Designation: F 1197 – 89 (Reapproved 2000)

An American National Standard

Standard Specification for Sliding Watertight Door Control Systems[1]

This standard is issued under the fixed designation F 1197; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers the design, manufacture, and testing of controls and operating mechanisms for use with sliding watertight doors meeting the requirements of Specification F 1196.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are for information only.

2. Referenced Documents

2.1 *ASTM Standards:*

A 312/A 312M Specification for Seamless and Welded Austenitic Stainless Steel Pipes[2]

F 1196 Specification for Sliding Watertight Door Assemblies[3]

2.2 *Institute of Electrical and Electronic Engineers Standards:*[4]

IEEE 45 Recommended Practice for Electrical Installations on Shipboard

IEEE 100 IEEE Standard Dictionary of Electrical and Electronic Terms

2.3 *Society of Automotive Engineers Standards:*[5]

J524 Seamless Low Carbon Steel Tubing Annealed for Bending and Flaring

J525 Welded and Cold Drawn Low Carbon Steel Tubing Annealed for Bending and Flaring

2.4 *Military Specification:*

MIL-S-901 Shock Test, H.I. (High Impact); Shipboard Machinery, Equipment and Systems, Requirements for[6]

2.5 *American Society of Mechanical Engineers:*

Section VIII, Division 1, ASME Boiler and Pressure Vessel Code, Pressure Vessels[7]

2.6 *National Electrical Manufacturers' Association:*[8]

Publication Number IS1.1 Enclosures for Industrial Controls and Systems

3. Terminology

3.1 *Definitions:*

3.1.1 *control station*—a location from which a sliding watertight door may be closed.

3.1.2 *door control*—the device that must be physically activated by the operator to initiate the opening or closing of a sliding watertight door.

3.1.3 *door control system*—the system of components necessary to operate a sliding watertight door, consisting of the door control, operating mechanism, and interconnecting components.

3.1.4 *electrical control voltage*—the voltage applied to the door controls, indicators, and alarms.

3.1.5 *electrical system voltage*—the voltage generated by the electrical power sources at which the operating mechanism will operate.

3.1.6 *interconnecting components*—those components between the door control and the operating mechanism necessary to cause the operating mechanism to move a sliding watertight door as directed by the door control or between the door and the remote indicator. Interconnecting components form a mechanical, hydraulic, or electrical system between the control station and the door and between the door and the remote indicator.

3.1.7 *local control station*—a location adjacent to a sliding watertight door from which the door may be opened or closed.

3.1.8 *manual control*—a door control that requires the operator to apply a continuous cyclic force, for example, the turning of a handwheel or operating of a pump handle, to cause the operating mechanism to function.

3.1.9 *operating mechanism*—the device, be it mechanical, electric, or hydraulic, that directly causes a physical force to be placed upon a sliding watertight door to cause its movement.

power control—a door control that requires the operator to exert a minimal physical force, for example, pushing of a button, flipping of a switch, or holding of a lever, to cause the operating mechanism to function.

3.1.10 *remote control station*—a location from which a door or doors can be remotely closed.

---

[1] This specification is under the jurisdiction of Committee F-25 on Ships and Marine Technology and is the direct responsibility of Subcommittee F25.03 on Outfitting.

Current edition approved Jan. 18, 1989. Published March 1989.

[2] *Annual Book of ASTM Standards*, Vol 01.01.

[3] *Annual Book of ASTM Standards*, Vol 01.07.

[4] Available from Institute of Electrical and Electronics Engineers, 445 Hoes Lane, PO Box 1331, Piscataway, NJ 08855–1331.

[5] Available from Society of Automotive Engineers, Inc., 400 Commonwealth Dr., Warrendale, PA 15096–0001.

[6] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

[7] Available from American Society of Mechanical Engineers, Headquarters, Three Park Ave., New York, NY 10016–5990.

[8] Available from National Electrical Manufacturers' Association, 1300 N. 17th St., Suite 1847, Rosslyn, VA 22209.

