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MILITARY SPECIFICATION

STRAINERS, SEDIMENT, PIPELINE, DUPLEX (WITH AND WITHOUT MAGNET)

This specification is approved for use by the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers duplex strainers for use in lubricating, diesel, fuel oil and sea water cooling systems.

1.2 Classification. Duplex strainers should be of the following types and classes as specified (see 6.2):

Type I - With magnet.

Class 1 - Steel body, 30 mesh basket; lubricating oil service, maximum temperature 220°F.
Class 2 - Non-ferrous body, 80 mesh basket; lubricating oil service, maximum temperature 220°F.
Class 3 - Non-ferrous body, 30 mesh basket; lubricating oil service, maximum temperature 220°F.
Class 4 - Steel body, 80 mesh basket; lubricating oil service, maximum temperature 220°F.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 55Z3, Department of the Navy, Washington, DC 20362-5101 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A
FSC 4730

Class 5 - Non-ferrous body, 40 micrometer absolute filtration; lubricating oil service, maximum temperature 220°F.
Class 6 - Steel body, 40 micrometer absolute filtration; lubricating oil service, maximum temperature 220°F.
Class 7 - Non-ferrous body, 25 micrometer absolute filtration; lubricating oil service, maximum temperature 220°F.
Class 8 - Steel body, 25 micrometer absolute filtration; lubricating oil service, maximum temperature 220°F.

Type II - Without magnet.

Class 1 - Steel body, 30 mesh basket, diesel oil, marine transfer service, maximum design pressure 100 pounds per square inch (psi), maximum temperature 120°F.
Class 2 - Non-ferrous, 1/8 inch perforated plate basket, sea water cooling service, design pressure 50 to 220 psi, maximum temperature 120°F.
Class 3 - Steel body, 24 mesh basket, fuel oil service, maximum design pressure 350 psi, maximum temperature 120°F.
Class 4 - Steel body, 80 mesh basket, fuel oil service, maximum design pressure 600 psi, maximum temperature 120°F.
Class 5 - Non-ferrous body, 40 micrometer absolute filtration; lubricating oil service, maximum temperature 220°F.
Class 6 - Steel body, 40 micrometer absolute filtration; lubricating oil service, maximum temperature 220°F.
Class 7 - Non-ferrous body, 25 micrometer absolute filtration; lubricating oil service, maximum temperature 220°F.
Class 8 - Steel body, 25 micrometer absolute filtration; lubricating oil service, maximum temperature 220°F.

2. APPLICABLE DOCUMENTS

2.1 Government documents. 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.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

QQ-C-390 - Copper Alloy Castings (Including Cast Bar).
QQ-N-281 - Nickel-Copper Alloy Bar, Rod, Plate, Sheet, Strip, Wire, Forgings, and Structural and Special Shaped Sections.
PPP-B-1055 - Barrier Material, Waterproof, Flexible.
PPP-F-320 - Fiberboard: Corrugated and Solid, Sheet Stock (Container Grade), and Cut Shapes.

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MIL-P-116 - Preservation, Methods of.
MIL-B-121 - Barrier Material, Greaseproofed, Waterproofed, Flexible.
MIL-S-901 - Shock Tests, H.I. (High-Impact) Shipboard Machinery, Equipment, and Systems, Requirements For.
MIL-G-1149 - Gasket Materials, Synthetic Rubber, 50 and 65 Durometer Hardness.
MIL-S-1222 - Studs, Bolts, Hex Cap Screws, Socket Head Cap Screws, and Nuts.
MIL-F-8815 - Filter and Filter Elements, Fluid Pressure, Hydraulic Line, 15 Micron Absolute and 5 Micron Absolute, Type II Systems.
MIL-P-15024 - Plates, Tags and Bands for Identification of Equipment.
MIL-P-15024/5 - Plates, Identification.
MIL-C-15726 - Copper-Nickel Alloy, Sheet, Plate, Strip, Bar, Rod and Wire.
MS18229 - Plug for 'O' Ring Gasket.
MIL-L-19140 - Lumber and Plywood, Fire-Retardant Treated.
MIL-F-20042 - Flanges, Pipe and Bulkhead, Bronze (Silver Brazing).
MIL-B-22191 - Barrier Materials, Transparent, Flexible, Heat Sealable.
MIL-S-22698 - Steel Plate, Shapes and Bars, Weldable Ordinary Strength and Higher Strength: Structural.
MIL-S-24093 - Steel Forgings, Carbon and Alloy Heat Treated.
MIL-P-24396 - Packing Material, Braided TFE (Polytetrafluoro-ethylene).
MIL-B-24480 - Bronze, Nickel-Aluminum (UNS No. C95800) Castings for Seawater Service.
MIL-V-24586 - Valve, Needle, Size 1/4-Inch and 1/2-Inch, Union Bonnet Construction.
MIL-C-24707 - Castings, Ferrous, General Specification for.
MIL-C-24707/1 - Castings, Ferrous, for Machinery and Structural Applications.
MIL-C-24707/3 - Castings, Ferrous, Corrosion-Resistant, Austenitic, Chromium-Nickel.
MIL-C-24723 - Castings, Nickel-Copper Alloy.
MIL-R-83248 - Rubber Fluorocarbon Elastomer, High Performance Fluid, and Compression Set Resistant.

STANDARDS

MILITARY

MIL-STD-278 - Welding and Casting Standard.
MIL-STD-2073-1 - DOD Materiel Procedures for Development and Application of Packaging Requirements.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, BLDG. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DRAWINGS

NAVAL SEA SYSTEMS COMMAND (NAVSEA)

NAVSHIPS 803-2177525	- Valve Assemblies, 900 lb ANSI, BW and SW, 1/4 - 2 Inch.
NAVSHIPS 803-4384536	- Valves, Bronze 1/4 inch - 2 Inch Union End Globe, Angle and Stop Check.
NAVSEA 803-5001048	- Strainer, Duplex, Fuel Oil, Firesafe, 3 inch.
NAVSEA 803-6397291	- Strainer Assembly, Duplex, Lube Oil, 6 inch.
NAVSEA 803-6397390	- Strainer Assembly, Duplex, Lube Oil, 2 inch.
NAVSEA 803-6397396	- Strainer Assembly, Duplex, Lube Oil, 4 inch.

(Application for copies should be addressed to: Commander, Portsmouth Naval Shipyard, Code 202.2, Portsmouth, NH 03801.)

2.2 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN NATIONAL STANDARDS INSTITUTE, INC. (ANSI)

B16.5 - Pipe Flanges and Flanged Fittings. (DoD adopted)

(Application for copies should be addressed to the American National Standard Institute, Inc., 1430 Broadway, New York, NY 10018.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

A 108	- Standard Specification for Steel Bars, Carbon, Cold Finished, Standard Quality. (DoD adopted)
A 167	- Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip. (DoD adopted)
A 216	- Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High Temperature Service. (DoD adopted)
A 276	- Standard Specification for Stainless and Heat-Resisting Steel Bars and Shapes. (DoD adopted)
A 312	- Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes. (DoD adopted)
A 595	- Standard Specification for Steel Tubes, Low-Carbon, Tapered for Structural Use.
B 124	- Standard Specification for Copper and Copper-Alloy Forging Rod, Bar, and Shapes. (DoD adopted)
B 138	- Standard Specification for Manganese Bronze Rod, Bar, and Shapes. (DoD adopted)

FIGURE 1. Solid pattern.

