MIL-STD-1399(NAVY)
SECTION 105
31 July 1974

MILITARY STANDARD

INTERFACE STANDARD FOR SHIPBOARD SYSTEMS

SECTION 105

SEA WATER SERVICE FOR SURFACE SHIPS

FSC MISC

DEPARTMENT OF THE NAVY

WASHINGTON, D.C. 20362

Interface Standard for Shipboard Systems,
Sea Water Service for Surface Ships

MIL-STD-1399 (NAVY)
SECTION 105

1. This Military Standard is approved for use by all interested Commands of the Department of the Navy in the technical development plans, design, and procurement specifications for new ship acquisitions, ship modernizations or conversions, and systems/equipment for installation therein and into active fleet ships.

2. Recommended corrections, additions, or deletions should be addressed to the Naval Ship Engineering Center, Center Building, Prince George's Center, Hyattsville, Maryland 20782.

FOREWORD

Purpose. This section defines the standard interface requirements for, and the constraints on, the design of systems/equipment which utilize sea water services onboard ship.

Nature of the interface. Navy ships have a variety of needs for sea water for machinery/equipment cooling, fire fighting, sprinkling, washdown countermeasures and various utility purposes. Water for these purposes is obtained by suction directly from the sea (or operating waters of the ship). Although adequate supply is readily available to any ship in operational status, it is vital that distribution in adequate quantity to meet the primary and emergency needs of all users be provided for. This section provides guidance to ensure compatibility between each user and the sea water service system involved and for the documentation of user requirements to assist in the design of the ships sea water service system.

Structure of this section. The technical content first delineates the characteristics of the total shipboard sea water service in terms of basic system elements, water quality and pressure. Constraints on the design of user systems, including the requirement for documentation of user needs, are then established.

Numerical quantities. Numerical quantities are expressed in metric (SI) units followed by U.S. customary units in parentheses. The SI equivalents of the U.S. customary units have been approximated to a practical number of significant figures. The values stated in U.S. units are to be regarded as the current specified magnitude.

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1. GENERAL, SCOPE, INTERFACE AND APPLICABILITY

1.1 General. Policies and procedures established by MIL-STD-1399 are mandatory. This section and the basic standard are to be viewed as an integral single document.

1.2 Scope. This section establishes interface requirements for shipboard systems/equipment utilizing sea water services to ensure compatibility between such systems/equipment and the sea water service system.

1.3 Interface. Basic characteristic and constraint categories concerned with this interface are shown symbolically on figure 1 (see section 3 of MIL-STD-1399).

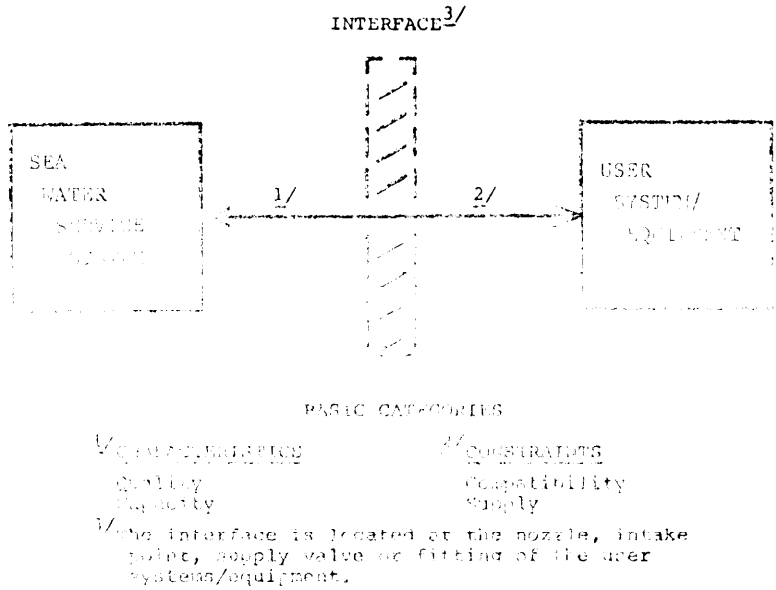

Figure 1 - Interface

Particular interface characteristics and constraints pertinent to this section are described in 5.2 and 5.3.

1.4 Applicability. This section applies to surface ship sea water user systems, whose primary or emergency back-up supply is from the firemain, and auxiliary machinery sea water circulating systems supplied from the water service main or firemain. It does not apply to sea water user systems which have an independent supply of sea water integral to the design of the individual systems/equipment such as the main condenser, distilling plant, propulsion motor/generators, etc., except when such user systems receive emergency support from the firemain or water service main.

2. REFERENCED DOCUMENTS

2.1 This section does not apply to this standard.

3. DEFINITIONS

3.1 Sea water service system. A sea water service system is a shipboard system, including the necessary pumps, piping, valves, fittings, nozzles, and service arrangements, for distribution of sea water to users throughout the ship.

3.2 User system/equipment. A user system or equipment is any facility or apparatus which utilizes or consumes water from a sea water service system.