3.1.11 *remote indicator*—the device, mechanical or electric, located at a remote control station that indicates whether a door is open, closed, or at an intermediate position.

4. Classification

4.1 Sliding watertight door control systems are of the following types:

4.1.1 *Manual*—a door control system that requires the operator to apply a continuous cyclic force to the door controller to cause the operating mechanism to function. Manual control systems consist of the following types:

4.1.1.1 *Mechanical*—An operating system, such as that consisting of a handwheel, shafting, gears, universal joints, and a rack and pinion assembly.

4.1.1.2 *Hydraulic*—A system consisting of a hand pump, fluid power cylinder, and interconnecting pipe, tubing, valves, and fittings.

4.1.2 *Power*—A door control system that requires only that the operator exert a minimal physical force to cause the operating mechanism to function. Power control systems consist of the following types:

4.1.2.1 *Electric*—A system consisting of a pushbutton, switch, or lever that activates, through an electric circuit, an electric motor that drives a rack and pinion operating mechanism that applies the necessary force to open and close the door.

4.1.2.2 *Hydraulic*—A system consisting of a lever-operated control valve, hydraulic accumulator, and interconnected pipe, tubing, valves, and fittings that actuates a fluid power cylinder operating mechanism that applies the necessary force to open and close the door.

4.1.2.3 *Electrohydraulic*—A system consisting of a combination of electric and hydraulic components, whereby a pushbutton, switch, or lever, through an electric circuit, activates an electric motor that drives a hydraulic pump that supplies hydraulic fluid under pressure to an operating mechanism consisting of a fluid power cylinder that applies the necessary force to open and close the door.

5. Ordering Information

5.1 Specify the following information when ordering:

5.1.1 Quantity,

5.1.2 Door type,

5.1.3 Door class,

5.1.4 Opening hand,

5.1.5 Door size,

5.1.6 Design pressure head of door,

5.1.7 Type of control system,

5.1.8 Electrical system voltage,

5.1.9 Electrical control voltage,

5.1.10 Distance from the door to remote control stations,

5.1.11 Remote control panel requirements (if applicable),

5.1.12 Supplementary requirements (if any),

5.1.13 Additional requirements as contracted by the manufacturer and purchaser, and

5.1.14 ASTM specification designation.

6. Materials and Manufacture

6.1 Cast iron components shall not be used unless shock tested and approved in accordance with MIL-S-901.

7. Design of Manual Operating Controls

7.1 All sliding watertight doors shall be provided with a means of local and remote manual operation.

7.2 The maximum force required to operate each manual control shall be 25 lbs (11 kg), except that a maximum force of 50 lbs (23 kg) is acceptable during wedging if applicable.

7.2.1 Hand pumps may operate with an all around crank motion or a reciprocating motion.

7.2.2 Handwheels shall be at least 18 in. (457 mm) in diameter.

7.3 Manual controls shall remain stationary when the door is operated by other means.

7.4 *Local Manual Controls*:

7.4.1 Local manual controls shall be capable of opening and closing each door from both sides of the bulkhead.

7.4.2 Local manual controls shall be located within 10 ft (3 m) of, and in visual contact with, the door.

7.4.3 Local manual controls shall always operate, even in the event of rupture of hydraulic lines more than 10 ft (3 m) from the door.

7.5 *Remote Manual Controls*:

7.5.1 A remote manual control shall be provided above the bulkhead deck to close each door remotely.

7.5.1.1 It shall not be possible to open a door remotely.

7.5.2 An indicator, mechanically connected to the door, shall be located at the remote manual control station to indicate whether the door is open or closed.

8. Design of Power Operating Controls

8.1 Each Class 3 door, as defined in Specification F 1196, shall be provided with local power controls for opening and closing the door and remote power controls for closing the door. Door control systems intended for installation aboard Coast Guard inspected and certificated vessels shall comply with Supplementary Requirements S1 through S4 in addition to the following.

