

## G13.2(1)(b) Ladders in manholes

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Section 13.2(1) of the *OHS Regulation* states:

- (1) A ladder, window cleaner's belt or work platform must meet and be used in accordance with
  - (a) the applicable CSA or ANSI standard in effect when the equipment or structure was manufactured, except as otherwise determined by the Board,
  - (b) another standard acceptable to the Board, or
  - (c) if there is no applicable standard under paragraphs (a) or (b), the requirements of a professional engineer.

This guideline sets out a standard acceptable to the Board for the design and construction of an individual rung ladder in a manhole that is part of a water, sewer or storm sewer system. These manholes typically have an outside diameter of 48 inches or less, and may have a tapering cone section near the top. For these structures it is recognized that the amount of interior space for access and to perform work is limited and the access ladder arrangement needs to provide for safe access while not protruding unnecessarily into the entry and work space. The Board recognizes the *ASTM Specification C 478M Standard Specification for Precast Reinforced Concrete Manhole Sections* as a standard acceptable to the Board under section 13.2(1)(b) for an individual rung ladder in such manholes. (Note this version is the metric companion to *ASTM Specification C 478*, which is also acceptable to the Board.) This standard refers to an individual rung as a "step".

*ASTM Specification C 478M* was developed for manholes assembled using precast concrete components for the base, riser, cone, and top sections. Manholes are also assembled using components for these sections made from other materials. Manhole steps or individual rungs will be cast, mortared or attached by mechanical means to the walls of base, riser or cone sections. Steps or rungs in a manhole must meet the design, material, dimension, and testing and acceptance criteria of the *ASTM Specification C 478M*, regardless of the material used to make the risers or cone sections.

*ASTM Specification C 478M* requires steps in a manhole's base, riser(s) and conical top section **be aligned to form a continuous ladder with steps (rungs) equally spaced vertically** at a maximum spacing of 400 millimetres (16 inches). Rungs must project a minimum clear distance of 100 millimetres (4 inches) from the wall of the base, riser or cone section measured at the point of embedment or attachment. The minimum clear distance between the rung and the opposite wall of the riser or cone must be **450 millimetres (18 inches)** measured at the centre face of the rung. The minimum width of a step or rung is 250 millimetres (10 inches).

The maximum distance down from the entry level (rim of the manhole cover) to the centerline of the **first rung below entry level in any manhole should be 500 mm (20 inches) where no handhold is provided above the first rung. Where a handhold is provided between the entry level and the first rung, the maximum distance may be increased to not more than 660 mm (26 inches).**

*ASTM Specification C 478M* does not require any additional ladder safety features, such as a cage, rest platform or ladder climbing device, regardless of the length of climb. Safety cages and rest platforms should not be used in a manhole as they may impede rescue or retrieval procedures. A worker entering a deep manhole, such as one more than 5 metres (16 feet) deep, should use a personal fall protection/rescue harness system which will arrest a fall and allow for rescue/recovery if necessary. Such systems are often part of the employer's confined space entry program for work in and around manholes.

A worker assigned to enter manholes should receive training that includes awareness of the limited step depth and width for manhole rungs and the need to proceed cautiously when climbing into or out

of a manhole. Training should also include procedures to assess the integrity of the steps or rungs when going into a manhole that has not been entered for a while, as rungs may have deteriorated due to corrosion or become loose due to deterioration of the supporting concrete or other material in the riser or cone sections.

The above acceptance of *ASTM Specification C 478M* is intended to apply to manholes where entry into such manholes is infrequent; for example, access to manholes is typically in the range of once or twice per year. If more regular access is required, such as monthly or more frequently, ladder access meeting the requirements of *ANSI Standard A14.3 American National Standard for ladders-fixed-safety requirements* should be provided. It is not the intention of the Board to require existing manholes which are currently used frequently to be modified to accommodate a fixed ladder. However, new facilities where frequent entry is going to be made should be sized and installed with a proper fixed ladder. A ladder in a well or shaft is required to meet the ANSI standard.