4. REQUIREMENTS

4.1 The specific interface requirements and constraints established herein are mandatory and shall be adhered to by SYSCOMs, Project Managers (PMs), contractors, and all others engaged in any aspect of shipboard sea water service system design to which these requirements and constraints apply, including system/equipment design, production, and installation (see section 4 of MIL-STD-1399).

5. INTERFACE CHARACTERISTICS AND CONSTRAINTS

5.1 General considerations. Sea water services provided by the firemain and water service main are accomplished by means of pumps, valves, manifolds, risers and branches located as needed throughout the ship to best meet service requirements. Specific demands for individual ships vary widely depending upon the ship mission, size, configuration, and propulsion system. Typically, the firemain is designed to provide sea water to fireplugs throughout the ship to sprinkling systems, washdown countermeasure system, flushing system, drainage and ballasting system, and provide sea water as emergency back-up to independent circulating and machinery cooling systems. In addition, there are a variety of miscellaneous systems/equipment which are supplied with sea water from the firemain, depending upon the ship type, such as sonar domes, jet blast deflectors, missle systems, aqueous film forming foam systems, and certain reactor plant subsystems. The water service main provides sea water for auxiliary machinery cooling systems. There are various major and minor systems/equipment which require the use of sea water but which have their own independent supply integral to the design of the individual systems/equipment. The firemain and water service main are affected by such systems only to the extent that they may provide emergency back-up support.

5.1.1 Firemain. There are four basic types of firemain system arrangement as follows:

(a) Single main system. A single service main installed on the damage control deck near the centerline.
(b) Horizontal loop system. Two service mains installed on the damage control deck, separated athwartships, and cross-connected to form a series of horizontal loops.
(c) Vertical loop system. Two single service mains installed in an oblique plane and separated vertically and athwartship as far as practicable with the upper main installed on the damage control deck and the lower main installed as low as practicable in the ship.
(d) Composite system. Two service mains installed on the damage control deck, separated athwartship, with a by-pass main installed at a lower level near the centerline.

The firemain is capable of being segregated into a number of independent sections, each supplied by one or more pumps. Cutout valves are installed to permit isolation of segments of the system for damage control purposes.

5.1.2 Water service main. Water service mains are installed in machinery spaces. Each of these mains is supplied by separate auxiliary machinery circulating water pumps except in some smaller ships in which the supply is taken directly from the firemain. The water service mains supply sea water for cooling to various units of machinery such as turbine driven pumps, steam heating drain coolers, auxiliary gland exhaust condensers, air compressors within machinery spaces, lube oil coolers, reduction gears, stern tubes, and shaft seals. When specified, machinery installed outside of machinery spaces and shaft alleys may be furnished services from the firemain. Emergency back-up from the firemain is provided to the water service main; if auxiliary machinery cooling is provided directly from the firemain, supply from two separate firemain segregations is required for casualty control purposes. In all cases, maximum flexibility is provided to ensure an adequate supply of sea water to the systems/equipment interface.

5.1.3 Arrangement. Optimum arrangement of fire and water service mains installed in a particular ship is determined on the basis of the individual ship characteristics and requirements.

5.2 Interface characteristics. The interface characteristics of the ships sea water service system are specified in 5.2.1 through 5.2.2. Shipboard sea water service systems are designed in accordance with the characteristics specified in 5.2.1 through 5.2.2 in order to ensure the provision of an adequate supply of sea water to the systems/equipment interface.

5.2.1 Sea water quality. Quality of sea water at the source is as follows:

(a) Temperature -
Minimum -2°C (28°F)
Maximum 29°C (85°F) (specified value for design purposes although occasional higher readings may be recorded in some geographical areas.)

(b) Salinity - 35 parts per thousand average. Actual value is dependent upon operating area of ship and will vary from near zero in areas of high fresh water concentration to a maximum of approximately 40 parts per thousand in ocean areas of high evaporation rate.

5.2.1.1 Particulate matter. In general, passage of injected sea water through strainer plates will limit the size of solid particulate matter in sea water systems to a size smaller than the smallest flow passage served. However, particulate matter is further strained when necessary within a sea water system to protect machinery of systems/equipment as may be required in individual cases.

5.2.2 Capacity and pressure. System design capacity and pressure is based on the user systems/equipment requirements as specified in 6.1.

5.3 Interface constraints. Interface characteristics of the ships sea water service system impose certain constraints on the design and installation of systems/equipment utilizing sea water. These constraints are specified in 5.3.1 through 5.3.4.

5.3.1 Compatibility. Design and installation of systems/equipment utilizing sea water service shall be compatible with the interface characteristics specified in 5.2.

5.3.2 Vital services. Connections for vital services will be taken from locations in the sea water service system where the closing of cutout valves to non-vital services will not jeopardize the adequate supply of water to vital services.

5.3.3 Firemain pressure.

5.3.3.1 Fireplugs. Firemain will be capable of providing 483 kilopascals (kPa) (70 pounds per square inch (psi)) at the nozzle of 30.478 meters (100 feet) of hose connected to the two uppermost fireplugs.

