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Freight Container Spreader

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Freight Container Spreader

1 Scope

This Standard specifies the classification, model, dimension, technical requirements, test methods, inspection rules, marking and transportation of the freight container spreader.

This Standard is applicable to fixed and telescopic single freight container spreaders. Other types of freight container spreaders (hereinafter referred to as spreader) can be used as a reference.

2 Normative References

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this document.

GB/T 985.1 Recommended Joint Preparation for Gas Welding, Manual Metal Arc

GB/T 985.2 Recommended Joint Preparation for Submerged Arc Welding

GB/T 1228 High Strength Bolts with Large Hexagon Head for Steel Structures

GB/T 1229 High Strength Large Hexagon Nuts for Steel Structures

GB/T 1230 High Strength Plain Washers for Steel Structures

GB/T 1413 Series 1 Freight Containers - Classification, Dimensions and Ratings

GB/T 1591 High Strength Low Alloy Structural Steels

GB 2893 Safety Colors

GB 2894 Safety Signs and Guideline for Use

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

GB/T 3766 Hydraulic Fluid Power - General Rules Relating to Systems

GB/T 3811 Design Rules for Cranes

GB 4208 Degree of Protection Provided by Enclosure (IP Code)

GB/T 5117 Carbon Steel Covered Electrodes

GB/T 5118 Low Alloy Steel Covered Electrodes

GB/T 6067 Safety Rules for Lifting Appliances

GB 8923 Rust Grades and Preparation Grades of Steel Surfaces before Application

GB/T 11345 Method for the Manual Ultrasonic Testing and Classification of Testing Results for Steel Welds

GB/T 14957 Steel Wires for Melt Welding

JB/T 7949 Weld Outer Dimensions for Steel Construction

CB/T 3123 Quality Specification of Flame Cutting Plane for Marine Rolling Steel

3 Terms and Definitions

For the purpose of this document, the following terms and definitions apply.

3.1 Freight container spreader

A lifting tool connecting with the above and the below by a hoisting machine and a lifting device. The lifting tool has a structure suitable for a freight container box body, and is connected with a corner piece of the box body through a twist lock at a corner portion to perform operations of the freight container lifting.

4 Classification, Model and Dimension

4.1 Classification

The basic types of freight container spreaders are as follows:

- a) Fixed container spreader: no special telescopic power unit, the geometric size of the freight container spreader remains unchanged;
- b) Telescopic freight container spreader: equipped with a mechanical or hydraulic telescopic mechanism, which can perform telescopic adjustment within the relevant range of 6.10m (20ft) and greater than 6.10m (20ft).

4.2 Model

5.2 Materials

5.2.1 The material of main parts (twist lock, ejector rod) shall have the certificate of conformity from the material manufacturer.

5.2.2 The yield limit of the material selected for the load-bearing structural members of the freight container spreader shall be no lower than 235 MPa specified in GB/T 1591. The steel should be de-rusted before use.

5.2.3 The twist lock shall be made of high-quality steel with a yield limit of no less than 450 MPa.

5.3 Structural parts

5.3.1 The cutting surface that affects the appearance quality and product performance shall be no lower than the Level-2 specified in GB/T 3123.

5.3.2 Welding rods, wires and fluxes shall comply with the provisions of GB/T 5117, GB/T 5118; and shall be matched with the material of the structural parts to be welded.

5.3.3 The shape of the weld bevel shall comply with the provisions of GB/T 985.1 and GB/T 985.2.

5.3.4 The quality of the butt welds of the stressed structural parts is no lower than the Level-I specified in GB/T 11345 and the Level-II specified in GB/T 3323.

5.3.5 The shape and dimensions of the welded joints and welds of the components shall comply with the provisions of GB/T 985.1 and JB/T 7949. All welds shall be free of missing welds, burn-throughs, cracks, unwelded penetrations, undercuts, slags, and the like defects that affect performance and appearance quality.

5.3.6 After welding, the bending and arching of the frame shall not exceed 1.5 ‰ of the center distance of the spreader in the length and width directions.

5.3.7 High-strength bolts, nuts, and washers used to connect metal structural parts shall meet the requirements of GB/T 1228 ~ 1230.

5.3.8 The telescopic boom or beam of the telescopic spreader body shall be provided with lifting ears for loading and unloading bulk cargo.

5.4 Mechanism

5.4.1 Twist lock device

5.4.1.1 Twist lock device can be divided into manual, semi-automatic and power twist locks.

5.4.3.1 The telescopic device of the spreader is mainly composed of a telescopic beam, a power device and a transmission device.

5.4.3.2 The telescopic performance of the spreader shall be smooth and free of obstruction.

5.4.3.3 The sliding surface between the telescopic beam and the fixed beam shall be equipped with abrasion reducing linings or rollers.

