

described in paragraph (f)(7) of this section is prepared by the pipetting an appropriate volume of the solvent layer into a second volumetric flask and diluting to volume with solvent. If the net absorbance is less than 0.1 when determined in accordance with the procedures in this paragraph, it is recalculated using a longer pathlength cell.

(h) *Calculations.* (1) The plot described in paragraph (g)(6) of this section is used to determine the milligrams of oil in each 100 ml. of solvent layer contained in the volumetric flask after completing the steps described in paragraph (f) or paragraph (g)(7) of this section.

(2) The oil content of the sample is calculated using the following formula:

oil content of sample =  $R \times D \times 1000 / V$

R = mg. of oil in 100 ml. of solvent layer determined from plot.

D = 1 or, if the step described in paragraph (g)(7) of this section is performed, the ratio of the volume of the second volumetric flask described in that paragraph to the volume of solvent layer pipetted into the second volumetric flask.

V = The volume of water in milliliters drained into the graduated cylinder at the step described in paragraph (f)(8) of this section.

(3) The results are reported to two significant figures for oil contents below 100 mg/l and to three significant figures for oil contents above 100 mg/l. The results are converted to p.p.m.

## PART 163—CONSTRUCTION

### Subpart 163.001 [Reserved]

### Subpart 163.002—Pilot Hoist

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AUTHORITY: 46 U.S.C. 3306, 3703, 5115; E.O. 12234, 45 FR 58801, 3 CFR, 1980 Comp., p. 277; 49 CFR 1.46.

SOURCE: CGFR 50-30, 16 FR 1086, Feb. 6, 1951, unless otherwise noted.

### Subpart 163.001 [Reserved]

### Subpart 163.002—Pilot Hoist

SOURCE: CGD 74-140, 46 FR 63287, Dec. 31, 1981, unless otherwise noted.

#### § 163.002-1 Scope.

(a) This subpart contains standards and approval and production tests for pilot hoists used on merchant vessels.

(b) The requirements in this subpart apply to a pilot hoist designed for use along a vertical portion of a vessel's hull.

#### § 163.002-3 Applicable technical regulations.

(a) This subpart makes reference to the following Coast Guard regulations in this chapter:

(1) Subpart 58.30 (Fluid Power and Control Systems).

(2) Section 94.33-10 (Description of Fleet Angle).

(3) Part 111 (Electrical System, General Requirements).

(4) Subpart 163.003 (Pilot Ladder).

(b) [Reserved]

#### § 163.002-5 Definitions.

(a) *Maximum persons capacity* means—

(1) If the hoist has a rigid ladder, one person; or

(2) If the hoist has a platform, one person per square meter (10.75 sq. ft.) or fraction thereof of platform area (including hatch area);

(b) *Working load* means the sum of the weights of—

(1) The rigid ladder or lift platform, the suspension cables (if any) and the pilot ladder on a pilot hoist; and

(2) 150 kilograms (330 pounds) times the maximum persons capacity of the hoist;

(c) *Lift height* means the distance from the lowest step of the pilot ladder on a pilot hoist to the deck of a vessel on which the hoist is designed for installation when—

(1) The suspension cables of the hoist are run out until only three turns of cable remain on each drum; or

(2) If the hoist does not have suspension cables, the ladder or lift platform is in its lowest position.

**§ 163.002-7 Independent laboratory.**

(a) The approval and production tests in this subpart must be conducted by, or under the supervision of, an independent laboratory accepted by the Coast Guard under subpart 159.010 of this chapter.

(b) [Reserved]

**§ 163.002-9 Approval procedure.**

(a) *General.* A pilot hoist is approved by the Coast Guard under the procedures in subpart 159.005 of this chapter.

(b) *Approval testing.* Each approval test must be conducted in accordance with § 163.002-21.

(c) *Approval of alternative designs.* A pilot hoist 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.

**§ 163.002-11 Materials.**

(a) *Gears.* Each gear in a pilot hoist must be made of machine cut steel or machine cut bronze, or must be of a design of equivalent strength, durability, reliability and accuracy.

(b) *Suspension cables.* Each suspension cable on a pilot hoist must be a corrosion-resistant wire rope other than galvanized wire rope.

(c) *Corrosion-resistant materials.* Materials of a pilot hoist that are not in watertight enclosures must be—

(1) Corrosion-resistant or must be treated to be corrosion-resistant; and

(2) Galvanically compatible with each other adjoining material.

