2 Testing on coating thickness

The surface coating thickness shall be tested by thickness gauges.

5.3.10.3 Testing on coating adhesion

6.1.2.2 The inspection items of uprights are as follows:

a) The spacing of the first and the last holes of uprights;

b) The width of uprights;

c) The inside and outside bending of uprights.

6.1.2.3 The inspection item of beams is as follows:

The net length of beams.

6.1.2.4 The inspection item of brackets is as follows:

The net length of brackets.

6.1.2.5 Assemble the upright frames on site; after assembly, the inspection items are as follows:

a) The full length of upright frames;

b) The width of upright frames;

c) The height difference of upright frames' baseplates;

d) The verticality of the upright of upright frames and the floor;

e) The position dimension of each bolt hole.

6.2 Overall installation inspection of racking

The overall installation inspection items are as follows:

a) The installation precision of running rails;

b) The installation precision of guide rails;

c) The vertical distance deviation between running rails and guide rails;

d) The horizontal dislocation of running rails and guide rails (measured in *Z*-direction):

e) The height deviation of bracket pallet rail or beams in the same level of racking;

f) The verticality of the upright frames in *Z*-direction and the position limit deviation in *X*-direction;

g) The deviation of center-to-center distance at the bottom of uprights of adjacent upright frames;

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