ASTM (Continued)

B 139 - Standard Specification for Phosphor Bronze Rod, Bar, and Shapes. (DoD adopted)

B 369 - Standard Specification for Casting, Copper Nickel Alloy. (DoD adopted)

D 3951 - Standard Practice for Commercial Packaging. (DoD adopted)

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for related associated detail specifications, specifications, specification sheets or MS standards), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection (see 6.4) in accordance with 4.3.

3.2 Recovered materials. Unless otherwise specified herein, all equipment, material, and articles incorporated in the products covered by this specification shall be new and may be fabricated using materials produced from recovered materials to the maximum extent practicable without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products is allowed under this specification unless otherwise specifically specified.

3.3 Design. (See 6.2).

3.3.1 General construction. Each strainer shall be of the duplex basket type with 3-way valves (inlet and outlet valving) and constructed to be readily opened for examination, removal and cleaning of the baskets. The cross sectional area of the path of flow through the strainer shall be equal to or greater than the cross sectional area of the piping to which the strainer is connected. Each strainer shall be provided with shifting means to permit changeover (the act of shifting flow from one strainer basket to the other) without damage to any parts. Each strainer compartment shall have a set of vent and drain valves.

3.3.1.1 Changeover mechanism. This mechanism shall consist of an actuator and 3-way valves (inlet and outlet valving). The 3-way valving shall be arranged so that one basket is fully open and the other is fully shut off at the same time and so that no contaminated fluid can pass from the inlet to outlet side of the

strainer during changeover. The arrangement of the strainer shall be such that changeover shall be accomplished without interruption, even momentarily, of the full flow through the strainer. A visual indicator shall be included to identify the basket in service.

3.3.1.1.1 Equalizing feature. Except for type II, class 2, strainers shall have an equalizing feature that slowly pressurizes the off duty strainer basket compartment at a flow rate not exceeding 10 gpm at design pressure.

3.3.1.1.2 Changeover actuator. Shifting for all strainers except type II, class 2 shall require a minimum of four complete rotations of a handwheel to require slow changeover and to enable return to the original basket in the event of a leak in the oncoming basket compartment. The connection of the changeover valve operator to the valve stem shall prevent improper attachment causing incorrect orientation of the operator to the valve. Thus, square changeover valve stem ends are not acceptable. Internal stops shall prevent inadvertent disruption of fluid flow due to improper positioning of changeover valve part.

3.3.1.1.2.1 Safety interlock. Positive interlocks shall be provided to prevent the following operator actions (not applicable to type II, class 2):

(a) Changeover: Change over to an off-duty compartment when the off-duty compartment cover is off or when the drain and equalizing valves are open.
(b) Remove or loosen the cover when the compartment is pressurized.
(c) Open the drain valve on the compartment in service.

3.3.1.1.3 Operating torque. The maximum required force for any operation associated with shifting from one strainer basket to the other shall be less than 50 pounds (lbs).

3.3.1.1.4 Type of changeover valves. Plug, ball and disc changeover valves in accordance with 3.3.1.1.4.1, 3.3.1.1.4.2, and 3.3.1.1.4.3 are approved for use in these strainers.

3.3.1.1.4.1 Plug changeover valves. Plug valves shall be of the non-lubricated, straight-cartridge type, capable of tight seating in both directions. The valve operating arrangement shall not utilize a lift arrangement to unseat the plug before rotating, in order to reduce operating torque. Low friction fluoro-carbon or similar resin material shall be employed at rubbing surfaces to prevent sticking, and to provide low operating torque for ease of actuation. The plug ports shall be properly aligned with the housing ports in all flow positions, and the plug shall not be raised or lowered by the line pressure. The valve shall be operable by one person. The valve shall be fully ported. The valve housing shall withstand the applied stresses developed during operation of the valve. The valve shall be compatible with the fluid in the system.

3.3.1.1.4.2 Ball changeover valves. Ball valves shall tightly seat in both directions. The ball valve seats shall be nonmetallic, renewable, compatible with the fluid media, and shall minimize erosive effects due to fluid flow. The ball ports shall be properly aligned with the housing ports in all flow positions. The valve shall be operable by one person. The valve shall be fully ported. The valve housing shall withstand the applied stresses developed during operation of the valve. The valve shall be compatible with the fluid in the system.

3.3.1.1.4.3 Disc changeover valves. Disc valves shall tightly seat in both directions. The disc valve seats shall be nonmetallic, renewable, compatible with the fluid media, and shall minimize erosive effects due to fluid flow. The disc ports shall be properly aligned with the housing ports in all flow positions. The valve shall be operable by one person. The valve shall be fully ported. The valve housing shall withstand the applied stresses developed during operation of the valve. The valve shall be compatible with the fluid in the system.

3.3.1.1.5 Changeover valve leakage. When tested in accordance with 4.7.2, leakage shall be zero. After operational cycling in accordance with 4.7.12, leakage from all changeover valves shall not fill the off-duty strainer compartment in less than 1 hour.

3.3.2 Piping connections. Unless otherwise specified (see 6.2), piping connections for 3.3.2.1, 3.3.2.2, 3.3.2.3, and 3.3.2.4 shall be either welded, silver brazed, flanged, straight threaded unions, or boss connections to the strainer housing. Straight threaded unions, or boss connections shall be fitted with O-rings. Open ended valves with a union or boss connection must be secured to prevent accidental rotation of the threaded joint.

3.3.2.1 Inlet and outlet connections. Inlet and outlet connections of each strainer shall be the same type and size as specified (see 6.2). Unless otherwise specified (see 6.2), both inlet and outlet connections shall be flanged. Flange faces shall have concentric or phonographic circular finish.

3.3.2.2 Valved gage connections. When specified (see 6.2), valved gage connections shall be included at both the inlet and outlet.

3.3.2.3 Equalizing valve arrangement. When the changeover mechanism is not equipped with an equalizing position (see 6.2), a means shall be included which will equalize pressure from the duty side to the off-duty side. This arrangement shall contain a self actuating shut-off valve in the equalizing line or port.

3.3.2.4 Vent and drain valves. Vent and drain valves shall be installed with the underside of the seat subject to system pressure.

3.3.3 Operating conditions. The design flow capacity, design pressure, range of liquid temperature and viscosity, and maximum allowable pressure drop (see 4.7.4) shall be as specified (see 6.2).

3.3.4 Compartment covers. Covers shall be flanged and attached to the body by either bolts and nuts, hinged bolts, clamps, or a yoke. The cover shall effect a positive seal on a gasket recessed in the body.

3.3.4.1 Anti-spray feature. Compartment cover (except for type II, class 2 strainer) shall deflect fluid spray downward into a drip pan in the event of gasket failure. Where such spray would flow along a horizontal surface of the strainer body, a means shall be provided adjacent to the cover to direct the flow from the horizontal surface downward into the drip pan. The spray deflector shall remain in position at all times when the compartment is pressurized.

3.3.5 Identification plates. Identification plates shall be provided in accordance with MIL-P-15024 and MIL-P-15024/5, and shall include the following:

(a) Type and class.
(b) Manufacturer.
(c) Contract number.
(d) The nominal pipe size of the inlet and outlet connections.
(e) Design pressure.
(f) Basket mesh size.
(g) The necessary operating instructions (see 3.4.1).
(h) National Stock Number (NSN).
(i) Component Identification Number (Designation) (CID).

3.3.6 Type I - with magnets.

3.3.6.1 Class 1 and 4 strainers. Class 1 and 4 strainers, sizes 2 inch (in), 4 in and 6 in, shall be in accordance with Drawings 803-6397390, 803-6397396, and 803-6397291 (see table I). Materials for all other class 1 and 4 strainers shall be in accordance with table II.