(d) *Aluminum alloys.* Any aluminum alloy which is not resistant to stress corrosion in marine atmospheres (i.e., contains more than 0.6 percent copper), must not be used in a structural component or in any other hoist component subject to stress.

**§ 163.002-13 Construction.**

(a) *General.* Each hoist must have a rigid ladder or a lift platform on which a person being raised or lowered may stand.

(b) *Spreader.* Each hoist must have a spreader or other device to prevent twisting of its ladder or lift platform. If a spreader is provided, it must be at least 1800 millimeters (5 feet, 10 inches) long.

(c) *Rollers.* The rigid ladder or lift platform on a pilot hoist and the ends of its spreader (if a spreader is provided) must have rollers at each point of contact with the vessel that allow the ladder or platform to move smoothly over the side of the vessel.

(d) *Load carrying parts.* Each load carrying part of a pilot hoist must be designed to have a minimum breaking strength of at least six times the load imposed on the part by the working load during operation of the hoist.

(e) *Exposed moving parts.* Each exposed moving part of a pilot hoist that poses a hazard to personnel must have a screen or guard.

(f) *Nonfunctional sharp edges and projections of excessive length.* A pilot hoist must not have nonfunctional sharp edges and must not have fastening devices or other projections of excessive length.

(g) *Installation requirements.* Each pilot hoist must be designed to allow—

(1) Its installation along the edge of a deck at a vertical portion of the hull;

(2) Its installation on the deck in a manner that does not require use of the vessel's side rails for support; and

(3) Unobstructed passage between the ladder or lift platform of the hoist and the deck of a vessel.

(h) *Deck interlock for portable hoist.* A pilot hoist, if portable, must have a deck interlock that prevents movement of the ladder or lift platform when the hoist is not installed.

(i) *Power source.* Each hoist must be designed to operate on electric, pneumatic, or hydraulic power or a combination of these.

(j) *Electrical equipment.* Electrical equipment of a pilot hoist must meet the electrical engineering regulations in part 111 of this chapter. The operating voltage of electrical equipment on the ladder or lift platform of a pilot hoist must not exceed 25 volts.

(k) *Pneumatic and hydraulic equipment.* Pneumatic and hydraulic equipment of a pilot hoist must comply with the marine engineering regulations of subpart 58.30 of this chapter. Each pneumatically powered hoist must have a water trap, air filter, air regulator, pressure gauge, and oil lubricator in the air line between the vessel's compressed air source and the pneumatic motor.

(l) *Hoist control lever.* Each pilot hoist must have a control lever for raising and lowering its ladder or lift platform. Movement of the lever upward or toward the operator must result in upward movement of the ladder or lift platform. Movement of the control in the opposite direction must result in downward movement of the ladder or lift platform. The control must be designed so that when released by the operator the ladder or lift platform stops immediately.

(m) *Emergency disconnect device.* Each pilot hoist must have a switch or valve for disconnecting the main power source in an emergency.

(n) *Power indicator.* Each pilot hoist must have an indicator to show the operator when power is being supplied to the hoist.

(o) *Arrangement of controls and power indicator.* The hoist control lever, the emergency disconnect device, and the power indicator on a pilot hoist must be arranged so that the hoist operator, when standing, can view all movement of the ladder or lift platform while using this equipment.

(p) *Hand-operated device and interlock.* Each pilot hoist must have a hand-operated device for raising and lowering

its ladder or lift platform. The device must be operable from a standing position. The hoist must have an interlock that prevents simultaneous operation of its hand-operated device and its power source. Any removable hand gear, crank, or wheel of the hand-operated device must be securely stowed on the hoist.

(q) *Upper position stop.* Unless a hoist has a pneumatic motor that stalls at the end of cable travel without jarring, jerking, or damaging the hoist, it must have one or more limit switches or valves that stop the ladder or lift platform at its upper end of travel without jarring, jerking, or damaging the hoist.

(r) *Means of lubrication.* Each hoist must have a means to lubricate its bearings. Sliding-contact gearing, such as worm gears, must operate in an oil bath, or have another means of lubricating the gear teeth on each revolution. Each lubricant enclosure must be designed so that it can be readily filled, drained, and checked for lubricant level.

(s) *Machinery housing.* Each machinery housing on a pilot hoist except gear boxes and other enclosures that retain lubricants, must have means that permit examination of all internal moving parts using common tools or without tools. Each machinery housing, except gear boxes and other enclosures that retain lubricants, must be designed to prevent moisture accumulation.