5.4.3.4 The coefficient of additional frictional resistance of the telescope should be 1.2~1.5.

5.4.3.5 Under the action of rated load, the deflection value, Y_L , of the telescopic beam is no greater than $L_c/700$ (L_c is the effective working length of the cantilever).

5.4.3.6 The chain for the telescopic device shall meet the design requirements and provisions of GB/T 3811.

5.4.3.7 Each chain shall be interchangeable, and an adjustable device shall be installed at the joint between the telescopic chain and the structure.

5.4.3.8 The safety factor of the chain shall be no lower than the safety factor of the lifting chain specified in GB/T 6067.

5.4.4 Hydraulic system

5.4.4.1 The hydraulic system shall conform to the provisions of GB/T 3766. Before assembly of the hydraulic system, the joints, pipelines and channels shall be cleaned without any dirt; after assembly, the system shall be cleaned and the cleaning oil shall be drained completely.

5.4.4.2 The main hydraulic components shall be accompanied by the certificate of conformity of the manufacturer.

5.4.4.3 The pipelines of the hydraulic system shall be shock-resistant, impact-resistant and leak-free.

5.4.4.4 The hydraulic system installed on the spreader shall adopt vibration reduction measures.

5.4.4.5 The filter element and hydraulic oil shall be inspected every 1000h of the hydraulic system operation interval, and those that are not qualified shall be replaced.

5.4.4.6 The installation of hydraulic oil pumps and motors shall be easy to install, inspect and replace.

5.4.5 Electrical system

5.6.3 An eye-catching safety sign shall be painted on the end of the telescopic beam, and the color of the safety sign shall comply with the provisions of GB 2893 and GB 2894.

5.7 Appearance quality and dimensions

5.7.1 The surface of all parts shall be flat, without obvious deformation and damage, and the welds shall be uniform and beautiful.

5.7.2 The color of the paint shall be uniform, without smearing, paint leakage and peeling.

5.7.3 Each fastener shall be free of looseness and neglected loading, and the exposed length of fasteners at the same location shall be the same.

5.7.4 The pipelines shall be arranged neatly and there should be no oil leakage.

5.7.5 The nameplates, performance tables, hoisting signs and function indicators shall be complete.

6 Test Methods

6.1 Twist lock mechanism

Put the four lock heads of the spreader into the corner hole of the container so that the spreader does not leave the box. Each time the twist lock mechanism moves, the four lock heads are rotated 90° synchronously, and the unlocking and locking indicators are displayed correctly, and the action is repeated. The continuous test is no less than 50 times, and there is no one mis-operation.

6.2 Guide plate device

Operate the movable guide plate, check that the flip angle and overall dimensions of the guide plate shall meet the requirements of 5.4.2.2 and 5.4.2.4.

6.3 Telescopic mechanism

6.3.1 The telescopic position of the spreader shall meet the design requirements and be positioned accurately.

6.3.2 The telescopic action shall be smooth and free, without looseness and abnormal noise, and without blockage during movement.

6.3.3 The telescopic time shall meet the requirements in Table 3.

6.3.4 The continuous test of the telescopic motion shall be done at least 100 times and

7.1.1 The type inspection shall be performed in one of the following cases:

- a) If there are major changes in structure, materials, processes, etc., which may affect product performance;
- b) A periodical inspection shall be carried out for five consecutive years of production or producing 100 units in the same batch;
- c) When the production is resumed after three years of shutdown;
- d) When a national quality supervision agency requests a type inspection;
- e) When the exit-factory inspection results are significantly different from the last type inspection.

7.1.2 The type inspection shall be carried out in accordance with the following provisions, and all inspection items shall be carried out on the same sample:

- a) Confirm that the material, size of the forged, cast and machined parts, as well as the quality of purchased shall meet the requirements of 5.2 and 5.3;
- b) Visual examine the shape, paint, component composition, relative position, fit state, connection state, tightening state, and lubrication state of the spreader, which shall meet the corresponding requirements of 5.4, 5.6, and 5.7;
- c) Inspect the quality of welds, which shall meet the relevant requirements of 5.3.4 and 5.3.5;
- d) All tests in Clause 6 shall be carried out, which shall meet the corresponding requirements in Clause 6.

7.2 Exit-factory inspection

7.2.1 Products shall not be shipped until they have passed the inspection by the inspection department, and the inspection department shall issue a product certificate.

7.2.2 Each spreader shall be inspected for welding quality and structural reliability in accordance with the requirements of 5.3.4, 5.3.5 and 5.3.6.

7.2.3 The reliability of the safety interlock shall be checked for each spreader in accordance with the requirements of 5.5.

7.2.4 Each spreader shall be inspected in accordance with the requirements of 7.1.2.

7.3 Lot approval and sampling

For batch production, one set from each batch is selected for all tests specified in 6.1~6.5.

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