8.1.1 *Local Power Controls*:

8.1.1.1 Local power controls shall be so located that they may be held in the open position by a person passing through the doorway.

8.1.1.2 The controls shall be at least 48 in. (122 cm) above the deck.

8.1.1.3 The direction of movement of handles used to open and close the door shall be in the direction of the door movement.

8.1.2 *Remote Power Controls*:

8.1.2.1 Remote power controls shall be located on a central control station located on the navigating bridge.

8.1.2.2 The central control station shall have a “master mode’’ switch with two modes of control. (*1*) The “local control’’ mode shall allow any door to be locally opened and locally closed after use without automatic closure of the door. (*2*) The “doors closed’’ mode shall automatically close any door that is open. While permitting doors to be opened locally, either by power or hand, doors shall automatically reclose upon release of the local control mechanism whenever the “doors closed’’ mode is activated.

8.1.2.3 A diagram shall be provided on the central control station showing the location of each door, with visual indicators to show whether each door is open or closed. A red light shall indicate that a door is fully open, and a green light shall indicate that it is closed. A flashing red light shall indicate that a door is in an intermediate position.

8.1.2.4 The central control station shall be fitted with a test button to verify that all lights at the station are in proper working order.

8.2 *Actuating Components*—Doors that are required to be power operated shall be fitted with the necessary equipment to use electric, hydraulic, or other power sources. Actuating components include hydraulic valves, electric operators, or other suitable means of sequencing for automatic operation. Each drive unit shall be protected from injury caused by a jammed door, excessive electrical current, or excessive hydraulic or pneumatic pressure. No clutch device shall be used.

8.3 Connections and circuits shall be designed and installed so that a failure in one door circuit will not cause a failure in any other door circuit. Any failure in an alarm or indicator circuit shall not result in a loss of power for the door operation. The control system shall be such that a short or open circuit will not result in a closed door opening. The connections shall be such that leakage of salt water into local controls shall not establish a circuit that will cause a closed door to open.

9. Design of Electrical Components

9.1 Electrical components shall meet the applicable requirements of IEEE Standard 45.

9.2 Electrical motors, associated circuits, and control components located below the bulkhead deck shall be designed to operate submerged (NEMA 6 per NEMA Publication IS-1.1).

9.2.1 Electric door position circuits and components located below the bulkhead deck shall be hermetically sealed, as defined in IEEE 100.

9.3 Door movement warning signals and all electrical equipment located above the bulkhead deck shall be watertight (NEMA 4 per NEMA Publication IS-1.1).

10. Design of Hydraulic Components

10.1 All hydraulic components shall be designed with a minimum 4:1 factor of safety.

10.2 Hydraulic cylinders shall be designed for a bursting pressure of not less than four times the maximum allowable working pressure.

10.3 Accumulators shall be designed, constructed, and tested in accordance with Section VIII, Division 1 of the ASME Code.

10.4 Hydraulic pipe and tubing shall be stainless steel, Specification A 312/A 312M, or seamless tubing, SAE J524 or J525.

10.5 Hydraulic fluids shall have a minimum flashpoint of 315°F. In addition, the fluid shall be suitable for operation of the hydraulic system through the entire temperature range to which it may be subjected.

11. Operating Requirements

11.1 Door control systems, both manual and power, shall be designed to open and close doors against a 15° list, both by power or by hand. In addition, the operating mechanisms shall be designed to close the door against a 10–ft head of water.

11.2 A manual control system must be designed to close a door in not more than 90 s.

11.3 All hydraulic systems shall be designed so that any hydraulic "line'' break more than 10 ft (3 m) from the door will not prevent local power or hand closing or remote power closing of the door.

11.4 Power control systems shall close doors at an approximately uniform rate of closure, but in no case shall the closure time, from the time a door begins to move to the time it reaches the fully closed position, be less than 20 s or more than 40 s.