(t) *Suspension cable.* If a hoist has suspension cables, at least 2 cables must be provided and they must be arranged so that the ladder or lift platform remains level and stationary if one of the cables breaks. Each cable must be arranged to lead fair in a 15 degree vessel list toward the side of the vessel on which the hoist is installed. The devices for attaching the cables to their winch drums must be capable of supporting 2.2 times the working load with the cables run all the way out.

(u) *Sheaves and drums.* Each sheave and each winch drum for a suspension cable on a pilot hoist must be of a size recommended by the cable supplier for the diameter and construction of the cable. Each sheave must have a device that prevents the cable from jumping out of the sheave groove. Each drum must be designed to accept one level

wind of wrap. The fleet angle of a grooved drum must not exceed 8 degrees, and the fleet angle of a non-grooved drum must not exceed 4 degrees.

NOTE: The term *fleet angle* is defined in §94.33-10 of this chapter.

(v) *Rigid ladder.* A rigid ladder on a pilot hoist must have thermally insulated handholds and a padded backrest so that the person being raised or lowered may firmly brace himself or herself between the ladder and the backrest. The ladder must be at least 2.5 m (100 in.) long from the bottom rung to the top of the handholds.

(w) *Ladder rungs.* Each rigid ladder must have at least six rungs, each with a non-skid surface that does not retain water. Adhesive non-skid sheets may not be used. (For example, a suitable surface for a wooden rung is one that has grooves at least 3 mm (1/8 in.) deep cut in a diamond pattern so that water runs off the edge of the step. Non-skid grit is applied directly to the step surface.) The stepping surface of each rung must be not less than 115 mm (4½ in.) wide and not less than 400 mm (16 in.) long. The distance from the top of one rung to the top of the next must be uniform, between 300 mm (12 in.) and 350 mm (13¾ in.).

(x) *Platform railing.* A lift platform on a pilot hoist must be enclosed by a guardrail that has a diameter of between 30 millimeters (1¼ inches) and 75 millimeters (3 inches). The center of the guardrail must be at least 900 millimeters (3 feet) above the platform. At least one intermediate rail must be provided between the guardrail and the platform. Each rail must be set back from the edge of the platform at least 50 millimeters (2 inches). Each gate in the rails must have a latch that can keep the gate securely closed.

(y) *Platform floor.* The platform floor of a pilot hoist must have a non-skid surface and must be at least 750 millimeters (30 inches) by 750 millimeters, exclusive of the surface area of any hatch. Each hatch in the platform floor must be at least 750 millimeters (30 inches) by 750 millimeters. Each hatch must have a means to keep it securely positioned both when opened and closed.

(z) *Pilot ladder fittings.* The bottom of the rigid ladder or lift platform on a pilot hoist must have fittings to attach a pilot ladder of the type that meets the requirements of subpart 163.003 of this chapter. The fittings must be arranged so that—

(1) The distance between the top of the highest step on the pilot ladder and the surface of the lift platform or top of the bottom rung on the rigid ladder is between 300 and 350 millimeters (12 and 13¾ inches);

(2) The steps of the pilot ladder are directly below and in line with the steps of the rigid ladder or edge of the lift platform; and

(3) The pilot ladder can bear on the side of the vessel when in use.

(aa) *Emergency stop switch.* Each pilot hoist must have an emergency stop switch that can be operated by a person on the ladder or lift platform.

(bb) *Fasteners.* Each fastening device securing a part of a pilot hoist must have a means to prevent the device from loosening.

(cc) *Gears.* Each gear must be keyed to its shaft.

(dd) *Welding.* Each weld must be made using automatic welding equipment or be made by a welder who is qualified by the U.S. Coast Guard, U.S. Navy, American Bureau of Shipping, American Welding Society, American Society of Mechanical Engineers, or other organization that has similar procedures for welder qualifications that are acceptable to the Commandant.

#### § 163.002-15 Performance.

(a) Each pilot hoist must have sufficient performance capability to pass the approval tests in § 163.002-21.

(b) [Reserved]

#### § 163.002-17 Instructions and markings.

(a) *Instruction plates or placards.* Each pilot hoist must have instructions that show its method of operation and lubrication of its working parts. The instructions must be on one or more corrosion-resistant plates, or must be weatherproof placards. The instructions must be attached to the hoist. Each instruction must be in English or must have understandable symbols or

pictograms. The operator of the hoist must be able to see and read the operating instructions when operating the hoist control lever. The lubricating instructions must state the recommended lubricants for the temperature range in which the hoist is designed to operate. The temperature range must be stated in both degrees Celsius and Fahrenheit.

