MIL-E-2186E(SHIPS)
19 October 1970
SUPERSEDING
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(See 6.2)

MILITARY SPECIFICATION

EXTINGUISHER, FIRE, CARBON DIOXIDE SYSTEMS (FIXED PIPE, NAVAL SHIPBOARD USE)

1. SCOPE

1.1 This specification covers chemical (carbon-dioxide) fire-extinguisher systems of the fixed (stationary) pipe type whereby carbon-dioxide (liquefied and stowed in containers) is expelled, by local or remote control, through a fixed piping system and discharge nozzles to a predetermined space, compartment or area. Alarm devices and ventilation system interlocks are included.

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of the specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

BB-C-101 - Carbon Dioxide (CO^2): Technical and U.S.P.
QQ-N-281 - Nickel-Copper Alloy Bars, Plates, Rods, Sheets, Strips, Wire, Forgings, and Structural and Special Shaped Sections
RR-C-901 - Cylinders, Compressed Gas: With Valve or Plug; ICC 3AA.
WW-P-404 - Pipe, Steel, (Seamless and Welded, Black and Zinc-Coated) (Galvanized).
PPP-B-585 - Boxes, Wood, Wirebound.
PPP-B-591 - Boxes, Fiberboard, Wood-Cleated.
PPP-B-601 - Boxes, Wood, Cleated-Plywood.
PPP-B-621 - Boxes, Wood, Nailed And Lock-Corner.
PPP-B-636 - Box, Fiberboard.
PPP-C-650 - Crates, Wood, Open and Covered.

MILITARY

MIL-P-116 - Preservation, Methods of.
MIL-B-121 - Barrier Material, Greaseproofed, Waterproofed, Flexible.
MIL-B-233 - Boxes, Repair Parts, Storage.
MIL-S-901 - Shock Tests, H.I. (High-Impact); Shipboard Machinery, Equipment And Systems, Requirements For.
MIL-D-1000 - Drawings, Engineering and Associated Lists.
MIL-D-1000/2 - Drawings, Engineering and Associated Lists.
MIL-P-15024 - Plates, Identification-Information and Marking For Identification of Electrical, Electronic and Mechanical Equipment.
MIL-M-15071 - Manuals, Technical, Equipment and Systems, Requirements For.
MIL-C-16310 - Cylinder, Compressed Gas (Compressed Air and Carbon Dioxide, Nonshatterable and Nonmagnetic).
MIL-B-17360 - Valves, Cylinder, Gas, Carbon Dioxide Fire Extinguisher.
MIL-E-17555 - Electronic and Electrical Equipment And Associated Repair Parts: Preparation For Delivery Of.
MIL-T-24107 - Tube, Copper (Seamless).

STANDARDS

FEDERAL

FED-STD-595 - Colors.

MILITARY

MIL-STD-129 - Marking for Shipment and Storage.

DRAWINGS

BUREAU OF SHIPS
810-1385943 - Unions, Silver Brazing, 3000 psi, WOG, IPS for UT Inspection.
810-1385941 - Fittings, Silver Brazing, WOG, 3000 psi, for UT Inspection.
810-1385867 - Decalcomania for Navy Gas Cylinders.

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2. Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

DEPARTMENT OF TRANSPORTATION
Code of Federal Regulations.

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.)

UNIFORM CLASSIFICATION COMMITTEE
Uniform Freight Classification Rules

(Application for copies should be addressed to the Uniform Classification Committee, 202 Union Station, 516 West Jackson Boulevard, Chicago, Illinois 60606.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. REQUIREMENTS

‡ 3.1 Sample for first article inspection. Prior to beginning production a sample shall be tested as specified in 4.2 (see 6.2).

3.2 Design. The fire extinguisher system shall consist of cylinders, cylinder clamps, cylinder valves, discharge heads, operating gear or control devices as necessary, flexible discharge loops, discharge manifold, alarm device, ventilation system shut-off switch interlock, time delay, pneumatic release mechanism, distribution piping (tubing) and fittings, as specified, together with properly sized discharge nozzles.