TABLE I. Lubricating oil strainer Navy standard drawings.

Navy standard drawing number	Nominal pipe size (inches)	Capacity (GPM)	Maximum clean differential pressure (PSID)	Operating pressure range (PSI)	Maximum operating temperature (°F)	Type I class 1 basket mesh/ wire od	Type I class 4 basket mesh/ wire od
803-6397390	2	300	5	50-250	220	30x30/ 0.016 in	80x80/ 0.007 in
803-6397396	4	500	5	50-250	220	30x30/ 0.016 in	80x80/ 0.007 in
803-6397291	6	850	5	50-250	220	30x30/ 0.016 in	80x80/ 0.007 in

3.3.6.2 Class 6 and 8 strainers. For class 6 and 8 strainers, sizes 2 in, 4 in, and 6 in, where possible use standard drawing designs listed in table I with an altered strainer basket design in accordance with 3.3.6.6. Materials for all other class 6 and 8 strainers shall be in accordance with table II.

TABLE II. Materials for type I, steel body strainers.

Part	Material	Applicable document	Remarks
Bodies, bonnets and cover	Steel castings	MIL-C-24707/1	
		ASTM A 216 WCB	GR 70-30
Clamps, yokes, valve operators	Steel	ASTM A 595(A)	
		ASTM A 108	
	Manganese bronze	ASTM B 138	
Glands	Steel or cast steel	MIL-C-24707/1	
	Corrosion-resisting steel	MIL-C-24707/3	
Changeover valves	Manganese bronze cast	ASTM B 138	
Vent, gage, equalizing valves	Steel	MIL-V-24586	Cl 1 Style A type II
Drain valves	Forged steel	803-2177525	
Threaded fasteners	Steel	MIL-S-1222	
O-rings	Fluorocarbon rubber	MIL-R-83248	Type I Cl 1 (Cl 2 for threaded bosses)
Packing for valve stems and rods		MIL-P-24396	
Basket frames, top rings and handle	CRES plate	ASTM A 167	S30400
	CRES wire	ASTM A 276	S30400
Threaded plugs	Steel	ASTM A 108	MS18229
Basket wire mesh	CRES wire	ASTM A 276	S30400
Magnet rods	CRES pipe	ASTM A 312	S30400
Magnets	Alnico VIII A		
	Alnico VIII S		

3.3.6.3 Classes 2, 3, 5, and 7 strainers. Material shall be in accordance with table III.

TABLE III. Materials for type I, non-ferrous body strainers.

Part	Material	Applicable document	Remarks
Bodies, bonnets covers and changeover valves	Cast tin bronze	QQ-C-390	C90300
	Aluminum bronze	MIL-B-24480	C95800
Clamps, yokes, valve operators	Cast tin bronze	QQ-C-390	C90300
	Aluminum bronze	MIL-B-24480	C95800
	Steel casting	MIL-C-24707/1	
	Bronze phosphor	ASTM B 139	C51000
Glands	Cast tin bronze	QQ-C-390	C90300
Vent valves	Bronze, angle	803-4384536	
Drain, gage and equalizing valves	Bronze, globe	803-4384536	
Threaded fasteners	Nickel-copper	MIL-S-1222	GR 400, 405
	Steel	MIL-S-1222	
O-rings	Fluorocarbon rubber	MIL-R-83248	Type I Cl 1 (Cl 2 for threaded bosses)
Packing for valve stems and rods		MIL-P-24396	
Basket frames	CRES plate	ASTM A 167	S30400
	CRES wire	ASTM A 276	S30400
Top ring and handle	Brass	ASTM B 124	
Threaded plugs	Manganese bronze	ASTM B 138	
	Nickel-copper	QQ-N-281	MS18229

TABLE III. Materials for type I, non-ferrous body strainers - Continued.

Part	Material	Applicable document	Remarks
Basket wire mesh	Copper-nickel alloy	MIL-C-15726	C70600 or C71500
	Nickel-copper alloy	QQ-N-281	N04400 or N04405
Magnet rods	CRES	ASTM A 312	S30400
Magnets	Alnico VIII A		
	Alnico VIII S		

3.3.6.4 Flanges.

3.3.6.4.1 Classes 1, 4, 6, and 8. Flanges shall be integrally cast with the body and shall be dimensionally in accordance with ANSI B16.5, class 150.

3.3.6.4.2 Classes 2, 3, 5, and 7. Flanges shall be integrally cast with the body and shall be dimensionally in accordance with MIL-F-20042, class 100.

3.3.6.5 Basket for classes 1, 2, 3, and 4.

3.3.6.5.1 Mechanical construction. Baskets shall be screen type construction, consisting of a supporting framework (strength member) with a wire mesh as the screening medium. The supporting framework (strength member) shall be either plate or wire construction, with a flange for supporting the frames on a machined surface in the strainer body. A seal shall be provided between the strainer element lands to prevent by-passing of contaminants. The basket elements shall be held securely in place when the strainer is assembled. Baskets shall not rupture when totally clogged and subjected to a differential pressure equal to 125 percent of the maximum design pressure for a duration of 10 minutes.

3.3.6.5.2 Strainer basket. Flow through the basket shall be inside-out. The strainer basket shall be made of inner and outer elements as specified in 3.3.6.5.2.1 through 3.3.6.5.2.2. The total clear area through the assembled strainer basket shall equal or exceed 2-1/2 times the cross-sectional area of the strainer discharge connection. The total clear area of an assembled basket of two-element construction is the area of those mesh openings of the inner element which are visible through the opening in the outer element, when assembled.

3.3.6.5.2.1 Inner elements.

3.3.6.5.2.1.1 Class 1 and 3 strainers. The inner element shall be wire mesh: 0.016 inch diameter wire with 0.0173 inch square openings, 30 mesh per lineal inch. Sufficient clearance shall be allowed to permit withdrawal.

3.3.6.5.2.1.2 Class 2 and 4 strainers. The inner element shall be wire mesh, 0.007 inch diameter wire fabric with 0.0055 inch square openings, 80 mesh per lineal inch. Sufficient clearance shall be allowed to permit withdrawal.

3.3.6.5.2.2 Outer elements. Wire outer elements shall have square openings at least 0.253 inches long using 0.08 inch diameter wire. Plate outer elements shall be at least 3/32 inch thick.

3.3.6.6 Basket for classes 5, 6, 7, and 8.

3.3.6.6.1 Mechanical construction. For classes 5, 6, 7, and 8 strainers, baskets shall be of pleated or similar construction which will result in a large surface area per unit of volume. Strainer baskets shall prevent passage of particulate matter larger than the size specified in 1.2 (smallest cross section). The supporting framework (strength member) shall be either plate or wire construction, with a flange for supporting the frames on a machined surface in the strainer body. A seal shall be provided between the strainer element lands to prevent by-passing of contaminants. The basket elements shall be held securely in place when the strainer is assembled. Baskets shall not rupture when totally clogged and subjected to a differential pressure equal to 125 percent of the maximum design pressure for a duration of 10 minutes. Materials shall be corrosion resistant, and shall meet the performance requirements of this specification. Flow through the basket may be inside-out or outside-in, with the provision that construction and operating instructions (see 3.3.5) for outside-in shall include measures to prevent accumulation of dirt in the strainer body.

