of the water in not more than five seconds, without assistance or the use of any means of auxiliary buoyancy which must be inflated by the wearer; or to allow the wearer to turn from a face down to a face up position in not more than 5 seconds, without assistance or the use of any means of auxiliary buoyancy. If an automatically inflated means of auxiliary buoyancy is used to meet this paragraph, the inflation mechanism must meet the requirements for commercial hybrid PFDs in § 160.077–15(c) of this chapter, and the tests required under § 160.077–21(c)(3) of this chapter. Auxiliary buoyancy, if fitted and/or inflated, must not interfere with righting.

(c) *Thermal protection*. The suit must be designed to protect against loss of body heat as follows:

(1) The thermal conductivity of the suit material when submerged 1 m (39 in.) in water must be less than or equal to that of a control sample of 4.75 mm (3⁄16 in.) thick, closed-cell neoprene foam. The control sample of foam must have a thermal conductivity of not more than 0.055 watt/meter – ° K (0.38 Btu – in./hr. – sq.ft. – °F).

(2) The suit must provide the wearer with sufficient thermal insulation, following one jump into the water from a height of 4.5 m, to ensure that the wearer's body core temperature does not fall more than 2 °C (3.6 °F) after a period of 6 hours immersion in calm circulating water at a temperature of between 0 °C (32 °F) and 2 °C (35.6 °F).

(d) *Donning time*. Each suit must be designed so that a person can don the suit correctly within two minutes after reading the donning and use instructions described in § 160.171–15(a).

(e) *Vision*. Each suit must be designed to allow unrestricted vision throughout an arc of 60° to either side of the wearer's straight-ahead line of sight when the wearer's head is turned to any angle between 30° to the right and 30° to the left. Each suit must be designed to allow a standing wearer to move head and eyes up and down far enough to see both feet and a spot directly overhead.

(f) *Water penetration*. An immersion suit must be designed to prevent undue ingress of water into the suit following a period of flotation in calm water of one hour.

(g) *Splash protection*. Each suit must have a means to prevent water spray from directly entering the wearer's mouth.

(h) *Storage temperature*. Each suit must be designed so that it will not be damaged by storage in its storage case at any temperature between –30 °C (–22 °F) and +65 °C (149 °F).

(i) *Flame exposure*. Each suit must be designed to prevent sustained burning or continued melting after it is totally enveloped in a fire for a period of 2 seconds.

(j) *Oil resistance*. Each immersion suit must be designed to be useable after a 24 hour exposure to diesel oil.

§ 160.171–13 Storage case.

(a) Each suit must have a storage case made of vinyl coated cloth or material that provides an equivalent measure of protection to the suit.

(b) Each storage case must be designed so that it is still useable after two seconds contact with a gasoline fire.

§ 160.171–15 Instructions.

(a) Each suit must have instructions for its donning and use in an emergency. The instructions must be in English and must not exceed 50 words. Illustrations must be used in addition to the words. These instructions must be on the exterior of the storage case or printed on a waterproof card attached to the storage case or to the suit.

(b) If the suit has an inflatable auxiliary means of buoyancy, separate instructions covering the use of the inflation valve must be provided on the suit near the valve or on a waterproof card attached near the valve.

(c) Instructions for donning and use of the suit in an emergency must also be available in a format suitable for mounting on a bulkhead of a vessel. This placard must be in English, must include illustrations, and must include a warning as to the risk of entrapment in a submerged compartment due to the buoyancy of the suit.

(d) Instructions for donning and use of the suit in an emergency, instructions for care and repair of the suit,

and any additional necessary information concerning stowage and use of the suit on a vessel must be available in 8½×11 loose-leaf format suitable for inclusion in the vessel's training manual.

§ 160.171–17 Approval testing for adult size immersion suit.

Caution: During each of the in-water tests prescribed in this section, a person ready to render assistance when needed should be near each subject in the water.

(a) *General*. An adult size immersion suit must be tested as prescribed in this section. If the suit is also made in a child size, a child size suit must be tested as prescribed in § 160.171–19. If the suit is also made in an oversize adult size, an oversize adult suit must be tested as prescribed in § 160.171–17(g) to determine the measured buoyancy for the suit. No additional testing will be required if the oversize adult suit is of the same design as the adult suit except for extra material to provide for larger persons.

(b) *Test samples*. Each test prescribed in this section may be performed by using as many immersion suits as needed to make efficient use of the test subjects and test equipment, except that each subject in the impact test described in § 160.171–17(c)(11) must not use more than one suit during the test, and the suits used in the impact test must also be used in the thermal protection test described in § 160.171–17(d).

(c) *Mobility and flotation tests*. The mobility and flotation capabilities of each immersion suit must be tested under the following conditions and procedures:

(1) *Test subjects*. Seven males and three females must be used in the tests described in this paragraph. The subjects must represent each of the three physical types (ectomorphic, endomorphic, and mesomorphic). Each subject must be in good health. The heaviest subject, of either sex, must weigh at least 135 kg (298 lb.). The heaviest male subject must weigh at least 115 kg (254 lb.) and the lightest male subject must weigh not more than 55 kg (121 lb). The heaviest female subject must weigh at least 115 kg (254 lb.) and the lightest female subject must weigh not more than 55 kg (121 lb). Each subject must be unfamiliar with the specific suit under test. Each subject must wear a standard range of clothing consisting of:

(i) Underwear (short sleeved, short legged);

(ii) Shirt (long sleeved);

(iii) Trousers (not woolen);

(iv) Woolen or equivalent synthetic socks;

(v) Rubber soled work shoes.

(2) *Donning time*. Each subject is removed from the view of the other subjects and allowed one minute to examine a suit and the manufacturer's instructions for donning and use of the suit in an emergency. At the end of this period, the subject attempts to don the suit as rapidly as possible without the aid of a chair or any support to lean on. If the subject does not don the suit completely, including gloves and any other accessories, within two minutes, the subject removes the suit and is given a demonstration of correct donning, and again attempts to don the suit. At least nine of the ten subjects must be able to don the suit completely, including time to remove shoes if necessary, in two minutes in at least one of the two attempts.

(3) *Field of vision*. The immersion suit's field of vision must be tested as follows:

(i) While wearing a suit, each subject sits upright and faces straight ahead. An observer is positioned to one side of the subject at an angle of 60° away from the subject's straight-ahead line of sight. The observer must be able to see the subject's closest eye at this position. The observer then walks past the front of the subject to a position on the subject's other side that is at an angle of 60° away from the subject's straight-ahead line of sight. The suit must not obstruct the observer's view of the subject's eyes at any point between the two positions.

(ii) While wearing the suit, each subject stands upright and faces straight ahead. An observer is positioned to one side of the subject at an angle of 90° away from the subject's straight-ahead line of sight. The subject then turns his or her head through an arc of 30° toward the position of the observer. This procedure is repeated with the observer