3.2.1 Cylinders. Cylinders shall be in accordance with type II, class 1, of RR-C-901. Each cylinder shall have affixed thereto decalcomanias conforming to decal No. 7 of 810-1385867. Nonmagnetic cylinders, when specified (see 6.1), shall conform to size B of MIL-C-16310. Finish paint shall be red enamel, Color 11105 of FED-STD-595.

3.2.1.1 Saddle type clamps and bolts for securing the cylinders to the ship's structure shall be furnished. The clamps and bolts shall be capable of withstanding shock tests specified in 4.5.1. Nonmagnetic saddle type clamps and bolts shall be furnished when nonmagnetic cylinders are specified (see 6.1).

3.2.2 Cylinder valves. Each cylinder shall be fitted with a valve in accordance with class C of MIL-V-17360.

3.2.3 Discharge heads. Each cylinder shall be fitted with a discharge head to permit release of the carbon dioxide. The heads shall be designed for use with the valves specified in 3.2.2. Discharge heads shall withstand the test specified in 4.5.1. They shall have a check feature to prevent release of CO_2 from the manifold when attached to the flexible loop but not to a cylinder valve.

‡ 3.2.4 Operating gear or control devices. The operating gear shall consist of a combination of the following devices as specified (see 6.1): A cable-operated lever or cam device for both local and remote manipulation, together with pull cable, cable guard pipe, multiple pull box, corner pulleys, pull box assemblies and incidental fittings. The control device shall withstand the test specified in 4.5.1.

3.2.4.1 The pull cable shall be made of nickel-copper alloy in accordance with QQ-N-281, and shall be of the preformed type, 1/8-inch diameter.

3.2.4.2 The cable guard pipe shall be of 3/8-inch steel, galvanized pipe in accordance with WW-P-404. For nonmagnetic installations, the guard pipe shall be of aluminum, copper or brass.

3.2.4.3 The corner pulley housings shall be made of cast or forged copper base alloy. Corner pulley sheaves may be of bronze or nylon. Corner pulleys shall turn freely. When specified (see 6.1), pull boxes shall be watertight if exposed to weather; otherwise, non-watertight design shall be used. Pull boxes shall be free of cracks. Watertight pull boxes shall be of a copper alloy. Nonwatertight pull boxes may be of aluminum or other metal.

3.2.5 Flexible discharge loops. The flexible metallic discharge loops shall be 3/8-inch inside diameter hose and 12-1/2 ± 3/4 inches long. Loops shall withstand the test of 4.5.2 and shall be constructed of non-ferrous material. Loops shall have a union type inlet connection for connection to the discharge head. The outlet end shall be prepared for silver brazing to a fitting conforming to 810-1385941.

3.2.6 Discharge manifold. The discharge manifold shall be of properly sized copper tubing as specified in MIL-T-24107, shall withstand 1900 psi minimum working pressure, and shall be prepared for silver brazed fittings as shown in 810-1385941 and 810-1385943. Tubing employed by manifolds shall be as specified in 3.2.11.

3.2.7 Alarm device. The alarm device shall be an electrically actuated gong or siren as specified (see 6.1). The switch shall be a CO_2 piston-operated toggle type designed to permit both manual and CO_2 pressure operation with manual reset without disconnecting the CO_2 supply piping. Voltage and amperage shall be as specified (see 6.1).

3.2.8 Interlock switch. The ventilation system electrical interlock switch shall be of the CO_2 actuated piston-toggle design with manual and CO_2 pressure operation and manual reset without disconnecting the CO_2 supply piping. Voltage and amperage shall be as specified (see 6.1).

3.2.9 Time delay devices. Time delay devices shall be made of nonferrous metal, and shall be provided in all fixed piping systems discharging into working or living spaces. The time lag shall be as specified (see 6.1).

3.2.10 Auxiliary valves. The system shall incorporate such quick-acting stop, differential or directional valves as are necessary for the safe and proper control of the carbon dioxide. Such valves shall be of cast or forged bronze and easily operable without sticking or binding when under pressure, and shall withstand the test specified in 4.5.1.

3.2.11 Distribution system. Copper tubing as specified in MIL-T-24107 shall be employed for distributing the carbon dioxide, and shall be properly sized to permit a free and uninterrupted flow. The maximum allowable pressure at 100°F. shall be 1900 psi. Fittings, tees, crosses, elbows, and unions shall be as shown in 810-1385941 and 810-1385943.