3.3.6.6.2 Dirt holding capacity. Strainer basket assemblies shall retain one gram of AC coarse dust per gpm of rated flow without exceeding a differential pressure of 10 psi through the strainer when tested in accordance with 4.7.8.3.

3.3.6.6.3 Cleaning procedures. An effective secondary means of cleaning without special equipment shall be provided. Detergents or solvents prescribed for cleaning shall be subject to acceptance for shipboard use by the chemistry and toxicology unit of NAVSEA. The cleaning procedure shall result in an average clean basket pressure differential not greater than 6.6 psi or as specified (see 6.2), and the final minimum dirt holding capacity shall be 0.8 gram per gpm of rated flow when tested in accordance with 4.7.8.4.

3.3.6.7 Magnet. Inside-out flow strainer baskets shall be equipped with magnets, which shall be secured to a tube with a guide rod in the center of each basket. The magnet element shall be withdrawn with the basket and shall be readily detachable for cleaning or replacement without damage to the wire mesh screens. The magnets shall have rounded ends. The magnets and magnet assembly shall be installed to prevent the magnets or magnet assembly from coming into contact with the strainer basket should any unlocked screwed connection become unscrewed in service. For outside-in flow, magnets shall be placed in the center of the inlet flow path.

3.3.7 Type II - without magnets.

3.3.7.1 Class 1 strainers. Class 1 strainers shall be as specified in 3.3.6.1 except that magnets are not applicable.

3.3.7.2 Class 2 strainers.

3.3.7.2.1 Material. The material shall be in accordance with table IV.

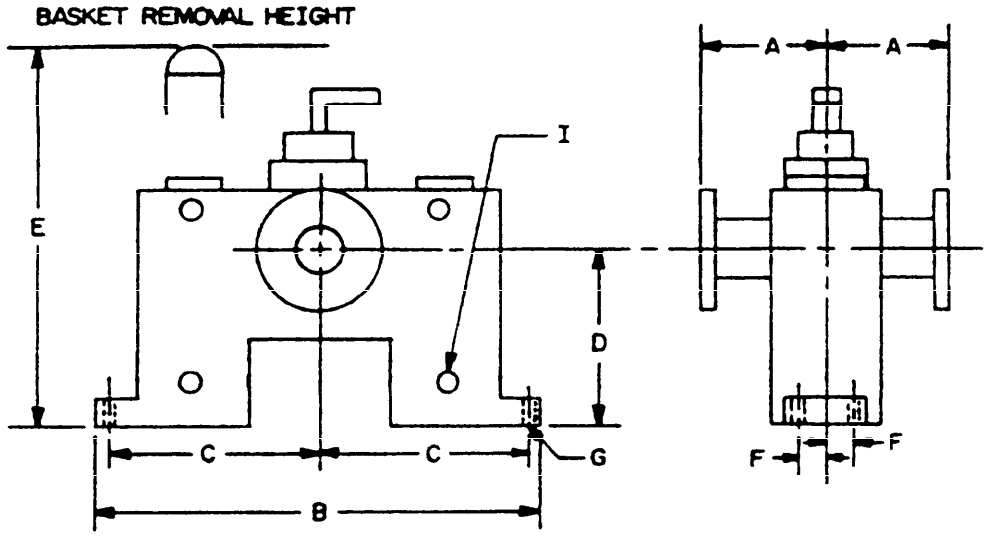
TABLE IV. Materials for type II, class 2 strainers.

Part	Material	Applicable document	Remarks
Bodies, covers, bonnets, glands and changeover valves (parts in contact with seawater)	Copper-nickel alloy	ASTM B 369	Alloy C96400
	Aluminum bronze	MIL-B-24480	C95700
Clamps, yokes, valve operators, (parts not in contact with seawater)	Cast tin bronze	QQ-C-390	Alloy C90300 or C92200
	Cast nickel-copper alloy	MIL-C-24723	
	Steel forging	MIL-S-24093	Class H
	Steel plate	MIL-S-22698	
Vent, drain, gage and equalizing valves	Bronze, globe	803-4384536	
Threaded fasteners	Nickel-copper alloy	MIL-S-1222	GR 400, 405
	NiCuAl alloy	MIL-S-1222	GR 500
Gaskets	O-ring	MIL-R-83248	Type I, class 1 (class 2 for threaded bosses)
	Synthetic rubber	MIL-G-1149	
Packing for valve stems and rods		MIL-P-24396	
	O-ring	MIL-R-83248	Type I, class 1
Basket	CuNi plate	MIL-C-15726	Alloy C71500
	NiCu plate	QQ-N-281	N04400 or N04405
Threaded plugs	NiCu	QQ-N-281	MS18229
	CuNi	MIL-C-15726	

3.3.7.2.2 Flanges. Flanges shall be integrally cast with the body and shall be dimensionally in accordance with MIL-F-20042 as applicable to the design pressure.

3.3.7.2.3 Strainer basket and handle. The strainer basket and handle assembly shall be an integral unit. Baskets shall be perforated plate with a flange for securing the baskets in the strainer body. Strainer baskets and handles shall be at least 3/32 inch thick. The total clear area of the perforations shall be not less than 3 times the cross-sectional area of the strainer discharge connection. Unless otherwise specified (see 6.2), the basket sides and bottom shall have 1/8-inch diameter holes, spaced at a minimum 3/16 inch center to center. When finer straining is required, an inner liner shall be added to the basket. Baskets shall not rupture when totally clogged and subjected to a differential pressure equal to 125 percent of the maximum design pressure for a duration of 10 minutes.

3.3.7.2.4 Class 2 envelope dimensions. Dimensions shall be as specified on figure 1.



Nominal pipe size	2	3	4	5	6	8
A	7	9	10	14	14	16
B	22 1/4	25 1/4	32	40	45	58
C	10 1/4	11 5/8	14 7/8	18 7/8	21 1/4	27 7/8
D	9	12	15	22	22	30
E	28 MAX	38 MAX	48 MAX	55 MAX	55 MAX	72 MAX
F	2 1/4	3	3 3/4	4 3/4	5 1/2	7 1/4
G	5/8	5/8	3/4	1	1	1
I	1/2	1/2	1/2	1	1	1

See notes at top of next page.

FIGURE 1. Type II, class 2 envelope dimensions.

NOTES: 1. All dimensions are in inches.
2. Flange drilling, straddles center line (see 3.3.7.2.2).
3. Vent valves 1/4 inch on inlet side of each compartment or on the basket compartment covers.
4. Drain valves on inlet side of each compartment.
5. Unless otherwise noted all dimensions ± 1/16 inch.
6. Half sizes shall use the next largest envelope dimensions.
7. 6 inch and 8 inch strainer basket compartments are to be flanged to the changeover valve(s).
8. Foundation base shall be designed to accommodate a minimum of 4 mounting bolts.

3.3.7.3 Classes 3 and 4. Class 3 and 4 strainers shall be in accordance with Drawing 803-5001048 (see table V).

TABLE V. Fuel oil strainer Navy standard drawings.

Type and class	Navy standard drawing number	Nominal pipe size (inches)	Capacity (GPM)	Maximum clean differential pressure (PSID)	Maximum operating pressure (PSI)	Maximum operating tempera-ture (°F)	Basket mesh/ wire OD
Type II Class 3	803-5001048	3	80	5	300 - 350	120	24x24/ 0.023"
Type II Class 4	803-5001048	3	80	5	300 - 600	120	80x80 0.007"

3.3.7.4 Classes 5, 6, 7, and 8 strainers. Type II class 5, 6, 7, and 8 strainers shall be in accordance with the requirements for the same class of type I strainer except magnets shall not be furnished.

