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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB 4053.1-2009

Replacing GB 4053.1-1993

**Safety requirements for fixed steel ladders and platforms - Part
1: Steel vertical ladders**

固定式钢梯及平台安全要求 第1部分：钢直梯

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Foreword

This Part is mandatory except Clause 3. GB 4053 "Safety requirements for fixed steel ladders and platform" is divided into the following parts. - GB 4053.1 Steel vertical ladders; - GB 4053.2 Steel inclined ladders; - GB 4053.3 Industrial guardrails and steel platform. This Part is Part 1 of GB 4053 "Safety requirements for fixed steel ladders and platform". This Part is revision to GB 4053.1-1993 "Fixed steel vertical ladders". This Part replaces GB 4053.1-1993 "Fixed steel vertical ladders". Compared with GB 4053.1-1993, the main changes in this Part are as follows: - modified the requirements for materials; - added the provisions on load of ladder supports and their connecting parts; - added the provisions on inclination range of fixed steel vertical ladders; - modified the requirements for anti-rust and anti-corrosion; - added the requirements for lightning protection grounding; - modified the provisions on maximum height of the ladder and platform spacing; - modified the requirements that height of the cage ladder shall be set; - modified the provisions on inside clear width of ladder; - modified the provisions on rung spacing; - modified the provisions relevant to rung size; - added the requirements for rung size of the ladder used in abnormal environment; - modified the provisions on stile size; - added the size requirements for the

stile used in abnormal environment; - modified the provisions on cage component size; - modified the provisions on horizontal cage hoop spacing; - added the requirements for spacing and clearance of cage poles; - added the provisions on distance between cage poles and gap between cage components; - modified the provisions on height from the cage bottom to the bottom datum plane. This Part was proposed by State Administration of Work Safety. This Part shall be under the jurisdiction of National Technical Committee on Safe Production of Standardization Administration of China. Main drafting organizations of this Part. Jilin Institute of Safety Science and Technology, Changchun Industrial College, Changchun Institute of Technology. Main drafters of this Part. Xiao Jianmin, Zheng Fanying, Qu Sheng, Han Lianying, Sun Wei. Versions of standard substituted by this Part are. - GB 4053.1-1983; - GB 4053.1-1993. Safety requirements for fixed steel ladders and platform - Part

1 Scope

Part 1 of China's mandatory series on fixed steel ladders and platforms, covering the steel vertical ladder - the caged ladder bolted to the side of a tank, a silo, a stack or a machine, climbed with both hands by people carrying tools, and the item that appears in accident statistics out of all proportion to its cost. This part specifies the basic safety requirements for the design, the manufacture and the installation of steel vertical ladders, and it applies to the steel vertical ladders used in the workplaces of industrial enterprises unless a standard specifies otherwise. The whole part is mandatory apart from clause 3. The general requirements cover the materials, the loads the ladder and its supports and connecting parts must carry, the permitted range of inclination, the protection against rust and corrosion, and the lightning protection earthing, which follows GB 50057. The structural requirements, which occupy the second half, set the geometry that decides whether the ladder is climbable and survivable: the width of the ladder and the spacing and diameter of the rungs, the clearance behind the ladder and to the sides, the safety cage and where it must begin and end, the rest platforms and the maximum unbroken height between them, the landing and the handholds at the top, and the fixing of the ladder to the structure, with the erection quality accepted in accordance with GB 50205. Where a ladder discharges onto a platform the guardrails of Part 3 apply. Issued on 31 March 2009 and in force since 1 December 2009, it replaces GB 4053.1-1993; with respect to that edition the requirements on materials and on protection against corrosion were revised and provisions were added on the loading of the ladder supports and their connections, on the range of inclination and on lightning protection earthing.

This Part specifies basic safety requirements for design, manufacture and installation of steel vertical ladders. This Part is applicable to steel vertical ladders that are used in workplaces in industrial enterprises (unless otherwise specified by the standard).

2 Normative references

The provisions in following documents become the provisions of this Part of

GB 4053 through reference in this Part. For dated references, the subsequent amendments (excluding corrigendum) or revisions do not apply to this Part, however, parties who reach an agreement based on this Part 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 4053.3, Safety requirements for fixed steel ladders and platform - Part 3. Industrial guardrails and steel platform

GB 50057, Design Code for Protection of Structures against Lightning

GB 50205, Standard for acceptance of construction quality of steel structures

3 Terms and definitions

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

3.1 fixed steel ladder a ladder that is permanently installed on a building or equipment, forms an angle of 75° ~ 90° with the horizontal plane, of which the main components are made of steel (see Figure 1)

3.5 support a component that is used to fix a steel ladder to a building or equipment

3.6 handrail a component at the top of a steel ladder for climbers to hold

3.7 inside clear width the distance measured from the inside of the two stiles parallel to the rung, as ladder width for short

3.8 height of the ladder the vertical distance between the upper datum plane of a ladder and the lower datum plane, as ladder height for short

4.1 Materials

4.1.1 The mechanical properties of the steel used in steel ladder shall not be lower than Q235-B. The carbon content shall be guaranteed.

4.2 Inclination angle of steel ladder The steel ladder shall be parallel to its fixed structural surface and as vertical as possible to the horizontal plane. When limited by conditions and it cannot be perpendicular to the horizontal plane, the inclination angle between the plane of the centerline of the two ladder beams and the horizontal plane shall be in the range of 75° ~ 90° .

4.3 Design load

4.3.1 The design load of the stile is calculated according to 2kN of vertical concentrated live load on its upper end after assembly and fixing (the height is selected according to the distance between the supports; when there is no intermediate support, it is selected according to the distance between the fixed points). The flexural deformation in any direction shall not be more than 2mm.

4.4 Manufacture and installation

4.4.1 Steel ladders shall be welded. The welding requirements shall meet the requirements of GB 50205. When other methods are used for connection, the connection strength shall not be lower than welding. The installed ladder shall not be skewed, twisted, deformed or have other defects.

4.4.2 The manufacturing and installation process shall ensure that the surface

4.5 Anti-rust and anti-corrosion

4.5.1 The design of the fixed steel ladder shall minimize the accumulation of moisture to reduce the rust and corrosion of the ladder.

4.5.2 According to the use of steel ladder and environmental conditions, appropriate anti-rust and anti-corrosion coating shall be applied to the ladder.

4.5.3 Ladder used in the natural environment shall be coated with at least one primer and one (or multiple) topcoats. Or use hot-dip galvanizing or use equivalent metal protection methods.

4.5.4 For ladder used in continuous humid conditions, recommend to use hot-dip galvanizing, or use special coating or use corrosion-resistant materials.

5.1 Support spacing

5.1.1 For steel ladders without foundation, weld at least two pairs of supports to fix the stile to structures, buildings or equipment. The vertical distance between two adjacent pairs of supports shall be determined according to the cross-sectional size of the stile, the net width of the inside of the ladder and the pull-out load characteristics of the steel structure or concrete structure.

5.2 Space around ladder

5.2.1 For ladders without cages, the vertical distance from the centerline of the rung to the nearest continuous surface of the climbing surface shall not be less than 760mm. For discontinuous obstacles, the vertical distance shall not be less than 600mm.

5.2.2 The vertical distance from the centerline of the rung to the continuous surface of the building, structure or equipment behind the ladder shall not be less than 180mm. For