ASAE S412.2 APR2020
Ladders, Cages, Walkways and Stairs

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ASABE, 2950 Niles Road, St. Joseph, MI 49085-9659, USA, phone 269-429-0300, fax 269-429-3852, hq@asabe.org

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Proposed initially by the Grain Bin Manufacturers Council of the Farm and Industrial Equipment Institute; approved by the ASAE Structures Group; approved by the ASAE Structures and Environment Division Standards Committee; adopted by ASAE, December 1981; reconfirmed December 1982, December 1984, December 1985, December 1986, withdrawn as ASAE publication June 1988; S412.1 developed by the Grain Bin Ladders, Cages and Walkways Subcommittee of the ASAE Structures Group; approved by the Structures and Environment Division Standards Committee; adopted by ASAE March 1990; revised editorially January 1991; reaffirmed December 1994, December 1995, December 1996, December 1997, February 2003, February 2008; revised April 2020.

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1 Purpose and scope

1.1 The purpose of this Standard is to promote personal safety to owners or operators who use ladders and stairs that are attached to agricultural structures.

2 Normative References

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

OSHA 1910 Subpart D — Walking Working Surfaces, January 17, 2017 (Federal Register Volume 81, No. 223)

NOTE: Regarding the use of ladders, cages, walkways, stairs, platforms and fall protection, the requirements outlined in OSHA 1910 Subpart D — Walking Working Surfaces, shall be applied to agricultural structures. Requirements outlined in this standard are intended to supplement but not supersede the requirements of OSHA 1910 Subpart D.

3 Definitions

3.1 Agricultural structure: A shelter for farm animals or crops; or when incidental to agricultural production, a shelter for processing or storing products of farm animals or crops, or for storing or repairing agricultural equipment. An agricultural building is not for use by the public, or for human habitation.

3.2 Catwalk: A raised walkway which may be positioned horizontally or at an incline up to 15 degrees.

3.3 Silo chute: A multipurpose enclosure mounted on the exterior wall of tower silos used for the discharge of stored materials, access into the structure for adjustment and maintenance of silo filling and discharge equipment, and/or various functions appurtenant to proper utilization of the structure.

3.3.1 Chute ladder: A series of uniformly spaced individual steps or rungs, which may or may not have a side rail relationship, incorporated into a silo door assembly, serving the purpose of hinging and/or latching and/or removing said silo door(s) assembly.

3.4 Eave line: The intersection of the roof and the structure wall.

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3.5 External ladder: A ladder attached to the outside of a structure.

3.6 Fastening: Attaching a ladder, cage or other component to a structure.

3.7 Grain bin: A structure for the storage of grain.

3.8 Internal bin wall ladder: A ladder attached to the interior surface of a grain bin wall.

3.9 Landing platform: An elevated horizontal surface area that provides access/egress for a fixed ladder.

3.10 Roof cleats: A member fastened to the inclined roof of a structure for ascent or descent.

3.11 Roof slope: Degree of deviation of the roof from the horizontal.

3.12 Silo: A cylindrical structure of which the design intent is to be used for storage of high moisture forage, silage and high moisture grain.

3.13 Silo door: Generally a rectangular shaped door mounted flush to interior wall and opening inwardly, which as a unit consists of a dual rung and/or hinge assembly and latching device(s), and specifically designed to perform the purposes as specified in paragraph 3.3.1.

3.14 Splice: A device for connecting adjoining members.

3.15 Vertical entry and exit platform: An elevated horizontal surface area specifically designed to allow access/egress through a hinged door.

4 Fixed ladder requirements

4.1 Performance requirements

4.1.1 The ladder rung shall be capable of sustaining a minimum 1100 N (250 lbf) concentrated live load applied to cause maximum stress on the member.

4.1.2 The side rails and fastenings shall be capable of sustaining two live loads of 1100 N (250 lbf) each concentrated between any two consecutive fastenings plus the weight of the ladder and attachments and each applied to cause maximum stress in the members.

4.1.3 Additional live loads resulting from a uniform coating of ice on the ladder (as recommended by ASCE 7-10, Chapter 10, Ice Loads — Atmospheric Icing), and wind loads on the ladder, should be considered in the ladder design.

4.1.4 Anticipated impact loads resulting from the use of ladder safety systems shall be considered in the ladder design.

4.1.5 Ladder splice connections shall be capable of resisting a minimum total live load of 2200 N (500 lbf) at each individual splice plus the weight of the ladder and attachments applied to cause maximum stress in the members.

4.1.6 The top of the ladder must be placed with the two side rails supported by the structure.

4.2 Rungs

4.2.1 The vertical spacing of the first rung of climb shall be permitted to be adjusted within the range of 350 mm (14 in.) (from ground level, floor or roof) at the access level. Other than the first rung the distance between rungs of wall ladders shall be a maximum of 300 mm (12 in.). Rung spacing shall be uniform throughout the length of the ladder (see Figure 1).

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