3.2.12 Nozzles. Discharge nozzles shall be of the shielded horn or baffle type with single or multiple jet orifices designed to permit constant flow, rapid expansion and diffusion of the carbon-dioxide gas (snow) without stratification or spotty concentration. The body of the nozzle shall be made of brass, and the orifice piece shall be made of nickel-copper alloy. The nozzle orifices shall be of proper size and design to prevent freezing during the discharge.

3.2.13 Charge. The charge for each extinguisher shall be 50 pounds plus or minus 1/4-pound of carbon dioxide conforming to grade B, type II of BB-C-101.

3.2.13.1 The undercharge, when specified (see 6.1) for an extinguisher for use when the temperature is 130°F. or higher, shall be 90 percent of 50 pounds or 45 pounds plus or minus 1/4-pound of carbon dioxide as specified in 3.2.13.

3.3 Repair parts. Onboard repair parts shall consist of the following:

(a)	Safety disk and washer	100 percent
(b)	Seal wires	100 percent
(c)	Recharge adapter	One per ship (min)
(d)	Pull box glass	One per box
(e)	Discharge loop	One per ship (min)
(f)	Discharge head	One per ship (min)
(g)	Gaskets (if used)	50 percent

(h) One fully charged replacement cylinder shall be furnished for each cylinder installed in the system, or 30 percent of the total cylinders installed in the ship, whichever is greater.

3.3.1 Tools. No special tools shall be required for installation or maintenance of the system. Special tools are defined as those tools not listed in the Federal Supply Catalog (copies of this catalog may be consulted in the office of the Defense Contract Administration Service (DCAS)).

3.4 Identification plates. Identification plates exposed to the weather shall conform to type A or B of MIL-P-15024. The material shall be brass, corrosion-resisting steel or nickel-copper. If brass is used, the plate shall be given a satin chrome finish. The letter filling shall be colored black. Identification plates not exposed to the weather shall be type B of plastic material of MIL-P-15024.

3.5 Manuals. Manuals shall conform to type III of MIL-M-15071.

3.6 Drawings. Unless otherwise specified (see 6.1), drawings shall be furnished and shall be in accordance with categories A, F, and G, form 2 of MIL-D-1000 and Type II of MIL-D-1000/2. The drawings shall accompany bids.

3.7 Workmanship. The workmanship shall be first class in every respect.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 First article inspection. First article inspection shall consist of the examination of 4.4 and the tests of 4.5.

4.3 Quality conformance tests. One cylinder of each contract or order shall be subjected to the examination of 4.4 and the test of 4.5.1.

4.4 Visual examination. All parts of the system shall be examined to determine conformance with this specification and with the manufacturer's approved drawings (see 3.6 and 6.1).

4.5 Test procedures.

4.5.1 Shock tests. The following tests shall be conducted:

(a) An assembly of one cylinder, cylinder valve, discharge head, control device, flexible discharge loop and discharge manifold fitting secured to the shock machine by the cylinder clamps and bolts specified in 3.2.1.1 shall be subjected to high-impact shock test in accordance with grade A, class I of MIL-S-901. The cylinder shall contain 50 pounds of water and shall be pressurized to 870 pounds per square inch gage (psig) with air or nitrogen for this test.

(b) The alarm device, interlock switch, time delay device and auxiliary valves shall be similarly tested without internal pressure.

4.5.2 Flexible discharge loops. The loops shall be subjected to a 3000 p.s.i. working pressure for a minimum of 5 minutes to determine conformance with 3.2.5.

4.5.3 Equipment submitted for test which fails to conform to this specification, or indicates any weakness under test, shall be cause for rejection.

4.6 Inspection of preservation, packaging, packing and marking for shipment and storage. Preservation, packaging, packing and marking for shipment and storage shall be examined to determine conformance with the documents *referenced in Section* 5.

5. PREPARATION FOR DELIVERY

(The preparation for delivery requirements specified herein apply only for direct Government procurements. For the extent of applicability of the preparation for delivery requirements of referenced documents listed in section 2, see 6.3.)