3.3.8 Mechanical shock. The complete strainer assembly shall withstand the high impact shock test specified in 4.7.5.

3.4 Safe operating characteristics.

3.4.1 Changeover operational sequence. The changeover operational sequence shall be as follows:

(a) Open vent valve on off-duty basket compartment.
(b) Admit fluid slowly to off-duty compartment by means of equalizing valve.
(c) When fluid flows from vent valve, close vent valve.
(d) Examine off-duty compartment for leaks. If there is no evidence of leakage, proceed with step (f).
(e) If leakage occurs, close equalizing valve, vent and drain compartment, remove cover, correct cause of leakage, replace cover and repeat steps (a) through (d).
(f) Close equalizing valve.

(g) Shift flow slowly to off-duty side while watching for leaks. If leakage occurs, shift quickly back to original flow pattern, and repeat step (e). If there is no leakage during shifting, proceed with step (h).
(h) Open vent valve (drain valve for type II, class 2) on new off-duty compartment.
(i) Open drain valve (vent valve for type II, class 2) on new off-duty compartment and allow fluid to drain while removing cover.
(j) When fluid level is below top of strainer basket, close drain valve.
(k) Remove strainer basket, if installed, slowly to allow fluid to drip into strainer body. Remove magnets, if installed in baskets.
(l) Clean basket and examine for damage. Repair or replace as necessary.
(m) Replace magnets, if installed in basket.
(n) Replace basket.
(o) Examine cover gasket. Replace if damaged.
(p) Replace and secure cover.
(q) Open equalizing valve.
(r) When fluid flows from vent valve, close vent.
(s) Examine for leaks. If there is no evidence of leakage close equalizing valve and proceed with other duties.
(t) If leakage occurs, perform step (e).

3.5 System safety check list. The manufacturer shall comply with the requirements of 3.3.1, 3.3.2.3, 3.3.4.1, 3.3.8, and 3.4 and as verified by 4.3 and 4.4.

3.6 Workmanship. The strainer and its components shall be free from blow holes, porosity, hard spots, shrinkage defects and cracks. All surfaces shall be smooth and clean. The inside surfaces of strainers shall be clean and free from sharp edges.

3.7 Welding and allied processes. Fabrication welding and inspection, and casting inspection and repair, shall be in accordance with MIL-STD-278.

3.8 Prohibited material. Zinc or cadmium plating shall not be used on any part of the strainer.

3.9 Mercury exclusion. The strainer shall be free of mercury contamination. During the manufacturing process, tests and examinations (see 6.3), the product to be offered for acceptance shall not come in direct contact with mercury or any of its components, nor with any mercury containing device employing a single boundary of containment.

3.10 Special tools. Special tools shall be furnished. 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)).

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor 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 this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of the manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

(a) First article inspection (see 4.3).
(b) Quality conformance inspection (see 4.4).

4.3 First article inspection. First article inspection shall consist of one strainer of each size, type, class, and identical design undergoing the examination and tests as specified in table VI (see 6.3).

TABLE VI. First article and quality conformance inspection.

Examination and tests	First article	Quality conformance
Examination	4.6	4.6
Hydrostatic	4.7.1	4.7.1
Tightness (leakage)	4.7.2	4.7.2
Shock	4.7.5	---
Torque	4.7.2.1	4.7.2.1
Operating capacity	4.7.3	---
Pressure drop	4.7.4	---
Spray deflector	4.7.7	---
Safety interlock	4.7.9	4.7.9
Nondestructive	4.7.10	4.7.10
Pilot pressure boundary casting	4.7.11	---
Operational cycling	4.7.12	---
Equalizing flow rate	4.7.13	4.7.13
Additional inspection	4.8	4.8

TABLE VI. First article and quality conformance inspection - Continued.

Examination and tests	First article	Quality conformance
Basket tests:		
Element strength	4.7.6	---
Bubble point	4.7.8.1.1	4.7.8.1.2
Maximum particle passed	4.7.8.2	---
Retention test	4.7.8.3	---
Cleaning procedures	4.7.8.4	---

4.4 Quality conformance inspection. All assembled strainers shall undergo testing as specified in table VI (see 6.3). Visual and dimensional examination shall consist of selecting strainer(s) in accordance with 4.5 and inspecting them in accordance with 4.6.

4.5 Sampling for visual and dimensional examination.

4.5.1 Lot. For sampling, a lot shall consist of strainers of the same type, class, size, and identical design offered for delivery at one time.

4.5.2 Sampling. As a minimum, the contractor shall select a sample quantity of strainers in accordance with table VII and inspect them in accordance with 4.6. If one or more defects are found in any sample, the entire lot shall be rejected. The contractor has the option of screening 100 percent of the rejected lot for the defective characteristic(s) or providing a new lot which shall be inspected in accordance with the sampling plan.

TABLE VII. Sampling for visual and dimensional examination.

Lot size number of strainers	Sample size
5 and under	All
6 to 8	5
9 to 15	7
16 to 25	10
26 to 40	15
41 to 65	25
66 to 110	35
111 to 180	50
181 to 300	75

4.6 Visual and dimensional examination. The strainers shall be examined to verify conformance to the requirements of table VIII. Strainers having one or more defects shall be rejected.

TABLE VIII. Visual and dimensional examinations.

Inspection	Paragraph
Changeover mechanism	3.3.1.1
Piping connection	3.3.2
Vent and drain valves	3.3.2.4
Cover	3.3.4
Anti-spray (except type II class 2)	3.3.4.1
Identification plate	3.3.5
Flange (classes 1, 4, 6, and 8)	3.3.6.4.1
(classes 2, 3, 5, and 7)	3.3.6.4.2
(type II class 2)	3.3.7.2.2
Magnets (type I only)	3.3.6.7
Basket construction (classes 1, 2, 3, and 4)	3.3.6.5.1
(classes 5, 6, 7, and 8)	3.3.6.6.1
(type II class 2)	3.3.7.2.3
Quality of workmanship	3.6

4.7 Tests.

4.7.1 Hydrostatic pressure test for strength and porosity. The test shall be an internal pressure test with water. Each completely assembled strainer shall be tested to a pressure equal to 150 percent of the design pressure for a duration of 60 minutes. Strainers not maintaining zero leakage shall be rejected.

4.7.2 Tightness tests (leakage). Each strainer shall be tested for a duration of 30 minutes to verify the seal tightness of the changeover valve at 100 percent of design pressure using test fluid as specified in 4.7.3. Strainers not maintaining zero leakage shall be rejected. The observation of wetting at fluid boundary formed by the seal does not constitute leakage. To be called leakage the fluid must form drops that become large enough to drop or flow away from the point of formation and into the basket compartment.

4.7.2.1 Torque test. While conducting the leakage test in 4.7.2, the force required to change over from one compartment to another, including valve unseating and reseating, shall be determined in both directions by (a) or (b) as follows:

(a) The operating force applied at the radius of the handwheel.
(b) The force applied at the end of the shifting lever (type II, class 2 only).

NOTE: Strainers whose operating force exceeds 50 pounds shall be rejected.

4.7.3 Operating. The strainer shall be tested for pressure drop across the strainer at the specified design flow capacity and pressure, under the conditions specified below. For strainers intended for use with oil, the test shall be conducted with oil of the lowest viscosity specified (see 3.3.3), or as follows if not specified:

(a) Type I, all classes, and type II, classes, 5, 6, 7, and 8: test with oil having viscosity of 175 Standard Saybolt Universal (SSU) maximum.
(b) Type II, class 1, 3 and 4: test with oil having viscosity of 95 SSU maximum.
(c) Type II class 2: test with water.