11.4.1 *Simultaneous Closing*—Means shall be provided for closing all power-operated doors simultaneously. When a large number of doors are involved, automatic means may be provided for operating the doors in sequence, with preference being given to doors in the lowest part of the vessel. The arrangement shall be such that all doors can be closed in not more than 60 s after actuation of the master mode switch.

11.5 An electric horn or howler shall give warning at least 5 s, but no more than 10 s, before door movement for Class 3 doors. This warning signal shall continue to sound until the door is closed.

11.6 See Supplementary Requirements for installation details.

12. Inspection and Testing of Doors and Controls

12.1 *Shop Tests and Inspections*:

12.1.1 *Shop Test of Operating Controls*—A prototype of one door and frame of each design together with its manual operating equipment, and in addition its power control equipment if a Class 3 door, shall be mounted on a structure in the shop in a vertical position. The setup for horizontal sliding doors shall be such that it can be tilted one way to demonstrate that the manual controls can close the door against a 15° list and, in addition for Class 3 doors, that electrical and hydraulic operators can close the door under 87.5 % normal voltage. In addition, a 15° opposite list shall be applied to demonstrate that the door will not overhaul and close itself and, when closed, can be opened manually and by power. Operating mechanisms shall close a door under a simulated 10 ft (3 m) head of water. Class 3 doors shall also be tested to show that a door can be unseated manually after being closed by power.

13. Certification

13.1 The manufacturer shall furnish written certification to the purchaser for each control system. The certification shall specify that the control system has been manufactured, inspected, and tested in accordance with this specification and that it has been found to meet the requirements contained herein.

14. Packaging

14.1 Components for sliding watertight door control systems shall be shipped with the door and door frame assembly with which they will be installed.

14.2 Hydraulic and electric components shall be adequately protected and shipped in reinforced cartons or crates.

14.3 All hydraulic components shall have all oil drained and

proper preservation applied.

15. Keywords

15.1 door; door control; electric door control; electrohydraulic door control; manual door control; hydraulic door control; marine; marine door; mechanical door control; power door control; ship; ship door; sliding door; watertight door; watertight sliding door

SUPPLEMENTARY REQUIREMENTS

The following supplementary requirements shall apply only when specified by the purchaser in the contract or order.

S1. *Power Supplies*—The primary power supply for all required Class 3 doors shall come directly from the vessel emergency switchboard.

S2. All electric controls, indicators, and alarms shall be supplied from the final emergency power source.

S3. *Power Sources*—All Class 3 doors shall be provided with one of the following types of power sources:

S3.1 A centralized system with two independent power sources each consisting of a pump capable of simultaneously closing all doors in not less than 60 s. In addition, there shall be for the whole installation hydraulic accumulators of sufficient capacity to operate all of the doors at least three times, that is, close-open-close. A single failure in the hydraulic piping of the power source operating system shall not affect the power operation of more than one door.

S3.2 An individual hydraulic system for each door with one power source capable of closing the door. In addition, there shall be a hydraulic accumulator of sufficient capacity to operate the door at least three times, that is, close-open-close.

S3.3 An individual electrical system for each door with one power source capable of closing the door. In addition, there shall be a battery of sufficient capacity to operate the door at least three times, that is, close-open-close.

S4. *Installation Tests and Inspection:*

S4.1 *Manual Control Installation Test*—After a door and controls have been installed, the door shall be closed and opened by means of the manual controls at the door and shall be closed by the manual remote control. The time and effort required to close the door shall be within the limitations prescribed in 7.2 and 11.2.

S4.2 *Power Control and Installation Test*—If power controls are provided, the door shall be operated by the power controls from each of the control stations. The rate of closing shall be as prescribed in 11.4. The time required to simultaneously close all doors shall be as prescribed in 11.4.1. Manual controls shall also be operated to show that closure by power will not jam the door so as to prevent manual opening.

S4.3 *Mechanical Indicator Operation*—The door indicator at the remote manual control station shall correctly show the position of the door when either manual or power operation is used.