5.1 Domestic shipment and early installation.

5.1.1 Packaging. Packaging of all parts of the fire extinguisher (except repair parts) shall be in accordance with the manufacturer's commercial practice.

5.1.1.1 Repair parts. Repair parts (onboard and stock) shall be cleaned, preserved, and packaged in accordance with MIL-P-116, using MIL-E-17555 as a guide. Repair parts shall be packaged one item per unit package unless used in sets or in quantities greater than one.

5.1.2 Packing. All parts of the fire extinguisher (except repair parts) shall be packed in a manner to insure carrier acceptance at the lowest rate and safe delivery at destination. Containers shall be in accordance with the Code of Federal Regulations, the Uniform Freight Classification Rules or regulations of other carriers as applicable to the mode of transportation.

5.1.2.1 Repair parts.

5.1.2.1.1 Stock repair parts. Stock repair parts shall be packed in wood-cleated fiberboard, cleated plywood, nailed wood, wirebound wood, corrugated or solid fiberboard boxes conforming to PPP-B-591, PPP-B-601, PPP-B-621, PPP-B-585, and PPP-B-636, respectively. Fiberboard boxes shall conform to the special requirements of the applicable box specification. The gross weight of wood and wood-cleated boxes shall not exceed 200 pounds.

5.1.2.1.2 Onboard repair parts. Where onboard parts are destined for a ship that is not fitted with bin or drawer type stowage (see 6.1), the onboard parts shall be packed in type M metal boxes conforming to MIL-B-233 and shall be overpacked in shipping containers conforming to PPP-B-621 or PPP-C-650. Where onboard parts are destined for a ship that is fitted with bin or drawer type stowage (see 6.1), onboard repair parts shall be packed in boxes as specified in 5.2.2.2.1. Charged gas cylinders shall be packed for shipment in accordance with RR-C-901.

5.1.3 Marking. Shipment marking information shall be provided on interior packages and exterior shipping containers in accordance with the contractor's commercial practice. The information shall include nomenclature, Federal stock number or manufacturer's part number, contract or order number, contractor's name and destination.

5.2 Domestic shipment and storage or overseas shipment. The requirements and levels of preservation, packaging, packing and marking for shipment shall be specified by the procuring activity (see 6.1).

5.2.1 Preservation and packaging.

5.2.1.1 Level A.

5.2.1.1.1 Preservation and packaging of all mechanical parts shall be in accordance with MIL-P-116. Electrical parts shall be preserved and packaged in accordance with MIL-E-17555. Plugs, caps or barrier material conforming to MIL-B-121 shall be used to seal openings to prevent entrance of foreign material.

5.2.2 Packing.

5.2.2.1 Level A.

5.2.2.1.1 Unless otherwise specified in the contract or order, the gas cylinders shall be prepared for shipment in accordance with RR-C-901. Disassembled parts of the system (except repair parts) shall be packed in cleated plywood, nailed wood, wirebound wood or symbol V fiberboard boxes conforming to PPP-B-601, PPP-B-621, PPP-B-585, and PPP-B-636, respectively. The gross weight of wood and wood-cleated boxes shall not exceed 150 pounds, and fiberboard boxes shall not exceed 70 pounds.

5.2.2.1.2 Repair parts.

5.2.2.1.2.1 Stock repair parts. Stock repair parts shall be packed in boxes conforming to PPP-B-591, PPP-B-601, PPP-B-621, or PPP-B-636. Fiberboard boxes shall conform to the special requirements of the applicable box specification. The gross weight of wood and wood-cleated boxes shall not exceed 200 pounds.

5.2.2.1.2.2 Onboard repair parts. Where onboard repair parts are destined for a ship that is not fitted with bin or drawer type stowage (see 6.1), the onboard repair parts shall be packed in type M metal boxes conforming to MIL-B-233 and shall be overpacked in

shipping containers conforming to PPP-B-621 or PPP-C-650. Where onboard repair parts are destined for a ship that is fitted with bin or drawer type stowage (see 6.1), onboard repair parts shall be packed in boxes as specified in 5.2.2.1.1. Charged gas cylinders shall be packed for shipment in accordance with RR-C-901.

