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(JMF)

**Safety of machinery — Permanent
means of access to machinery —
Part 4 : Fixed ladders**

ICS 13.110

Reference number : JIS B 9713-4 : 2004 (E)

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Health, Labour and Welfare and the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee according to the proposal of establishing a Japanese Industrial Standard from the Japan Machinery Federation (JMF) /the Japanese Standards Association (JSA), with a draft of Industrial Standard based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

This Standard has been made based on ISO/FDIS 14122-4:2002 *Safety of machinery—Permanent means of access to machinery—Part 4: Fixed ladders* for the purposes of making it easier to compare this Standard with International Standard; to prepare Japanese Industrial Standard conforming with International Standard; and to propose a draft of an International Standard which is based on Japanese Industrial Standard.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Ministers and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

JIS B 9713 consists of the following parts, under the general title "*Safety of machinery—Permanent means of access to machinery*":

Part 1: Choice of fixed means of access between two levels

Part 2: Working platforms and walkways

Part 3: Stairs, stepladders and guard-rails

Part 4: Fixed ladders.

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In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

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Safety of machinery—Permanent means of access to machinery—Part 4 : Fixed ladders

Introduction This Japanese Industrial Standard has been prepared based on the first edition of ISO/FDIS 14122-4 *Safety of machinery—Permanent means of access to machinery—Part 4: Fixed ladders* published in 2002 without modifying the technical contents.

The foreword of the original International Standard has been excluded because it is not part of the provisions.

This part of JIS B 9713 is a group safety standard and Part 4 of the series of standards in JIS B 9713.

The provisions of this document may be supplemented or modified by a product safety standard.

- Notes 1 For machines which are covered by the scope of a product safety standard and which have been designed and built according to the provisions of that standard, the provisions of that product safety standard take precedence over the provisions of this group safety standard.
- 2 This Standard requires the manufacturers to provide “safe access to operating position, servicing points and maintenance area” and to prevent “risk of slipping, tripping or falling”.
- 3 See also relevant matters described in 6.2.4 “*Provision for safe access to machinery*” of ISO 12100-2.
- 4 The use of materials other than metals (wood composite materials, so-called “advanced” materials, etc.) does not alter the application of this part of JIS B 9713.

Information : JIS Z 8051:2004 sets up the “hierarchy” of safety standards as follows:

- *basic safety standard*, comprising fundamental concepts, principles and requirements with regard to general safety aspects applicable to a wide range of products, processes and services;
- *group safety standard*, comprising safety aspects applicable to several or a family of similar products, processes or services dealt with by more than one committee, making reference, as far as possible, to basic safety standards;
- *product safety standard*, comprising safety aspect(s) for a specific, or a family of, product(s), process(es) or service(s) within the scope of a single committee, making reference, as far as possible, to basic safety standards and group safety standards;

The purpose of this Standard is to define the general requirements for safe access to machines mentioned in ISO 12100-2. Part 1 of JIS B 9713 gives advice about the correct choice of access means when the necessary access to the machine is not possible

directly from the ground level or from a floor.

1 Scope This Standard applies to all machinery (stationary and mobile) where fixed means of access are necessary.

This Standard applies to fixed ladders which are a part of a machine.

This Standard may also be applied to fixed ladders to that part of the building where the machine is installed, providing the main function of that part of the building is to provide a means of access to the machine.

Note 1 This Standard can be used also for means of access which are outside the scope of this Standard. In those cases the possible relevant national or other regulations should take precedence.

This Standard applies also to ladders which are not permanently fixed to the machine and which may be removed, moved to the side or pivoted (swivel-mounted) for some operations of the machine (e.g. changing tools in a large press).

For the significant hazards covered by this Standard, see clause 4 of JIS B 9713-1.

Note 2 The International Standard corresponding to this part of JIS B 9713 is as follows.

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and JIS are IDT (identical), MOD (modified), and NEQ (not equivalent) according to ISO/IEC Guide 21.

ISO/FDIS 14122-4:2002 *Safety of machinery—Permanent means of access to machinery—Part 4: Fixed ladders* (IDT)

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. If the indication of the year of publication is given to these referred standards, only the edition of the indicated year constitutes the provision of this Standard but the revision and amendment made thereafter do not apply. The normative references without the indication of the year of coming into effect apply only to the most recent edition (including amendments).