(b) *Marking of controls.* Each control on a pilot hoist and each position of the control must be identified by a marking on the hoist.

(c) *Marking of gauges.* Each gauge on a pilot hoist must be marked with its normal operating range.

(d) *Manual.* Each pilot hoist must have a manual of installation instructions, operating instructions, maintenance and repair instructions, a lubrication chart, a parts list, a list of sources of repair parts, and a log for keeping maintenance records. Each manual must be in English.

**§ 163.002-21 Approval tests.**

(a) *General.* If a pilot hoist fails one of the tests in this section the cause of the failure must be identified and any needed design changes made. After a test failure and any design change, the failed test, and any other previously completed tests affected by the change, must be rerun.

(b) *Visual examination.* Before starting the tests described in this section an assembled pilot hoist is examined for evidence of noncompliance with the requirements in §§ 163.002-11 and 163.002-13.

(c) The following approval tests must be conducted:

(1) *Rung strength.* If the pilot hoist has a rigid ladder a static load of 900 kilograms (2000 pounds) is applied to the center of a ladder rung for one minute. The load must be uniformly distributed over a 100 millimeter (4 inch) wide contact surface. The test must be repeated using a second ladder rung. The rungs must not break or crack during these tests.

(2) *Platform strength.* If the pilot hoist has a lift platform, the platform is lifted to a level where it is supported only by its suspension components. A static load of 900 kilograms (2000 pounds) is then applied to the center of the plat-

form for one minute. The load must be uniformly distributed over a 100 millimeter (4 inch) square contact surface. The test must be repeated enough additional times so that the load is placed in the center of each hatch cover when in its closed position, and in the center of each area of the platform located between floor supports. The platform must not break or crack during these tests.

(3) *Deck interlock.* If the pilot hoist is portable, it is placed in an uninstalled position. Its hoist control lever is then activated. The deck interlock must prevent movement of the ladder or lift platform when the lever is activated.

(4) *Lifting and lowering speed and level wind.* The hoist is installed in a level operating position and a weight equal to the weight of the pilot ladder plus 150 kg (330 lb.) times the maximum persons capacity of the hoist is placed on its ladder or lift platform. The ladder or lift platform is repeatedly raised and lowered under power operation until a total distance of at least 150 meters (500 feet) has been traversed. The ladder or lift platform is raised and lowered each time through a distance of at least 5 meters (16 feet). The average speed of raising the ladder or lift platform and the average lowering speed during this test must both be between 15 and 21 meters per minute (50 and 70 feet per minute). During the test, each suspension cable must have one level wind of wrap each time it is rewound onto its drum.

(5) *Upper position stop.* The hoist is installed in a level operating position and a weight equal to the weight of the pilot ladder plus 150 kg (330 lb.) times the maximum persons capacity is attached to the hoist. The hoist must be able to raise the weight to the upper limit of travel of the ladder or lift platform and must be able to stop at the upper limit without jarring, jerking, or damage. The test is repeated with no weight on the ladder or lift platform.

(6) *Cable securing device.* If the hoist has suspension cables, it is installed in a level operating position and the cables are run all the way out. A weight equal to 2.2 times the working load is then attached to the cables. The cables must remain securely attached to the

drums for at least one minute after the weight has been attached.

(7) *Controls and power indicator.* The hoist is installed in a level operating position and a weight equal to the working load is attached to the hoist. The hoist control lever is then operated with the power both on and off. The lever, when operated, must meet the requirements in §163.002-13(l). The power indicator must meet the requirements in §163.002-13(n) during the test. When the power is turned off, the ladder or lift platform must stop immediately and remain stationary until power is turned on. The emergency stop switch on the ladder or lift platform is activated at some point when the ladder or lift platform is being raised or lowered. Upon activation, the ladder or lift platform must stop and remain stationary.

(8) *Hand operation and interlock.* The hoist is installed in a level operating position and a weight equal to the working load is attached to the hoist. The hand operated device is then engaged. One person, when using the hand operated device, must be able to raise and lower the weight through a distance of at least 5 meters (16 ft.) in each direction and must be able to raise and lower it at a speed of at least 1.5 meters per minute (5 ft. per minute). When raising or lowering the hoist with the hand operated device, the power source for the hoist is turned on, or an attempt is made to turn it on. Then, with power source turned off, the hand operated device is disengaged. The power source is then turned on and an attempt made to engage the hand operated device. The interlock must prevent simultaneous operation of the power source and the hand operated device.