4.7.4 Pressure drop. The strainer shall be tested for pressure drop across the strainer at the specified design flow capacity and pressure, under the conditions specified below. The clean pressure drop shall not exceed that specified (see 3.3.3) or 6 psi, if not specified:

(a) Type I, all classes, and type II, classes 5, 6, 7, and 8: test with oil having viscosity of 600 SSU minimum.
(b) Type II class 1, 3 and 4: test with oil having viscosity of 450 SSU minimum.
(c) Type II class 2: test with water.

NOTE: Strainers exceeding specified clean pressure drop shall be rejected.

4.7.5 Mechanical shock test. The strainer shall be tested for compliance with high impact shock resistance in accordance with MIL-S-901 grade A at a laboratory satisfactory to the command or agency concerned. After shock test, the baskets shall be subjected to and pass the strength test in accordance with 4.7.6.

4.7.6 Basket strength test. The strainer basket shall be tested by applying a differential pressure across the basket equal to 125 percent of the specified strainer design pressure for the applicable type and class, using water for a duration of 10 minutes. Alternate methods of obtaining differential pressure across the straining element such as would be obtained when starting up with cold oil or having a strippable film on the element interior, will be considered by the command or agency concerned. Straining elements which distort, stretch or exhibit other weaknesses shall be rejected.

4.7.7 Spray deflector effectiveness test. One strainer of each type, class, size and specific design shall be subjected to this test. The strainer shall be centered in a drip pan 3-inches deep and of a size and shape to allow 4-inches clearance around the periphery. The strainer cover shall be installed with an O-ring which has been notched to cause leakage. The strainer shall be pressurized to maximum design pressure. Leakage shall be deflected into the drip pan. This test shall be conducted 8 times with the O-ring notch moved clockwise 45 degrees between tests. Failure to pass this test in any leakage position shall require redesign of the deflector and retest.

4.7.8 Basket straining element tests for classes 5, 6, 7, and 8.

4.7.8.1 Bubble point tests.

4.7.8.1.1 Bubble point (first article inspection). Four baskets shall be tested to determine the initial bubble point. The basket, containing no fluid, shall be installed in a test loop similar to figure 3 of MIL-F-8815. The fluid level shall be maintained at approximately 1/2-inch above the top of the basket. The air pressure, as indicated in inches of water on the manometer, shall be slowly raised by small increments. The basket shall be rotated 360 degrees about

its longitudinal axis for each increment of air pressure so that the entire area can be observed for the appearance of the first bubble. The area of greatest porosity is determined by observing the first bubble on the surface of the basket; and the manometer reading in inches of water at which this bubble emits from the basket shall be recorded. This test shall be accomplished within a period of 10 minutes after immersion in the fixture. The fluid used shall be Proprietary Solvent Number 3, or equivalent, at 70 + 5°F filtered through a 0.45-micrometer membrane Millipore filter, or equivalent.

4.7.8.1.2 Bubble point (quality conformance). The basket, containing no fluid, shall be installed in a test loop similar to figure 3 of MIL-F-8815. The fluid level shall be maintained at approximately 1/2-inch above the top of the basket. The air pressure shall be preset to 0.1 inch of water less than the minimum initial bubble point. The basket shall be rotated 360 degrees about its longitudinal axis and the entire area scanned for the appearance of any bubbles. No bubble shall emerge from the basket. The fluid used shall be Proprietary Solvent Number 3, or equivalent, at 70 + 5°F filtered through a 0.45-micrometer membrane Millipore filter, or equivalent.

4.7.8.2 Maximum particle passed. After completion of 4.7.8.1.1, the elements shall be subjected to a maximum particle passed test using a mixture of glass beads, both smaller and larger than the specified micron rating of the basket and the test procedures specified in 4.7.2.5 of MIL-F-8815 shall be performed on the basket assembly. The results of this test shall establish micron rating of baskets. Initial bubble point of this sample basket establishes acceptance criteria for the lot.

4.7.8.2.1 Test point values. The minimum allowable initial bubble point value shall be the lowest initial bubble point of the first article inspection baskets, and shall be determined prior to further testing. This value shall be indicated on the first article inspection report (see 6.3).

4.7.8.3 Retention test. The strainer basket and its straining elements shall be tested for effectiveness of filtration using clean oil of the viscosity specified in 4.7.3(a). Oil shall be pumped through the strainer at rated flow. At the rate of 10 grams per 4 minutes, 1.0 grams per gpm of AC coarse dust shall be added. After all dust has circulated, the pressure differential through the strainer shall not exceed 10 psi. Baskets exceeding 10 psi differential pressure shall be rejected.

4.7.8.4 Test of cleaning procedures. After completion of 4.7.8.3 the strainer basket and its straining elements shall be cleaned in accordance with 3.3.6.7.3 and the clean basket pressure differential shall be recorded. The test of 4.7.8.3 shall then be repeated 9 times with dirt holding capacity and differential pressure after cleaning recorded for each test. The final dirt holding capacity and the average clean basket differential pressure increase shall be as specified in 3.3.6.7.3.

4.7.9 Verification of safety interlock effectiveness. Except type II class 2, the contractor shall demonstrate that actions prohibited by 3.3.1.1.2.1 are positively prevented by the interlocks. Strainers permitting the actions in 3.3.1.1.2.1 shall be rejected.

4.7.10 Non-destructive. The strainer and its components shall have welds and casting surfaces inspected in accordance with MIL-STD-278. Welds or castings not in accordance with MIL-STD-278 shall be rejected.

4.7.11 Pilot pressure boundary casting test. Prior to production of casting lots, each foundry must establish foundry methods and techniques, produce one casting and subject it to radiographic and dye penetrant testing in accordance with MIL-STD-278 (see 6.3).

4.7.12 Operational cycling tests. The strainer shall be tested for a total of 600 cycles at design pressure and flow rates. One complete cycle is defined by the operation of the changeover valve switching one basket on line to the other and back again. At the completion of the 600 cycles, compliance with the requirements of 3.3.1.1.3 and 3.3.1.1.5, as specified by 4.7.2, and with the requirements of 4.3 shall be demonstrated.

4.7.13 Verification of equalizing flow rate. Each assembled strainer shall be tested in the equalizing positions to verify that the strainer is in accordance with 3.3.1.1.1. Strainers exceeding 10 gpm equalizing flow shall be rejected.

4.8 Additional inspection. Where other specifications form a part of this specification, sampling, examination and tests shall be conducted as required by the pertinent specification, unless otherwise specified in the contract or order (see 6.2).

4.9 Inspection of preparation for delivery. Sample packages and packs and the inspection of the preservation-packaging, packing and marking shall be in accordance with the requirements of section 5 and the documents specified.

5. PACKAGING

(The packaging requirements specified herein apply only for direct Government acquisition. For the extent of applicability of the packaging requirements of referenced documents listed in section 2, see 6.5.)

5.1 General requirements.

5.1.1 Disassembly and matchmarking.

5.1.1.1 Disassembly. Equipment disassembly shall be the minimum necessary to make all machined or critical internal surfaces accessible for cleaning and preservation. Removal of secondary assemblies, accessories or projecting parts which facilitate protection of the equipment from damage, pilferage and loss, or reduction of cube is permitted where such removal shall not effect permanent settings or alignments, and where the removed part can be readily reassembled at the installation site without the need for special tools or gauges. Removed hardware (bolts, nuts, pins, screws, washers, and others) shall be reinstalled in mating parts and secured to prevent their loss.