JIS B 9713-1 *Safety of machinery—Permanent means of access to machinery—Part 1: Choice of fixed means of between two levels*

Note : ISO 14122-1:2001 *Safety of machinery—Permanent means of access to machinery—Part 1: Choice of fixed means of between two levels* is identical with the said standard.

JIS B 9713-2 *Safety of machinery—Permanent means of access to machinery—Part 2: Working platforms and walkways*

Note : ISO 14122-2:2001 *Safety of machinery—Permanent means of access to*

machinery—Part 2: Working platforms and walkways is identical with the said standard.

JIS B 9713-3 *Safety of machinery—Permanent means of access to machinery—Part 3: Stairs, stepladders and guard-rails*

Note : **ISO 14122-3:2001** *Safety of machinery—Permanent means of access to machinery—Part 3: Stairs, stepladders and guard-rails* is identical with the said standard.

3 Terms and definitions For the purposes of this Standard, the terms and definitions given in clause 3 of **JIS B 9713-1** and the following apply.

The main terms used in this Standard are given as an example in figures 1, 2, 3 and 4.

Information : See **EN 1070** for relevant terms and definitions.

3.1 fixed ladder with two stiles ladder, according to 3.1 of **JIS B 9713-1**, which is stationary and where the rungs are arranged between and attached to the stiles. The stiles carry the load (see figure 2).

3.2 fixed ladder with one stile ladder, according to 3.1 of **JIS B 9713-1**, which is stationary and where the rungs are attached to both sides of the stile. The stile carries the load alone (see figure 3).

3.3 ladder flight continuous part of the fixed ladder (see figure 1):

- between arrival and departure area, in the case of ladders without platforms; or
- between the arrival area and departure area respectively and the nearest platform; or
- between rest platforms following each other

3.4 climbing height H of a fixed ladder total vertical distance between the walking surface of the arrival area at the top of the ladder(s) and the walking surface of the departure area at the base of the ladder(s) (see figure 1).

3.5 height h of the ladder flight vertical distance between the level at the beginning and the level at the end of each flight (see H , h_1 , h_2 , h_3 in figures 1a and 1b)

3.6 fall protection technical measure to prevent or reduce the risk of people falling from fixed ladders

Note : Commonly used fall protection devices are defined in 3.6.1 and 3.6.2.

3.6.1 safety cage assembly which serves to limit the risk of people falling from the ladder (see figure 2)

3.6.2 guided type fall arrester on a rigid anchorage line, fall arrester protective equipment fixed to ladder used in combination with personal protective equipment that everyone has available before being allowed to use the ladder. In the following text the abbreviation “fall arrester” will also be used for this type of fall protection device.

Information : See also definition in **EN 353-1** and **EN 363**.

3.7 arrival level the upper level of the surroundings or of the intermediate platform

to which, the person steps after the ascent (see figure 1)

3.8 departure level the lower level of the surroundings or of the intermediate platform from which the person starts to climb the fixed ladder (see figure 1)

3.9 intermediate platform horizontal structure (platform) between two consecutive flights of a ladder (used with ladders having staggered flights) (see figures 1b and 4b)

3.10 rest platform area equipped with the required protective means designed so that the user of the ladder can have a physical rest (see figures 1b and 10)

3.11 access platform horizontal structure at the arrival or departure area used by a person for means of access

3.12 trap door normally closed device which can be opened to give access through a platform or through other similar horizontal structures