(9) *2.2x overload.* The hoist is installed in a level operating position. Each roller on the ladder or lift platform is placed in contact with a vertical surface. A weight equal to the difference between 2.2 times the working load and the weight of the ladder or lift platform is placed on the ladder or lift platform. The ladder or lift platform is raised through a distance of at least 5 meters (16 feet) and the hoist control lever is then released. The ladder or lift platform must stop without jarring or

damage and must hold the weight for at least one minute. The weight is then lowered through a distance of not less than 5 meters (16 feet) and the control lever is then released. The ladder or lift platform must stop within 600 millimeters (2 ft.) of where the hoist was when the lever was released and the ladder or lift platform must remain stationary for at least one minute thereafter. Each roller must move smoothly over the vertical surface without jamming or sliding during the test.

(10) *6x overload.* The hoist is installed in a level operating position. A load of six times the working load is attached to the hoist. (If the hoist has suspension cables, the cables must be run out at least one meter (3 ft.) before adding the load to the hoist). The weight must remain stationary for at least one minute without damage to any part of the hoist. The test is repeated simulating a vessel list of 15 degrees toward the side on which the hoist is installed.

(11) *Level wind suspension cable.* If the hoist has suspension cables, it is installed in a level operating position with the cables wound onto the drums. A weight equal to the working load is attached to the hoist. The cables are run all the way out and then rewound back onto the drums at least ten times. Each drum and cable is observed for level winding as the cable is wound onto the drum. The test must be repeated with a weight equal to the weight of the rigid ladder or lift platform. In each test, each cable must always rewind onto the drum in one level wind of wrap.

(12) *Rung friction test.* One rung of each type used on a rigid ladder must be subjected to this test. This test compares the dry and wet surface friction characteristics of ladder rungs with those of a standard oak step.

(i) The standard step must have a surface of clean oak that meets §163.003-11(b) of this chapter and that is 115 mm (4½ in.) wide by 400 mm (16 in.) long. The stepping surface must have grooves that are 3 mm (⅛ in.) deep and 3 mm wide. The grooves must run in two different directions at right angles to each other, and at 45 degree angles with each edge of the stepping surface, so that the grooves form a diamond pattern covering the stepping surface.

The centers of all parallel grooves must be 13 mm (½ in.) apart.

(ii) The standard step must be set in a level position. A metal block must be placed on one end of the step so that the block is in contact with the stepping surface. The metal block must weigh between 1.5 kg (3.3 lb.) and 3.0 kg (6.6 lb.) and must not be more than 100 mm (4 in.) wide by 135 mm (5⅜ in.) long. The surface of the block in contact with the step must have leather or composition shoe sole material attached to it.

(iii) The end of the step that has the metal block on it must be slowly raised until the block starts to slide. The angle of the step in this position must be measured and recorded. The step and block must then be placed under water and the procedure repeated.

(iv) The procedure in paragraph (c)(12)(iii) of this section must be repeated using a rigid ladder rung in place of the standard step.

(v) The ladder rung must then be secured in a horizontal position with a block resting on its stepping surface. The block must be of a size similar to the one used in the previous tests and have the same shoe sole surface used in the previous tests. The block must be arranged to apply a vertical load of 40 kg (88 lb.) to the rung. The block must be then moved back and forth in the same line from one end of the stepping surface to the other. This must be done for a total of 1,500 cycles.

(vi) The rung must again be tested as described in paragraph (c)(12)(iii) of this section, except that the initial position of the block must be on a part of the stepping surface that was subjected to the 1,500 cycles of rubbing.

(vii) The angles at which the block starts to slide on a wet and dry ladder rung when tested under paragraphs (c)(12)(iv) and (c)(12)(vi) of this section must be equal to or greater than the corresponding angles measured for the standard step when tested under paragraph (c)(12)(iii) of this section.

**§ 163.002-25 Marking.**

(a) Each pilot hoist manufactured under Coast Guard approval must have a corrosion-resistant nameplate. The nameplate must contain the—

- (1) Name of the manufacturer;

- (2) Manufacturer's brand or model designation;

- (3) Working load;
- (4) Lift height;
- (5) Maximum persons capacity;
- (6) Hoist serial number;
- (7) Date of manufacture; and
- (8) Coast Guard approval number.

(b) The hoist must be permanently and legibly marked with the name of the laboratory that conducted the production tests.