5.2.2.2 Level B.

5.2.2.2.1 Unless otherwise specified (see 6.1), the gas cylinders shall be prepared for shipment in accordance with RR-C-901. Disassembled parts of the system shall be packaged in cleated fiberboard, cleated plywood, nailed wood, wirebound wood, corrugated or solid fiberboard boxes conforming to PPP-B-591, PPP-B-601, PPP-B-621, PPP-B-585, and PPP-B-636, respectively. Fiberboard shall conform to the special requirements of the applicable specifications. The gross weight of wood and wood-cleated boxes shall not exceed 200 pounds.

5.2.3 Marking. In addition to any marking required by the contract or order, all interior packages and exterior shipping containers shall be marked in accordance with MIL-STD-129. Gas cylinders shall be additionally marked as required by the Code of Federal Regulations. Nomenclature shall be the exact nomenclature for the part or item that has been approved under the contract or order.

5.3 Technical publications. Manuals shall be packaged in accordance with MIL-M-15071.

5.4 Use of polystyrene (loose-fill) material.

5.4.1 For domestic shipment and early equipment installation and level C packaging and packing. Unless otherwise approved by the procuring activity (see 6.1), use of polystyrene (loose-fill) material for domestic shipment and early equipment installation and level C packaging and packing applications such as cushioning, filler and dunnage is prohibited. When approved, unit packages and containers (interior and exterior) shall be marked and labelled as follows:

"CAUTION

Contents cushioned etc. with polystyrene (loose-fill) material.
Not to be taken aboard ship.
Remove and discard loose-fill material before shipboard storage.
If required, recushion with cellulosic material bound fiber,
fiberboard or transparent flexible cellular material."

5.4.2 For level A packaging and level A and B packing. Use of polystyrene (loose-fill) material is prohibited for level A packaging and level A and B packing applications such as cushioning, filler and dunnage.

6. NOTES

6.1 Ordering data. Procurement documents should specify the following:

(a) Title, number, and date of this specification.
(b) Type (magnetic or nonmagnetic) (see 3.2.1).
(c) Nonmagnetic saddle type clamps and bolts, when required (see 3.2.1.1).
(d) Control devices required (see 3.2.4).
(e) Watertight pull boxes when required (see 3.2.4.3).
(f) Alarm device required (see 3.2.7).
(g) Voltage and amperage required (see 3.2.7 and 3.2.8).
(h) Time lag required (see 3.2.9).
(i) Undercharge, when specified (see 3.2.13.1).
(j) Drawings other than as specified (see 3.6).
(k) Whether preparation for domestic or overseas shipment is required; if domestic, the type required (see Section 5).
(l) Whether repair parts boxes are required (see 5.1.2.1.2 and 5.2.2.1.2.2).
(m) Other than Level B packing for cylinders (see 5.2.2.2.1).
(n) Approval for the use of polystyrene (see 5.4).

6.2 First article inspection. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection as to those bidders offering a product which has been previously procured or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending procurement.

6.3 Sub-contracted material and parts. The preparation for delivery requirements of referenced documents listed in Section 2 do not apply when material and parts are procured by the supplier for incorporation into the equipment and lose their separate identity when the equipment is shipped.

6.4 CHANGES FROM PREVIOUS ISSUE. THE OUTSIDE MARGINS OF THIS DOCUMENT HAVE BEEN MARKED "#" TO INDICATE WHERE CHANGES (DELETIONS, ADDITIONS, ETC.) FROM THE PREVIOUS ISSUE HAVE BEEN MADE. THIS HAS BEEN DONE AS A CONVENIENCE ONLY AND THE GOVERNMENT ASSUMES NO LIABILITY WHATSOEVER FOR ANY INACCURACIES IN THESE NOTATIONS. BIDDERS AND CONTRACTORS ARE CAUTIONED TO EVALUATE THE REQUIREMENTS OF THIS DOCUMENT BASED ON THE ENTIRE CONTENT AS WRITTEN IRRESPECTIVE OF THE MARGINAL NOTATIONS AND RELATIONSHIP TO THE LAST PREVIOUS ISSUE.

Preparing activity:
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