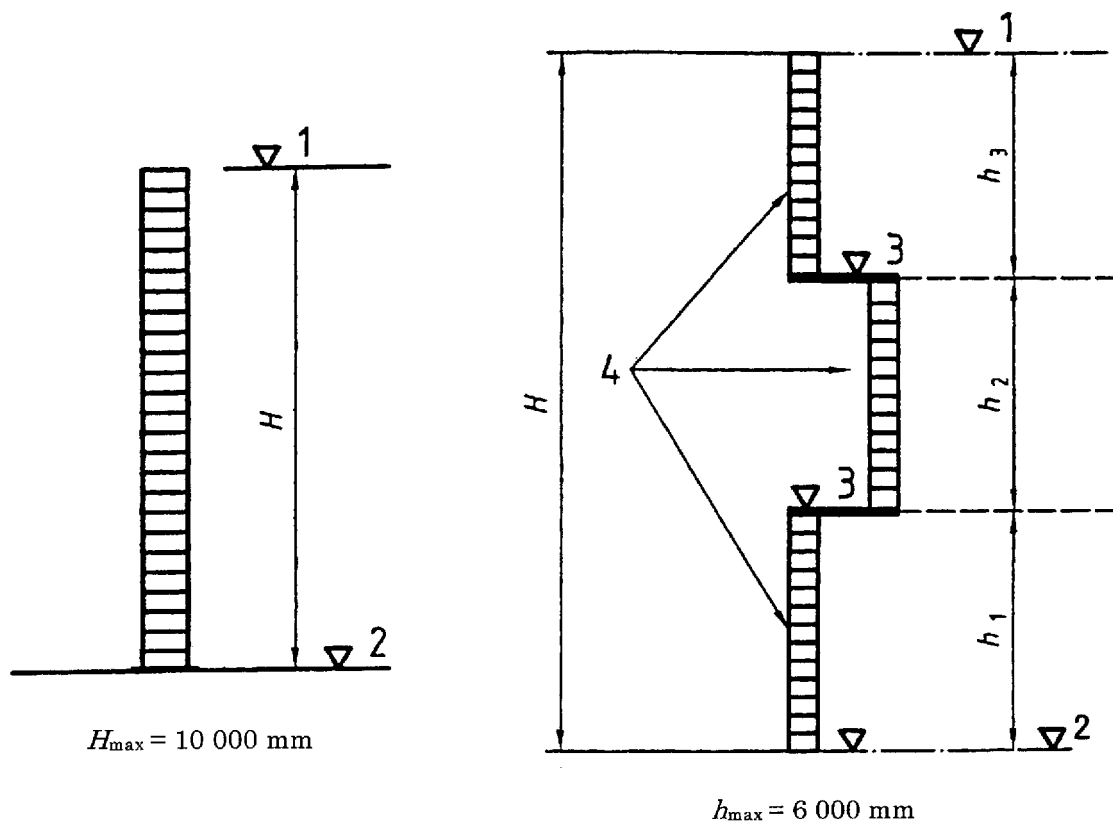
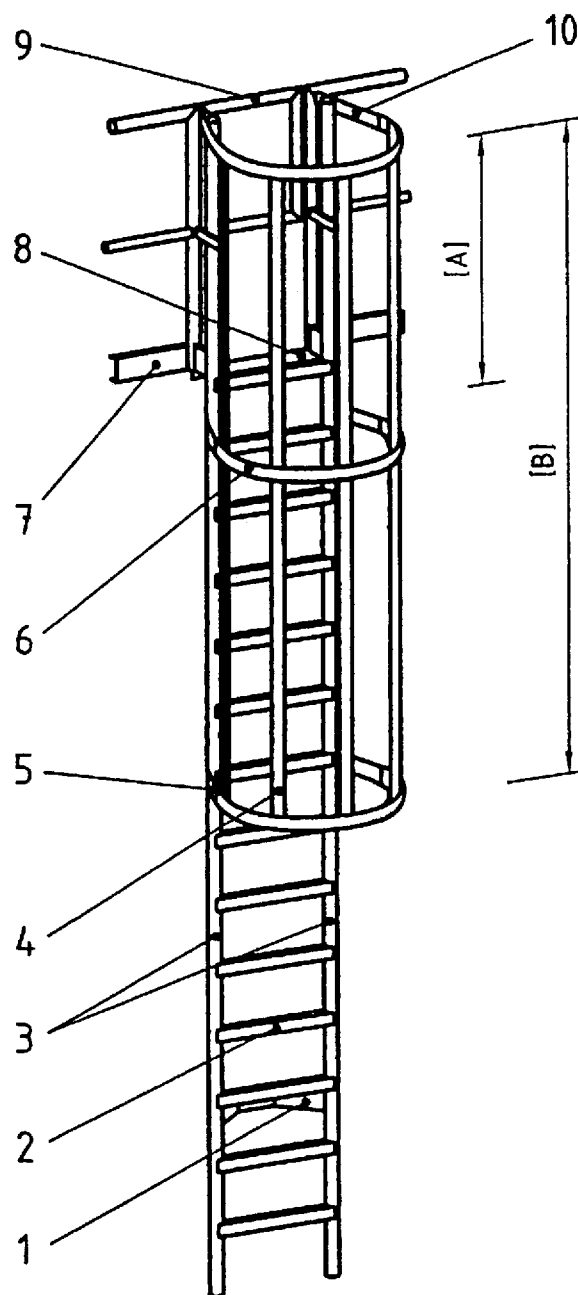
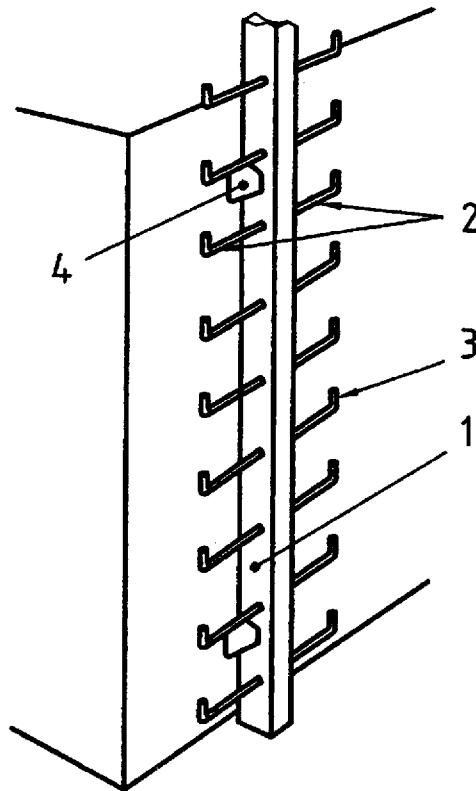