**§ 163.002-27 Production tests and examination.**

Each pilot hoist manufactured under Coast Guard approval must be tested as prescribed in § 163.002-21(c)(9) and subpart 159.007 of this chapter. The tests must be conducted by an independent laboratory. If the hoist fails the tests its defects must be corrected and retested until it passes. The laboratory must also conduct the visual examination described in § 163.002-21(b). The hoist may not be sold as Coast Guard approved unless it passes testing and unless each defect discovered in the visual examination is corrected

**Subpart 163.003—Pilot Ladder**

SOURCE: CGD 74-140, 46 FR 63291, Dec. 31, 1981, unless otherwise noted.

**§ 163.003-1 Scope.**

(a) This subpart contains standards and approval and production tests for a pilot ladder used on a merchant vessel to embark and disembark pilots and other persons when away from the dock.

(b) The requirements in this subpart apply to a pilot ladder designed for use along a vertical portion of a vessel's hull.

**§ 163.003-3 ASTM standard.**

The following standard of the American Society of Testing and Materials is incorporated by reference into this subpart: ASTM D 1435 entitled "Standard Recommended Practice for Outdoor Weathering of Plastics."

**§ 163.003-7 Independent laboratory.**

The approval and production tests in this subpart must be conducted by or

under the supervision of an independent laboratory accepted by the Coast Guard under subpart 159.010 of this chapter.

**§ 163.003-9 Approval procedure.**

(a) *General.* A pilot ladder is approved by the Coast Guard under the procedures in subpart 159.005 of this chapter.

(b) *Approval testing.* Each approval test must be conducted in accordance with § 163.003-21.

(c) *Approval of alternatives.* A pilot 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.

**§ 163.003-11 Materials.**

(a) *Suspension members.* Each suspension member must be mildew-resistant manila rope or a dacron polyester rope with a polypropylene core of a color that contrasts with the dacron. Each suspension member must have a breaking strength of not less than 24 kN (5,400 lb.) and a nominal circumference of not less than 60 mm (2¼ in.).

(b) *Wooden parts.* Each wooden part of a pilot ladder must be hardwood that is free from knots and any other defects affecting its strength or durability.

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

(d) *Molded steps.* Each step made of molded construction must be rubber or resilient plastic.

(e) *Metal parts.* Each metal fastener must be made of a corrosion resistant metal. Each other metal part must be made of corrosion-resistant metal or of steel galvanized by the hot dip process after the part is formed.

(f) *Plastics.* Each plastic material must be of a type that retains at least 30 percent of its original tensile strength and at least 80 percent of its original impact strength when subjected to the one year outdoor weathering test described in ASTM D 1435.

**§ 163.003-13 Construction.**

(a) *General.* Each pilot ladder must have two suspension members on each side. Each step in the ladder must be supported by each suspension member.

(b) *Suspension member.* The suspension members of a pilot ladder must meet the following requirements:

(1) Each suspension member must be continuous from the top of the ladder to the bottom and must not be painted or otherwise coated or covered.

(2) Except as provided in paragraph (g) of this section—

(i) The top end of one suspension member on each side of the ladder must extend at least 3 m (10 ft.) beyond the top ladder step; and

(ii) The top ends of the other suspension members must be just above the top step and must have an eye splice or thimble large enough to fit two passes of a suspension member.

(3) The top end of each suspension member that does not have an eye splice or thimble must be served or treated to prevent fraying.

(4) Each pair of suspension members must be clamped together both above and below each step. Marline seizing may not be used.

(5) The clear space between the suspension members on one side of a ladder and those on the other side must be at least 400 mm (16 in.), but not more than 480 mm (19 in.).

(6) The suspension members must not have fittings at the bottom of the ladder that can be used for attaching additional ladder sections.

(c) *Steps.* Pilot ladder steps must meet the following requirements:

(1) The four lowest steps must be molded steps and the rest of the steps must be either wooden or molded steps.

(2) The top face of each step must have a rectangular surface that is at least 115 mm (4½ in.) wide with a non-skid surface that does not retain water. Adhesive non-skid sheets may not be used. (For example, a suitable surface



for a step is one that has grooves at least 3 mm ( $\frac{1}{8}$  in.) deep cut in a diamond pattern so that water runs off the edge of the step. Non-skid grit is applied directly to the step surface extending to almost the full width of the step.)

(3) Each step at its thinnest point must be at least 25 mm (1 in.) thick and in determining this thickness, the depth of the grooves in the non-skid surface and the diameter of any hole extending from one side of the step to the other must not be counted.

(4) Each step must be at least 480 mm (19 in.) long.

(5) Each step must be designed so that it can be removed and replaced without unstringing the ladder. If special replacement steps are made to meet this requirement, the replacement steps must meet the requirements of this section.