5.3.3.2 Washdown countermeasure system. Washdown countermeasure system will be supplied by the firemain at a pressure of at least 621 kPa (90 psi). Washdown nozzles will be arranged in groups. The flow rate in any group will be no greater than 3,785 liters per minute (lpm) (1000 gallons per minute (gal/min)).

5.3.3.3 Flushing system. Sea water service will be provided by the firemain to the flushing system for sanitary purposes and also for low pressure sea water users such as garbage grinder rooms, sewage treatment rooms, and in boat stowage areas. System will be arranged in groups to service living area sanitary spaces in the same vicinity. Independent flushing groups will be provided for medical spaces. Water pressure shall be maintained at 345 kPa (50 psi) by reducing valves installed in each flushing system group.

5.3.4 User sea water requirements. Sea water requirements of each user system/equipment shall be reported as specified in 6.1

6. DOCUMENTATION REQUIREMENTS

6.1 DD Form 1423. When this standard is invoked, the following data requirements, as applicable, shall be specified by the Principal Development Activity (PDA) on DD Form 1423 (Contract Data Requirements List) attached to the contract or order. The Naval Ship Engineering Center, Fire Protection Systems Section, shall be included in the distribution listed in Block 14 of DD Form 1423 for data specified.

(a) Sea water requirements - individual user system/equipment. This documentation applies to each individual type of user system/equipment (see 3.2) which will utilize sea water from a ship sea water service system. It shall include the following information:
(1) Flow rate (lpm/gal/min)
(2) Nominal operating pressure (kPa/psi)
(3) Maximum operating pressure (kPa/psi)

(4) System design pressure (kPa/psi)
(5) When used for cooling, state whether the sea water is required for normal cooling or for standby emergency supply as back-up to an independent cooling system.

(b) Sea water service requirements - total ship. This documentation applies to the total ship sea water service system. The documentation shall provide separate listings for the various subsystems supported by the firemain, e.g., fire fighting, sprinkling, washdown countermeasures, flushing, machinery cooling, miscellaneous services, and for systems/equipment supported by the water service main. It shall include the following information:

(1) User equipment identification
(2) Number installed
(3) Nominal operating pressure (kPa/psi)
(4) Maximum operating pressure (kPa/psi)
(5) System design pressure (kPa/psi)
(6) Flow rate (lpm/gal/min per unit)
(7) Total flow rate (lpm/gal/min)
(8) Use category

6.1.1 Sample format for reporting the information specified in 6.1 is shown on figure 2.

7. DEVIATIONS

7.1 Conditions. In achieving the purpose of this section it is recognized that there may be some flexibility of application. During the early design stage of shipboard systems/equipment utilizing sea water service it may become apparent that significant advantages in the overall design/operation of such equipment can be achieved by deviating from the standard characteristics specified herein. In such instance, the provisions of section 5 of MIL-STD-1399 must be complied with.

7.1.1 Deviation procedure. Requests for deviations shall be submitted to NAVSEA with copies to:

(a) Program/Project Manager
(b) NAVSEC 6154

Review activities:
SC, CG, OS
User activities:
YD, CG

Preparing activity:
Navy - SH
(Project MISC N911-8)

IDENTIFICATION (USER EQUIP)	SUBSYSTEM INSTALLED	PRESSURE kPa (psi)			FLOW RATE SCFM (SCFM) OR lm (gal/min)				DESIGNATION USE FACTOR (%)					OTHER REQUIREMENTS (TEMP., HUMIDITY, PURITY, etc.)
		NORMAL OPERATING	MAXIMUM OPERATING	MINIMUM OPERATING	AVERAGE PER UNIT	TOTAL	MAXIMUM PER UNIT	TOTAL	VITAL	NON-VITAL	NORMAL OPS	GQ	IN PORT USAGE	

Figure 2 - Sample format for reporting sea water requirements (Entries not applicable to data specified in 6.1 (a) for an individual system/equipment may be left blank).

FOLD

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HYATTSVILLE, MARYLAND 20782

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PENALTY FOR PRIVATE USE $300

POSTAGE AND FEES PAID
DEPARTMENT OF NAVY

DOD 316

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

OMB Approval
No. 22-R255

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DOCUMENT IDENTIFIER AND TITLE

NAME OF ORGANIZATION AND ADDRESS

CONTRACT NUMBER

MATERIAL PROCURED UNDER A

[ ] DIRECT GOVERNMENT CONTRACT [ ] SUBCONTRACT

1. HAS ANY PART OF THE DOCUMENT CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

   A. GIVE PARAGRAPH NUMBER AND WORDING.

   B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY DOCUMENT REQUIREMENT CONSIDERED TOO RIGID

3. IS THE DOCUMENT RESTRICTIVE?

   [ ] YES [ ] NO *(If "Yes", in what way?)*

4. REMARKS

SUBMITTED BY *(Printed or typed name and address - Optional)*

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DATE

DD FORM 1 JAN 72 1426

REPLACES EDITION OF 1 JAN 66 WHICH MAY BE USED

S/N 0102-014-1802