Figure 1 Height of flights and location of platforms



- Key
- 1 Anchor bracket
 - 2 Rung
 - 3 Ladder stile
 - 4 Safety cage vertical members
 - 5 Lowest hoop
 - 6 Intermediate hoop
 - 7 Toe plate
 - 8 Platform step
 - 9 Gate
 - 10 Upper hoop
 - [A] Exit section
 - [B] Safety cage

Figure 2 Terminology



Key

- 1 Stile
- 2 Rung
- 3 Protective device against slipping-off
- 4 Anchor point

Figure 3 Example of a ladder equal to or less than 3 000 mm with one stile

4 Safety requirements

4.1 General requirements The materials, dimensions of constituent elements and construction mode used shall meet the safety objectives of this part of JIS B 9713.

Ladders shall be designed to meet the same installation requirements as the machine, taking into consideration where necessary, conditions such as harsh environment, vibrations, etc.

As far as possible, fixed ladders should be designed with two stiles. In exceptional circumstances (e.g. a continuous ladder with a varying angle of pitch or insufficient space to provide two stiles), fixed ladders may be provided with only one stile.

All parts likely to be in contact with users shall be designed so as not to catch, hurt or hinder i.e. sharp corners, welds with burrs, or rough edges, etc. should be avoided. Opening or closing the mobile parts (gate) shall not cause further hazards (e.g. shearing or accidental falling) for persons using the ladder and those in the vicinity.

Fittings, hinges, anchor points, supports and mounting points shall hold the assem-

bly sufficiently rigid and stable to ensure the safety of users under normal conditions of use.

4.2 Strength of fixed ladders

4.2.1 General requirements A ladder, platform and safety cage (when installed) shall meet the following design requirements:

4.2.1.1 Ladder element The ladder elements are considered to fulfil the requirements mentioned in 4.2.1. The maximum deflection as indicated in 5.1 shall not exceed 50 mm.

Information 1 See 3.1 of EN 131-2 for the requirements for aluminium alloys, steels, plastics and wood used for ladder elements.

In case of fixed ladders with one stile instead of the lateral bending test a torsion test shall be made by application of two test loads each 400 N. The deflection of the ladder shall not exceed 20 mm (see 5.3.3 and figure 16). For the rungs, the load is applied on a length of 100 mm close to the lateral devices against slipping off. The residual deflection of the rungs shall be not more than 0.3 % related to the length of the rung (see 5.3.2, and figure 15).

Information 2 See 4.4 of EN 131-2 for the details of the lateral bending test.

4.2.1.2 Safety cage The safety cage is considered to meet these requirements if the permanent deformation as the result of a vertical load of 1 000 N is not more than 10 mm and as the result of a horizontal load of 500 N is not more than 10 mm. (see 5.2 and figure 13).

4.2.1.3 Fixed ladders equipped with a fall arrester In addition to the requirements of 4.2.1.1, the combination of fall arrester and ladder shall be capable of stopping the user from falling (see clause 5).