(6) If a step has grooves for its suspension members, the grooves must be in the sides of the steps.

(7) The spacing from the top of one step to the top of the next step must be uniform and this spacing must be between 300 mm (12 in.) and 350 mm ( $13\frac{3}{4}$  in.).

(8) Each step must be a bright orange color, except that this color is not required for the non-skid surface. If a step is painted, it must be painted with a two-part epoxy paint intended for marine use, or a paint of equivalent durability.

(9) The height of each device attached to the step for securing the suspension members must not be more than one-half the width of the step so that the step is not prevented from rolling if the ladder is caught between a pilot boat and the hull of the vessel.

(10) Each replacement step must be either white or yellow instead of the orange color required under paragraph (c)(8) of this section, and must have the special marking required in §163.003-25(b).

(d) *Spreaders.* Each pilot ladder with 5 or more steps must have one or more spreaders that meet the following requirements:

(1) Each spreader must be at least 1.8 m (70 in.) long.

(2) The spreaders must be positioned at intervals of not more than 9 steps.

(3) The lowest spreader on a ladder must be on the fifth step from the bottom.

(e) *Fasteners.* Each fastening device securing a part of a pilot ladder must have a means to prevent the device from loosening.

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

(g) *Special arrangements for pilot hoists.* Each pilot ladder produced for use with an approved pilot hoist must have at least 8 steps. The top ends of its suspension members need not have an eye splice or thimble or be arranged as required in paragraph (b) of this section if necessary to permit attaching the ladder to fittings of a particular pilot hoist. The spreader required in paragraph (d) of this section may be omitted from an 8 step ladder for a pilot hoist.

[CGD 74-140, 46 FR 63291, Dec. 31, 1981, as amended by CGD 79-032, 49 FR 25456, June 21, 1984]

#### § 163.003-15 Performance.

(a) Each pilot 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.

(c) Each suspension member must be arranged so that, when the ladder is in use on a vessel, the suspension member cannot come in contact with the vessel's side.

(d) Each step must be arranged so that it can bear on the side of the vessel when the ladder is in use.

#### § 163.003-17 Strength.

(a) Each pilot ladder must be designed to pass the approval tests in § 163.003-21.

(b) [Reserved]

#### § 163.003-21 Approval tests.

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

any other previously completed tests affected by the change, must be rerun. Any ladder step that has a residual deflection after testing under this section may not be used thereafter in any ladder represented as Coast Guard approved.

(b) *Visual examination.* Before starting the approval tests, an assembled pilot ladder is examined for evidence of noncompliance with the requirements in §§ 163.003-11, 163.003-13, and 163.003-15.

(c) The following approval tests must be conducted:

(1) *Step flexibility test.* This test is performed on six different steps, one of which must be a molded step and one of which must be a replacement step if special replacement steps are made by the manufacturer. Each step is placed on a pair of supports located at the points where the step would ordinarily be attached to the suspension members. A static load must be applied uniformly for a period of at least one minute over a contact surface that is at the center of the step and is approximately 100 mm (4 in.) wide. The load must be 150 kg (330 lb.) for each molded step that is used only as one of the four bottom steps in the ladder. The load must be 320 kg (700 lb.) for each other step. The deflection of the step is measured while the step is under load and after the load is removed. The step must not deflect more than 20 mm (¾ in.) under the load, and there must be no residual deflection after the load is removed.

(2) *Strength test #1.* An assembled ladder is supported so that a static load, if placed on any of its steps, would exert a force on both the step and each suspension member. A static load of 900 kg (2,000 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 different steps, one of which must be a molded step. None of the steps may break or crack. No attachment between any step and a suspension member may loosen or break during this test.

(3) *Strength test #2.* An assembled ladder is suspended vertically to its full

length. A static load of 900 kg (2,000 lb.) is then applied to the bottom step of the ladder so that it is distributed equally between the suspension members. The suspension members, and inserts 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.

(4) *Strength test #3.* A rolled up ladder is attached 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.

(5) *Step friction test.* One step of each type used on a pilot ladder must be subjected to this test. This test compares the dry and wet surface friction characteristics of ladder steps with those of a standard oak step.

(i) The standard step must have a surface of clean oak that meets S/163.003-11(b) and that is 115 mm (4½ in.) wide by 400 mm (16 in.) long. The stepping surface must have grooves that are 3 mm (⅛ in.) deep and 3 mm wide. The grooves must run in two different directions at right angles to each other, and at 45 degree angles with each edge of the stepping surface, so that the grooves form a diamond pattern covering the stepping surface. The centers of all parallel grooves must be 13 mm (½ in.) apart.

