

procedures in subpart 159.005 of this chapter.

(b) *Approval testing.* Each approval test must be conducted in accordance with § 160.017-21.

(c) *Approval of alternatives.* A chain ladder that does not meet the materials, construction, or performance requirements of this subpart may be approved if the application and any approval tests prescribed by the Commandant in place of or in addition to the approval tests required by this subpart, show that the alternative materials, construction, or performance is at least as effective as that specified by the requirements of this subpart. The Commandant may also prescribe different production tests if the tests required by this subpart are not appropriate for the alternative ladder configuration.

§ 160.017-11 Materials.

(a) *Suspension members.* Each suspension member of a chain ladder must be a continuous length of non-kinking chain, such as single loop lock link coil chain, with a minimum breaking strength of at least 16 kN (3,560 lbs.).

(b) *Metal parts.* Each metal part of a ladder must be made of corrosion-resistant metal or of steel galvanized by the hot dip process after the part is formed. If the ends of galvanized fasteners are peened over to lock them in place, a corrosion resisting surface treatment must be applied to each peened surface.

(c) *Wooden parts.* Each wooden part of a ladder must be made of hardwood that is free of defects affecting its strength or durability.

(d) *Wood preservative.* After each wooden part is formed and finished, it must be treated with water-repellant wood preservative that is properly applied.

(e) *Lashing rings.* The inside diameter of each lashing ring must be at least 75 mm (3 in.). Each lashing ring must have a minimum breaking strength of at least 16 kN (3,560 lbs.).

§ 160.017-13 Construction.

(a) *General.* Each chain ladder must have two suspension members. Each step in the ladder must be supported at each end by a suspension member.

(b) *Suspension member.* The distance between the two suspension members must be at least 400 mm (16 in.), but not more than 480 mm (19 in.). The chain between each top lashing ring and the first step must be long enough so that the distance between the center of the lashing ring and the top of the first step is approximately 600 mm (24 in.).

(c) *Lashing rings.* A lashing ring must be securely attached to the top and bottom of each suspension member. The means of attachment must be at least as strong as the chain and the lashing ring.

(d) *Thimble or wear plate.* A thimble or wear plate must be attached to the chain where it can slide on its connections to the lashing rings.

(e) *Steps.* Each step of a ladder must have two rungs arranged to provide a suitable handhold and stepping surface. The distance between steps must be uniform. This distance must be between 300 mm (12 in.) and 380 mm (15 in.).

(f) *Rungs.* Step rungs must meet the following requirements:

(1) Each rung must be wooden, or a material of equivalent strength, durability, handhold, and step surface characteristics.

(2) In order to provide a suitable handhold and step surface, the width of each rung must be at least 40 mm (1½ in.) and the thickness must be at least 25 mm (1 in.), but not more than 40 mm (1½ in.).

(3) The distance between the rungs in each step must be uniform. This distance must be between 40 mm (1½ in.) and 65 mm (2½ in.).

(4) Each rung must be attached to a spacer ear by a method that prevents the rung from rotating and that supports it in a horizontal position when the ladder is hung vertically.

(g) *Spacer ears.* Spacer ears must meet the following requirements:

(1) All spacer ears on a ladder must be the same size and shape.

(2) The top and bottom of each spacer ear must be attached to a suspension member.

(3) The top point of attachment must be at least 100 mm (4 in.) above the top surfaces of the rungs attached to the spacer ear.

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(4) Each spacer ear made of sheet metal must have features such as formed ribs, rolled flange edges, and stress relief holes at the ends of cuts, to prevent the ear from bending or tearing.

(h) *Fasteners.* Each fastening device must have a means to prevent the device from loosening.

(i) *Workmanship.* A ladder must not have splinters, burrs, sharp edges, corners, projections, or other defects that could injure a person using the ladder.

§ 160.017-15 Performance.

(a) Each chain ladder must be capable of being rolled up for storage.

(b) Each ladder when rolled up must be able to unroll freely and hang vertically.

§ 160.017-17 Strength.

(a) Each chain ladder must be designed to pass the approval tests in § 160.17-21.

(b) [Reserved]

§ 160.017-21 Approval tests.

(a) *General.* Each approval test must be conducted on a ladder of the longest length for which approval has been requested. If a ladder fails one of the tests in this section, the cause of the failure must be identified and any needed changes made. After a test failure and any design change, the failed test, and any other previously completed tests affected by the design change, must be rerun.

(b) *Visual examination.* Before starting the tests described in this section, an assembled chain ladder is examined for evidence of noncompliance with the requirements in §§ 160.017.11, 160.017-13, and 160.017-15.

(c) The following approval tests must be conducted:

(1) *Strength test #1.* An assembled ladder is supported so that a static load, if placed on any of its steps, would exert a force both on the step and each suspension member. A static load of 315 kg (700 lb.) is then placed on one step for at least one minute. The load must be uniformly distributed over a contact surface that is approximately 100 mm (4 in.) wide. The center of the contact surface must be at the center of the step. This test is performed on six dif-

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ferent steps. No step may break, crack, or incur any deformation that remains after the static load is removed. No attachment between any step and a suspension member may loosen or break during this test.

(2) *Strength test #2.* A ladder is suspended vertically to its full length from its top lashing rings. A static load of 900 kg (2000 lbs.) is then applied to the bottom lashing rings so that it is distributed equally between the suspension members. The suspension members, lashing rings, and spacer ears must not break, incur any elongation or deformation that remains after the test load is removed, or be damaged in any other way during this test.

(3) *Strength test #3.* A rolled-up ladder is attached by its top lashing rings to anchoring fixtures in a location away from any wall or structure that would prevent it from falling freely, and where it can hang to its full length vertically. The ladder when dropped must unroll freely. When unrolling the ladder, its steps and attachments must not become cracked, broken, or loosened. Other similar damage making the ladder unsafe to use must likewise not occur.

§ 160.017-25 Marking.

(a) Each chain ladder step manufactured under Coast Guard approval must be branded or otherwise permanently and legibly marked on the bottom with—

(1) The name of the manufacturer;

(2) The manufacturer's brand or model designation;

(3) The lot number and date of manufacture; and

(4) The Coast Guard approval number.

(b) [Reserved]

§ 160.017-27 Production tests and examination.

(a) *General.* Each ladder manufactured under Coast Guard approval must be tested in accordance with this section and subpart 159.007 of this chapter. Steps that fail testing may not be marked with the Coast Guard approval number and each assembled ladder that fails testing may not be sold as Coast Guard approved.