4.2.2 Fixing elements

4.2.2.1 General Fixing elements such as fittings, anchorage points, hinges, supports and mountings shall hold the assembly sufficiently rigid and stable to ensure the safety of user under normal conditions of use (see verification in 5.4).

In case of fixed ladders equipped with a fall arrester the connecting elements shall withstand the stresses caused by the fall arrester catching the person who falls down.

4.2.2.2 Anchoring points of fixed ladders The anchoring points and connections to them shall be capable of supporting 3 000 N per stile. Up to four anchorages may be considered to contribute to this support (see 5.4 for the test method).

4.2.3 Platforms All platforms shall comply with the requirements of JIS B 9713-2.

Unit: mm

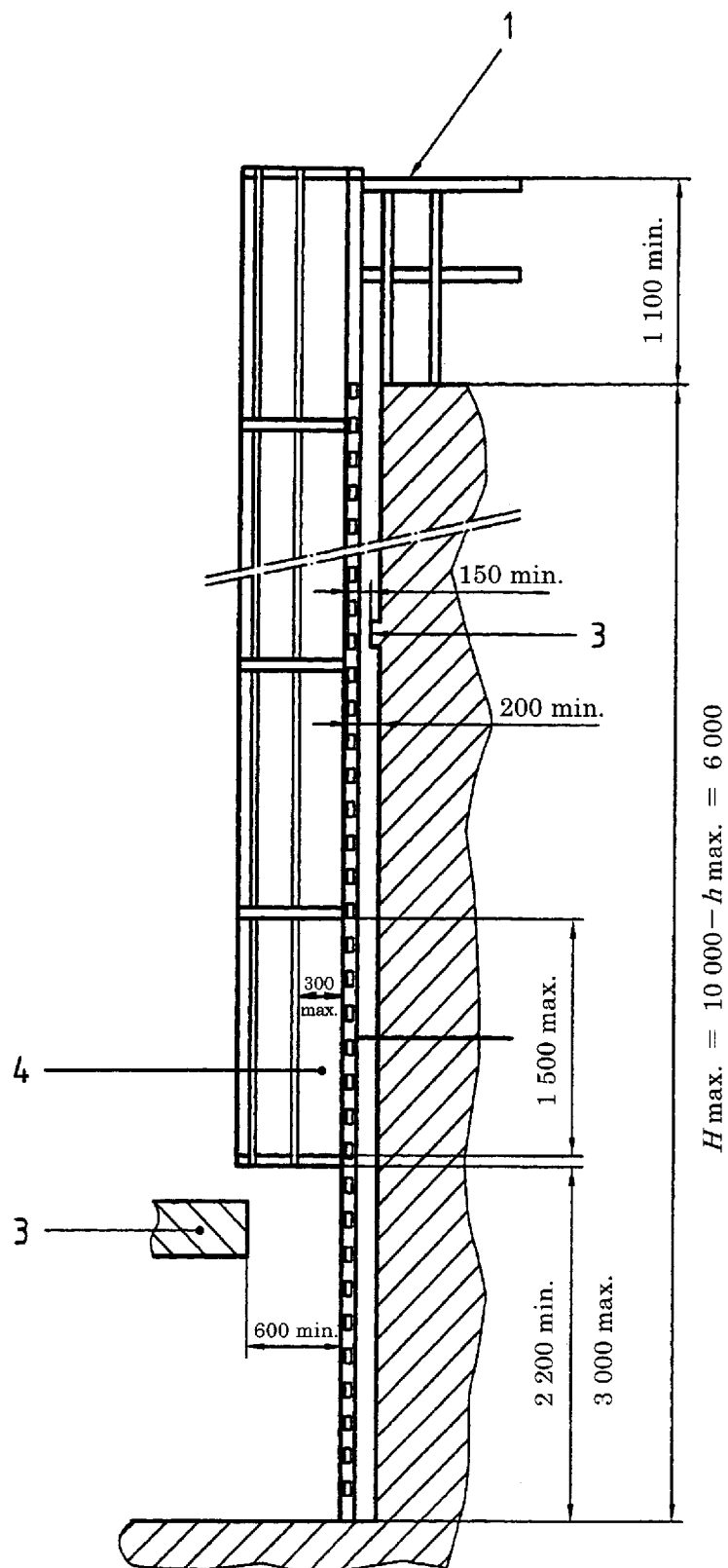


Figure 4.a Side elevation on ladder with a safety cage

Figure 4 Principal dimensions of ladders and safety cages