



October 30th, 2009

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State of California
Department of Industrial Relations
Occupational Safety and Health Standards Board
2520 Venture Oaks Way, Suite 350
Sacramento, California 95833

**OCCUPATIONAL SAFETY AND HEALTH
STANDARDS BOARD**

Re: Petition to Adopt Standard for Chain and Cable Ladders within the Petrochemical Industry

Dear Sir/Madam:

Chain and cable ladders, within the petrochemical industry, are sometimes required to perform maintenance inspection and repair work. An example of this is the inspection and repair of a cyclone within a pressure vessel. Fixed and/or portable ladders and scaffolding are too large to allow the necessary access to perform any inspection or repair work. The use of a chain and/or cable ladder in this situation is the only feasible choice.

Currently, there are no California regulations or ANSI or American Ladder Institute standards that govern the manufacturing and safe use of chain and cable ladders for the petrochemical industry. The lack of safety regulations for this type of apparatus can potentially pose a threat to a worker's safety if the chain and/or cable ladder is not manufactured properly, not in good condition, or used improperly. The attached proposed chain and cable ladder standard has been written to address those safety issues and concerns.

Please consider adopting this standard.

Sincerely,

A handwritten signature in blue ink that reads 'Colleen P. Kraus'.

Colleen P. Kraus
Process Safety Design Director
(707) 745-7575

Chain and Cable Ladder Specification

1.0 Scope

This specification applies to flexible chain or cable ladders, also known as "Jacob's ladders", for use within the petrochemical facilities.

2.0 Applicability

Chain or cable ladders shall be used only in those situations where other alternatives, such as rigid portable ladders, are not feasible. Some examples of these types of situations are cyclones that are internal to a pressure vessel.

3.0 Requirements

3.1 Materials

- 3.1.1 Chain – the vertical chain stringers shall be of galvanized steel and be free of projecting wire ends.
- 3.1.2 Cable – the vertical cable stringers shall be of steel and be free of projecting ends.

3.2 Structure

- 3.2.1 The ladder shall consist of two chain or cable stringers, spacer disks, rungs, and lashing rings and fittings.
- 3.2.2 Rungs – The ladder rungs shall be made of steel pipe, not exceeding $\frac{3}{4}$ " inside diameter, or sheet steel. Rungs shall be so constructed as to withstand the test specified in section 5.0. The length of the rungs shall be such as to space the stringer chains or cables not less than 15 inches or more than 16 inches center to center. The rung ends shall be uniformly spaced not over 14 inches center to center. The rung ends shall be slotted to fit closely the chain or cable stringers to prevent rotation of the rungs.

The distance between the top attachment and the first rung shall be such as to provide a rung spacing of approximately 14 inches to allow one ladder to be connected to another by means of connecting links.

- 3.2.3 Stringer – Ladders shall have two vertical stringers of chain or cable.
- 3.2.4 Lashing rings and fittings – The upper and lower ends of each stringer chain or cable shall have a 3/8 by 3 inch diameter lashing ring. The lower lashing ring shall be installed within 3 inches of the lower rung. Reinforcing thimbles shall be provided on the chain or cable links in way of the lashing rings to prevent wear on the chain or cable links. The rings at the upper end of the stringer chains or cables shall be fitted with a sister hook or a shackle. The rings at the lower end of the stringer chains or cables shall be provided with 1/4 inch connecting links. Shackle must have cotter pin, wire, or other reliable method to ensure it doesn't loosen.
- 3.2.5 Spacer Disks – Spacer disks shall be provided at the ends of each rung, flush to the chain or cable stringer, to prevent movement of the stinger, and shall be securely welded to the ladder rung with a 1/16 inches minimum size fillet weld. The steel shall be not less than 0.074 inch thick strengthened by means or a flanged edge not less than $\frac{1}{4}$ inch in inside

depth. The width of the spacer disks shall be such that the center line of the rungs is held at a minimum of 2.5 inches from the side of a vessel.

4.0 Inspection

- 4.1 Annual Inspection - Chain or cable ladders shall be inspected and documented annually. The inspection will consist of a visual inspection, a dimensional examination, and load testing. If the ladder fails any of these inspections, the ladder must be immediately taken out of service.
- 4.2 Before Use Inspection – Chain or cable ladders shall be visually inspected before each use. If the ladder fails the visual inspection, the ladder must be immediately taken out of service.

5.0 Testing

5.1 Load Testing

- 5.1.1 Rungs – One steel rung from the ladder shall be supported at its extremities and a 500 pound static load applied to a 5 inch width of contact at the center of the rung. If the rung fails to support the load or fails to return to its original shape or form under test, the ladder must be taken out of service permanently.
- 5.1.2 Ladders – The ladder shall be suspended vertically, with the top lashing rings at full length and free of any obstruction. A total static load of 2000 pounds shall be distributed throughout the length of the ladder. The appearance of any defects, signs of weakness, or undue stretch or sag in the ladder under test shall result in the ladder being taken out of service permanently.

5.2 Dimensional Inspection - The ladder must be measured to ensure it meets the requirements of Section 3.0. If the ladder fails this inspection, the ladder must be taken out of service immediately.

5.3 Visual Inspection – The ladder must be taken out of service immediately if any of the following conditions exist:

- There are broken or split rungs.
- There are broken or split chains or cables in the stringer.
- It has other damaged sections or sharp/rough edges.
- Any hardware or fittings are not secure.
- Bent or dented rungs or rails.
- Ladder rungs are not free of grease, oil or other slip hazards.

6.0 Usage

- 6.1 The before use visual inspection must be completed and documented for each job on which the chain ladder is used.
- 6.2 The chain or cable ladder user shall wear a safety harness that is attached to a fall protection / rescue retrieval system at all times in order to use the chain or cable ladder.
- 6.3 The chain or cable ladder must be securely anchored at the top and at the bottom when possible prior to use, recognizing the chain or cable ladder will require the first and last person to use the chain or cable ladder without the bottom being anchored.

6.4 The chain or cable ladder user shall not have objects in their hands while ascending or descending the chain or cable ladder. Three points of contact should be maintained during ascending or descending the chain or cable ladder.

6.5 Chain or cable ladders cannot be used near energized electrical equipment where the ladder may come in contact with the energized electrical equipment.

6.6 Chain or cable ladders shall be cleaned of oil, grease, or slippery materials.

7.0 Employee Training

7.1 Employees using wire rope ladders shall be trained in the following:

7.1.1. Recognition of and preventive measures for the hazards associated with climbing chain and cable ladders. These hazards shall include but not necessarily be limited to fatigue hazards, falling hazards, slipping and tripping hazards, cuts and abrasion hazards, as well as hazards presented by the specific installation.

7.1.2 Inspection and correct use of the mandatory Personal Fall Arrest System shall be used with the ladder.

7.1.3. Climbing techniques.