

INCH-POUND

MIL-STD-1399(NAVY)

SECTION 106B

5 February 1988

SUPERSEDING

MIL-STD-1399(NAVY)

SECTION 106A

19 April 1973

(See 9.2)

MILITARY STANDARD

INTERFACE STANDARD FOR SHIPBOARD SYSTEMS

SECTION 106
COMPRESSED AIR SERVICE
FOR SURFACE SHIPS



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SECTION 106B
5 February 1988

DEPARTMENT OF THE NAVY
NAVAL SEA SYSTEMS COMMAND

Washington, DC 20362-5101

Interface Standard for Shipboard Systems,
Compressed Air Service for Surface Ships

1. This Military Standard 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.

2. 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.

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FOREWORD

1. Purpose. This section defines the standard interface requirements for, and the constraints on, the design of shipboard systems and equipment which will utilize compressed air service.

2, Nature of the interface. Navy ships have a need for compressed air services for a variety of uses and at differing pressures. Compressed air is generated and distributed throughout the ship to satisfy the needs of the various users. This section provides for the documentation of user requirements to assist in the design of compressed air service systems and provides guidance to ensure compatibility between each user and the compressed air system involved.

3. Structure of this section. The technical content first describes the characteristics of the total shipboard compressed air service in terms of air quality and pressure. Constraints on user systems, including the requirement for documentation of user needs, are then established,

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1. GENERAL, SCOPE, INTERFACE AND APPLICABILITY

1.1 General. 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 and equipment utilizing compressed air services to ensure compatibility between such systems and equipment and the compressed air service system.

1.3 Interface. The basic characteristics and constraint categories concerned with this interface are shown symbolically on figure 1 (see definitions of MIL-STD-1399).

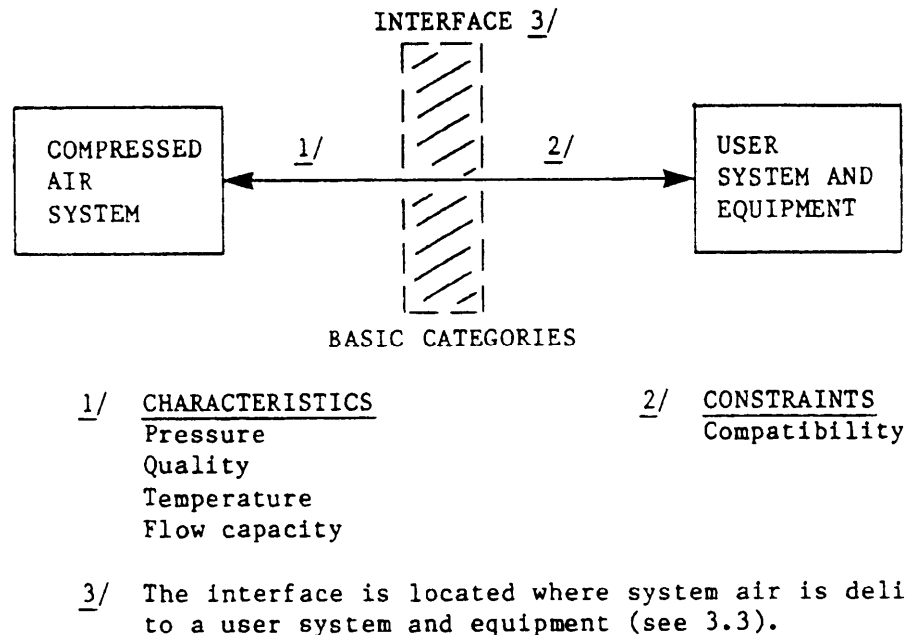


FIGURE 1. Interface.

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

1.4 Applicability. This section applies to interface considerations between high pressure and ship service low pressure air systems and user systems and equipment. It does not apply to self-contained compressed air systems supplied by their own compressors for specialized uses such as "Prairie/Masker" air, oxygen-nitrogen generating plant air, gas turbine bleed air, and diesel starting air systems, nor does it apply to low pressure dry air systems (see MIL-STD-1399, section 102).

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2. REFERENCED DOCUMENTS

2.1 Government documents.

2.1.1 Standards. Unless otherwise specified, the following standards of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this standard to the extent specified herein.