(ii) The standard step must be set in a level position. A metal block must be placed on one end of the step so that the block is in contact with the stepping surface. The metal block must weigh between 1.5 kg (3.3 lb.) and 3.0 kg (6.6 lb.) and must not be more than 100 mm (4 in.) wide by 135 mm (5⅜ in.) long. The surface of the block in contact with the step must have leather or composition shoe sole material attached to it.

(iii) The end of the step that has the metal block on it must be slowly raised until the block starts to slide. The angle of the step in this position must be measured and recorded. The step

and block must then be placed under water and the procedure repeated.

(iv) The procedure in paragraph (c)(6)(iii) of this section must be repeated using a pilot ladder step in place of the standard step.

(v) The ladder step must then be secured in a horizontal position with a block resting on its stepping surface. The block must be of a size similar to the one used in the previous tests and have the same shoe sole surface used in the previous tests. The block must be arranged to apply a vertical load of 40 kg (88 lb.) to the step. The block must be then moved back and forth in the same line from one end of the stepping surface to the other. This must be done for a total of 1,500 cycles.

(vi) The step must again be tested as described in paragraph (c)(6)(iii) of this section, except that the initial position of the block must be on a part of the stepping surface that was subjected to the 1,500 cycles of rubbing.

(vii) The angles at which the block starts to slide on a wet and dry ladder step when tested under paragraphs (c)(6)(iv) and (c)(6)(vi) of this section must be equal to or greater than the corresponding angles measured for the standard step when tested under paragraph (c)(6)(iii) of this section.

#### § 163.003-25 Marking.

(a) Each pilot 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 or date of manufacture; and
- (4) The Coast Guard approval number.

(b) In addition to the markings required under paragraph (a) of this section each step sold as a replacement step must be branded or otherwise permanently and legibly marked with the words "REPLACEMENT STEP ONLY."

[CGD 74-140, 46 FR 63291, Dec. 31, 1981, as amended by CGD 79-032, 49 FR 25456, June 21, 1984]

#### § 163.003-27 Production tests and examination.

(a) *General.* Each ladder produced 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.

(b) *Test No. 1: Steps.* Steps must be separated into lots of 100 steps or less. Steps of different types must be placed in separate lots. One step from each lot must be selected at random and tested as described in § 163.003-21(c)(2) except that supports are placed under the step at the points where it would be attached to suspension members in an assembled ladder. If the step fails the test, ten more steps must be selected at random from the lot and tested. If one or more of the ten steps fails the test, each step in the lot must be tested. No step that has any residual deflection after the test may be used in a ladder represented by the manufacturer as Coast Guard approved.

(c) *Test No. 2: Ladders.* Assembled ladders must be separated into lots of 20 ladders or less. One ladder must be selected at random from the ladders in each lot. The ladder selected must be at least 3 m (10 ft.) long or, if each ladder in the lot is less than 3 m long, a ladder of the longest length in the lot must be selected. The ladder must be tested as prescribed in § 163.003-21(c)(3) except that only a 3 m section of the ladder need be subjected to the static load. If the ladder fails the test, each other ladder in the lot must be tested.

(d) *Independent laboratory.* Each production test must be conducted or supervised by an independent laboratory. However, if a test is performed more than 4 different times per year, laboratory participation is required only 4 times per year. If the laboratory does not participate in all tests, the times of laboratory participation must be as selected by the laboratory. The times selected must provide for effective monitoring throughout the production schedule.

(e) *Visual examination.* The visual examination described in § 163.003-21(b)

must be conducted as a part of each production test.

**§ 163.003-29 Effective date and status of prior approval.**

(a) Approval certificates for pilot ladders issued under subpart 160.017 terminate on March 31, 1982.

(b) Applications for approval of pilot ladders under this subpart will be accepted on and after December 31, 1982.

(c) In previous regulations, pilot ladders were referred to as Type I—Rope Suspension Ladders.

**PART 164—MATERIALS**

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Sec.

- 164.003-1 Applicable specifications.
- 164.003-2 Grades.
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- 164.015-1 Applicable specifications and standards.
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**Subpart 164.018—Retroreflective Material for Lifesaving Equipment**

- 164.018-1 Scope.
- 164.018-3 Classification.
- 164.018-5 Specifications and standards incorporated by reference.
- 164.018-7 Approval procedures.
- 164.018-9 Design requirements.
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**Subpart 164.019—Personal Flotation Device Components**

- 164.019-1 Scope.
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