5.1.1.2 Matchmarking. Removed parts of the equipment shall be matchmarked to facilitate reassembly. Removed parts shall be tagged with cloth shipping tags. The tags shall be attached to each of the mating parts. The tags and printing thereon shall be resistant to water, oil, and fading.

5.1.2 Painting. Strainers shall not be painted.

5.1.3 Navy fire-retardant requirements.

(a) Treated lumber and plywood. Unless otherwise specified (see 6.2), all lumber and plywood including laminated veneer material used in shipping containers and pallet construction, members, blocking, bracing, and reinforcing shall be fire-retardant treated material conforming to MIL-L-19140 as follows:

Level A and B - Type II - weather resistant
Category I - general use.

Level C - Type I - non-weather resistant
Category I - general use.

(b) Fiberboard. Fiberboard used in the construction of interior (unit and intermediate) and exterior containers including interior packaging forms shall conform to the class-domestic/fire retardant or class-weather resistant/fire retardant material requirements as specified (see 6.2) of PPP-F-320 and amendments thereto.

5.2 Detailed requirements.

5.2.1 Preservation. Preservation shall be level A or commercial, as specified (see 6.2).

5.2.1.1 Level A. Cleaning, drying and preservatives shall be in accordance with MIL-P-116, with each strainer unit protected in accordance with method I.

5.2.1.1.1 Preservation. All internal bare metal surfaces subject to corrosion shall be preserved using a preservative compatible with the system requirements. The following preservative application shall apply:

(a) Lubricating, diesel and fuel oil systems: Type P-2 of MIL-P-116.
(b) Sea water systems: Preservation shall not be applied to internal surfaces.

5.2.1.1.1.1 Threaded and other unpainted non-critical metal surfaces. Unless otherwise specified (see 6.2), threaded and other unpainted non-critical corrodible metal surfaces shall be coated with preservative type P-2. Exterior surfaces coated with preservative type P-2 shall be overwrapped as specified in 5.2.1.1.1.2.

5.2.1.1.1.2 Machined exterior surfaces. Machined exterior surfaces shall be coated with type P-2 preservative and shall be wrapped or covered with greaseproof barrier-material conforming to type I, grade A of MIL-B-121. When components are packed in unsheathed crates as permitted, the additional wrappings as specified in 5.2.1.1.1.2 and 5.2.1.1.1.2.2 shall be applied.

5.2.1.1.1.2.1 Irregular surfaces. Preserved surfaces of irregular contour shall be over-wrapped with greaseproof barrier-material conforming to type I, grade A of MIL-B-121. All edges of the wrapped surfaces shall be sealed with pressure-sensitive, waterproof tape.

5.2.1.1.1.2.2 Regular surfaces. Surfaces of regular contour, such as exposed areas of shafts or flat machined faces, shall be over-wrapped with a non-bleeding waterproof barrier material conforming to type C-1 or C-2 of PPP-B-1055. All edges of the waterproof wrap shall be sealed with pressure-sensitive waterproof tape.

5.2.1.1.1.3 Preservative protection. All equipment surfaces which are preserved shall be protected from direct contact with any blocking, dunnage, and shrouding by inserting one or more layers of barrier material conforming to type I, grade A of MIL-B-121 at points of contact.

5.2.1.1.1.4 Closure of openings. Small openings shall be sealed with pressure sensitive waterproof tape. Large openings shall be covered with waterproof paper conforming to class E-3 or L-4 of PPP-B-1055 and secured with tape as specified. When openings are covered and the covering is vulnerable to puncture, the covering shall be further protected by hardboard, wood, plywood, or metal covers. The open ends of all piping and fittings shall be sealed with pipe plugs or plastic caps.

5.2.1.1.2 Detached parts. Detached parts (see 5.1.1.1) shall be cleaned, dried and preserved-packaged individually in accordance with method I or method III of MIL-P-116 as applicable.

5.2.1.1.3 Special tools. Special tools shall be cleaned, preserved, and packaged in accordance with MIL-P-116 as follows:

(a) Tools made of ferrous metal with non-critical surfaces shall be cleaned by process C-1, dried as required, coated with type P-2 preservative and packaged method I of MIL-P-116. In lieu of the greaseproof wrap required, tools may be wrapped in transparent flexible greaseproof film conforming to type II of MIL-B-22191.

(b) Tools made of ferrous metal with critical surfaces shall be cleaned by process C-5, dried as required, coated with type P-9 preservative, and packaged method IC of MIL-P-116. Selection of the submethod of preservation shall be at the supplier's option. Transparent flexible greaseproof film conforming to type II of MIL-B-22191 may be used in lieu of wrapping material conforming to MIL-B-121 for a preliminary wrap.

(c) Tools fabricated completely of non-ferrous materials or ferrous materials that are plated or otherwise treated to resist corrosion shall be packaged by method III of MIL-P-116.

NOTE: In lieu of the preservatives cited in (a) and (b), P18 of MIL-P-116 may be used.

5.2.2 Commercial. Commercial packaging shall be in accordance with ASTM D 3951.

5.3 Packing. Packing shall be level A, B or commercial as specified (see 6.2).

5.3.1 General requirements.

5.3.1.1 Levels A and B. Shipping containers shall be of a minimum weight and cube consistent with the protection required. Tools and detached components accompanying the basic equipment shall be packed for the level specified in accordance with 5.2.1.1.3. Packed detached components shall be included within the same container as the basic unit, except when minimum cube and tare weight are adversely affected they shall be packed separately. Unless otherwise specified (see 6.2), repair parts and tools shall be shipped separately and concurrently with the basic equipment. Crates shall be used for the shipment of individual items exceeding the weight limitations specified in the wood or plywood container specification. Open crates shall be used only for the shipment of items which are not readily susceptible to damage from outside forces, and which are designed for outdoor installation and use which require only limited protection. Items shipped in open crates shall be shrouded with flexible waterproof barrier material conforming to PPP-B-1055 or polyethylene, minimum 0.006 inch thickness. Components packed and coated with a preservative as specified (see 5.2.1.1.1.1) shall be wrapped with a barrier as specified in 5.2.1.1.1.2. The selection of shipping containers shall be at the option of the contractor. The multiple packing of items of different stock numbers will not be permitted in shipping containers, unless the items of each stock number are intermediate packaged in fiberboard boxes as specified in 5.3.2 for the level required.

5.3.2 Levels A, B, and C containers. Strainers preserved as specified (see 5.2), shall be packed in exterior shipping containers for the level of packing specified (see 5.3), in accordance with table VII, exterior shipping container requirement, of MIL-STD-2073-1, and herein. Unless otherwise specified (see 6.2), container selection and options shall be at the contractor's option.

5.3.2.1 Caseliners, closure, and gross weight.

5.3.2.1.1 Caseliners. Unless otherwise specified (see 6.2), level A shipping containers containing strainers preserved commercial shall be provided with waterproof caseliners in accordance with MIL-STD-2073-1.

5.3.2.1.2 Closure. Container closure, reinforcing, or banding shall be in accordance with the applicable container specification or appendix thereto except that class weather-resistant/fire-retardant fiberboard boxes shall be closed in accordance with method V and reinforced with non-metallic or tape banding and class-domestic/fire retardant fiberboard boxes shall be closed in accordance with method I using pressure sensitive tape.