STANDARDS

MILITARY

MIL-STD-1399 - Interface Standard For Shipboard Systems.
MIL-STD-1399, - Low Pressure Dry Air Service For Surface
Section 102 Ships.

(Copies of standards required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this standard and the references cited herein, the text of this standard shall take precedence.

3. DEFINITIONS

3.1 High pressure air system. A high pressure air system is a shipboard system including the necessary compressing, processing, storing, and distribution arrangements required to generate oil-free dry air at pressures of 3000 pounds per square inch (lb/in²) gauge. If required for a specific ship design, 5000 lb/in² gauge compressors are available.

3.2 Ship service air system. A ship service low pressure air system is a shipboard system including the necessary compressing, processing, storing, and distribution arrangements required to generate oil-free dry air at a pressure of 125 lb/in² gauge for distribution throughout the ship.

3.3 User system and equipment. A user system and equipment is any system or equipment which uses compressed air supplied by the compressed air systems covered by this section. Pressure reducing devices which may be installed to provide lesser pressure are considered to be a part of the compressed air system concerned.

4. REQUIREMENTS

4.1 The specific interface requirements and constraints established herein are mandatory and shall be adhered to by SYSCOMs, PMs, contractors and all others engaged in any aspect of shipboard compressed air systems design including systems and equipment design, production, and installation (see requirements of MIL-STD-1399).

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5. INTERFACE CHARACTERISTICS AND CONSTRAINTS

5.1 Compressed air service - system description. The shipboard compressed air service system supplies low and high pressure air at specified pressure and of prescribed quality to support a wide variety of user systems and equipment. Low pressure service is provided by means of low pressure compressed air plants, each comprised of a compressor, dehydrator, receiver and controls, and service mains with user service branch lines and equipment. Both vital and nonvital low pressure services are supported via dedicated service mains separated by priority valves, which function to cut off supply of air to nonvital services during peak demand or emergencies, thus ensuring adequate air supply to vital services. High pressure service is provided as required by means of high pressure compressor plants, a high pressure air main, and a combination of branches, air flasks, and banks of air flasks. The high pressure system also provides emergency support for vital ship service air users via reduced pressure cross connections. To accomplish delivery of high pressure and ship service low pressure air to adequately serve the established needs of all user systems and equipment during various phases of ship operations, the following functions are necessary:

- (a) Compress - Compress atmospheric air to required pressure
- (b) Process - Cool, remove oil, dehydrate, filtrate
- (c) Store - In air receivers, flasks and banks of flasks
- (d) Distribute - Via mains, manifolds, loops, branches, and reducers.

Figure 2 shows the basic elements of a typical compressed air service system.

5.2 Interface characteristics. The interface characteristics of the ships compressed air service system are specified below. Each shipboard system will provide an adequate supply of compressed air at the system and equipment interface with the characteristics given in 5.2.1 through 5.2.5.

5.2.1 Pressure. The system air pressure at the interface will reflect the effect of compressor cut-in setting, cut-out setting, and relief valve protection of the distribution system as follows:

- (a) High pressure air system - 3000; (or 5000 lb/in^2 gauge if required). The pressure delivered from the discharge of high pressure compressor plants will vary from approximately 2500 to 3300 lb/in^2 gauge for 3000 lb/in^2 gauge systems, and 4200 to 5400 lb/in^2 gauge for 5000 lb/in^2 gauge systems. The pressure drops in the distribution system to each user service shall be minimized to ensure proper operation.
- (b) Low pressure air system - 125 lb/in^2 gauge. The pressure of the air delivered from low pressure compressed air plants may vary from approximately 100 to 155 lb/in^2 gauge. The maximum permissible pressure drop from the discharge of each LP plant receiver to the furthest user service is 10 lb/in^2 gauge for vital services and 15 lb/in^2 gauge for nonvital services. During emergencies or periods of unusual air demand, low pressure supply pressure to the user interfaces may fall below 80 lb/in^2 gauge.

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5.2.2 Pressure reduction. When user systems and equipment cannot use air at the pressures specified in 5.2. 1, pressure reduction will be accomplished by approved reducing stations.