5.3.2.1.3 Weight. Wood, plywood, and cleated type containers exceeding 200 pounds gross weight shall be modified by the addition of skids in accordance with MIL-STD-2073-1 and the applicable container specification or appendix thereto.

5.3.3 Commercial. Strainers preserved as specified (sse 5.2), shall be packed for shipment in accordance with ASTM D 3951 and herein.

5.3.3.1 Container modification. Shipping containers exceeding 200 pounds gross weight shall be provided with a minimum of two, 3- by 4-inch moninal wood skids laid flat, or a skid- or sill-type base which will support the material and facilitate handling by mechanical handling equipment during shipment, stowage, and storage.

5.4 Marking, levels A, B, C, and commercial. In addition to any special marking required (see 6.2), interior (unit and intermediate) packs and shipping containers shall be marked including bar coding and structural for shipment, stowage, and storage in accordance with MIL-STD-2073-1.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The strainers specified are intended for installation on the discharge side of pumps.

6.2 Acquisition requirements.

(a) Title, number, and date of this specification.
(b) Type and class required (see 1.2).
(c) Issue of DoDISS to be cited in the solicitation, and if required, the specified issue of individual documents referenced (see 2.1.1 and 2.2).
(d) Whether first article inspection is required (see 3.1).
(e) Alternate or additional design characteristics (see 3.3).
(f) Alternate piping connections (see 3.3.2)
(g) Type and size of inlet and outlet connections and whether flanged or not flanged (see 3.3.2.1).
(h) Whether gauge connections are required at inlet and outlet (see 3.3.2.2).
(i) Whether equalizing connections are required (see 3.3.2.3).
(j) The required design flow capacity, design pressure, range of fluid temperature and viscosity, and maximum allowable pressure drop (see 3.3.3).
(k) National Stock Number (see 3.3.5).
(l) Special requirements or instructions (see 3.3.6.6.3).
(m) Alternate strainer basket design and characteristics (see 3.3.7.2.3).
(n) If other specifications are not to form a part of the specification for sampling, examination and tests (see 4.8).
(o) Special requirements or instructions (see 4.8).
(p) When fire retardant lumber and plywood is not required (see 5.1.3 (1)).
(q) Class of fire retardant fiberboard required (see 5.1.3 (2)).
(r) Level of preservation and level of packing required (see 5.2.1 and 5.3).
(s) When preservative is not required for threaded and other unpainted non-critical metal surfaces (see 5.2.1.1.1.1).
(t) Container selection if other than contractor's option (see 5.3.2).
(u) When waterproof caseliners are not required (see 5.3.2.1.1).
(v) Special marking required (see 5.4).
(w) Quantity of technical manuals and drawings required (see 6.3).
(x) Whether repair parts are required (see 6.6.1).

6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contract. The applicable Data Item Description (DID's) should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/provided and that the DID's are tailored to reflect the requirements of the specific acquisition. To ensure correct contractual application of the data requirements, a Contract Data Requirements List (DD Form 1423) must be prepared to obtain the data, except where DoD FAR Supplement 27.475-1 exempts the requirement for a DD Form 1423.

Reference Paragraph	DID Number	DID Title	Suggested Tailoring
6.2	DI-DRPR-81000	Product drawing and associated lists	----
4.4	UDI-R-21375A	Plan, inspection and test	----
4.3, 4.7.8.2.1	DI-T-5315A	First article qualification test plan	----
3.9, 4.3 and 4.4	UDI-T-23732B	Procedures, test	----
4.3, 4.4 and 4.7.11	DI-NDTI-80809	Test/Inspection reports	----

The above DID's were those cleared as of the date of this specification. The current issue of DoD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DID's are cited on the DD Form 1423.

6.3.1 Data requirements waiver instructions. The data requirements of 6.3.2 and any task in sections 3, 4, or 5 of this specification required to be performed to meet a data requirement, may be waived by the contracting/acquisition activity upon certification by the offeror that identical data were submitted by the offeror and accepted by the Government under a previous contract for identical item acquired to this specification. This does not apply to specific data which may be required for each contract regardless of whether an identical item has been supplied previously (for example, test reports).

6.3.2 Technical manuals. The requirement for technical manuals should be considered when this specification is applied to a contract. If technical manuals are required, military specifications and standards that have been cleared and listed in DoD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL) must be listed on a separate Contract Data Requirements List (DD Form 1423), which is included as an exhibit to the contract. The technical manuals must be acquired under separate contract line item in the contract.

6.3.3 Technical repair standard (TRS). A technical repair standard should be prepared upon initial introduction of a new equipment or introduction of an equipment that has an approved TRS if major or minor configuration changes have been approved that would effect the adequacy of the standard for use in new equipment repairs.

6.3.3.1 TRS technical content. A TRS shall include sufficient technical details to enable a repair, maintenance, or overhaul activity to restore the equipment dimensions, clearances, and tolerances such that the equipment is capable of performing its function as originally specified and is capable of being logistically supported by the DoD logistics support system.

6.4 First article. When a first article inspection is required, the items should be a first article sample. The first article should consist of the units specified. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired 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 contract.

6.5 Sub-contracted material and parts. The packaging or delivery preparation requirements of referenced documents listed in section 2 do not apply when material and parts are acquired by the contractor for incorporation into the equipment and lose their separate identity when the equipment is shipped.

6.6 Ordering spare or repair parts. When ordering spare parts or repair parts for the equipment covered by this specification, the contract should state that such spare parts and repair parts should meet the same requirements and quality assurance provisions as the parts used in the manufacture of the equipment. Packaging for such parts should also be specified.

6.6.1 Repair parts and repair parts boxes. Complete sets of repair parts should be furnished for each type and class as follows:

(a) One set of repair baskets for each of the ten initial strainers supplied.
(b) One set of repair baskets for each two additional strainers supplied.
(c) Cover gaskets - four for every strainer supplied.
(d) Other gaskets, seals and springs - one set for every ten strainers supplied.

When specified (see 5.2.1.1.4 and 6.2) items (c) and (d) should be furnished in repair boxes.

6.7 Depreservation instruction. A set of instructions covering the depreservation of the equipment should be furnished. Instructions should include all information necessary for depreservation, such as, but not limited to: the addition of lubricants prior to operation, flushing of lines, removal of grease-proof barrier and the location of detached components. Instructions should be packaged in a transparent waterproof plastic bag, minimum 4 mil thick. Closure should be by heat sealing. The shipping container in which the instructions are packed should be so marked.

6.8 Subject term (key word) listing.

Filtration
Fittings
Mesh basket
Oil service
Screens
Valves

6.9 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Preparing activity:
Navy - SH
(Project 4730-N052)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
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I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER	2. DOCUMENT DATE (YYMMDD)
	MIL-S-17849E(SH)	920319

3. DOCUMENT TITLE

STRAINERS, SEDIMENT, PIPELINE, DUPLEX (WITH AND WITHOUT MAGNET)

4. NATURE OF CHANGE (*Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.*)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (*Last, First, Middle Initial*)	b. ORGANIZATION	
c. ADDRESS (*Include Zip Code*)	d. TELEPHONE (*Include Area Code*) (1) Commercial (2) AUTOVON (*If applicable*)	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

a. NAME	b. TELEPHONE (*Include Area Code*)	
TECHNICAL POINT OF CONTACT: Chris D. Galecki SEA 56Y23	(1) Commercial 703-602-0367	(2) AUTOVON 332-0367
c. ADDRESS (*Include Zip Code*) Commander, Naval Sea Systems Command SEA 55Z3 Washington, DC 20362-5101	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	