5.2.3 Air quality. The air quality will be as follows:

(a) High pressure air system:

- (1) Water content - not to exceed that for a dew point of minus 60 degrees Fahrenheit ($^{\circ}\text{F}$) (minus 51.1 degrees Celsius ($^{\circ}\text{C}$)) at compressor discharge pressure (3000 or 5000 lb/in^2 gauge).
- (2) Hydrocarbons - not to exceed 50 parts per million (p/m) by weight for systems which do not interface with compressed oxygen systems and 5 p/m by weight for systems which do.
- (3) Particulate contaminant - not to exceed 15 micrometers.

(b) Ship service air system:

- (1) Water content - not to exceed 0.0015 pound of water per pound of dry air with a dew point of 55°F (12.8°C) at 80 lb/in^2 gauge.
- (2) Hydrocarbons - not to exceed 50 p/m by weight.
- (3) Particulate contaminant - not to exceed 5 micrometers.

(c) Special air service requirements. Certain user systems and equipment may need additional filtering. In such cases filter will be provided as a part of the air system concerned (see 6. 1(a)).

5.2.4 Temperature.

(a) High pressure air system - The temperature of air discharging from the high pressure compressed air plants will be 115°F maximum. For users requiring reduced pressure, the cooling effect due to expansion should be considered.

(b) Low pressure air system - The temperature of air discharging from the low pressure compressed air plants will be 55°F maximum.

5.2.5 System flow capacity. System capacity will be based on the user systems and equipment requirements as specified in 6.1, with an allowance for standby capacity and growth.

5.3 Interface constraints. The interface characteristics of the ships compressed air service system impose certain constraints on the design and installation of systems and equipment utilizing compressed air. These constraints are described in 5.3.1 through 5.3.3.

5.3.1 Compatibility. The design and installation of systems and equipment utilizing compressed air service shall be compatible with the interface characteristics given in 5.2.

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5.3.2 Other considerations. Certain subsystems may require further processing of air to meet the particular needs of the users. Interface characteristics and constraints internal to such subsystems are not the concern of this section but may be the subject of other documentation (for example, MIL-STD-1399, section 102).

5.3.3 User air requirements. The air requirements of each user system and 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 Contract Data Requirements List (CDRL) DD Form 1423 attached to the contract or order. The Naval Ship Engineering Center, Compressed Air and Gases Section, shall be included in the distribution listed in block 14 of DD Form 1423 for data specified.

- (a) Compressed air requirements - individual user system and equipment. This documentation applies to each individual user system and equipment (see 3.3) which will utilize compressed air from a ship compressed air service system. It shall include the following information:
- (1) Operating pressure (lb/in^2 gauge)
 - (2) Flow rate in standard cubic feet per minute (ft^3/min) (maximum)
 - (3) Estimated duration and frequency of flow for intermittent services
 - (4) Dew point, if incompatible with the air quality standards specified in 5.2.3
 - (5) Hydrocarbon content, if incompatible with the air quality standards specified in 5.2.3
 - (6) Particulate matter, if incompatible with the air quality standards specified in 5.2.3
 - (7) Temperature restrictions, if any
- (b) Compressed air service requirements - total ship. This documentation applies to the total ship compressed air service system. The documentation shall provide separate listings for high pressure and ship service systems. It shall include the following information:
- (1) User equipment identification
 - (2) Number installed
 - (3) Operating pressure (lb/in^2 gauge)
 - (4) Flow rate (ft^3/min) (maximum per unit)
 - (5) Total ft^3/min (all units)
 - (6) Estimated duration and frequency of flow for intermittent services
 - (7) Vital or nonvital designation
 - (8) Estimated use factor

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6.1.1 A sample format for reporting the information specified in 6.1 is shown on figure 3.

7. DEVIATIONS

7.1 Conditions. In achieving the purpose of this section it is recognized that there must be some flexibility of application. During the early design of shipboard systems and equipment which will utilize the ship compressed air system it may become apparent that significant improvement in the overall design and operation of such systems and equipment can be achieved by deviating from the standard characteristics of the compressed air system as specified herein. In such instance, the deviations requirements of MIL-STD-1399 shall apply.

7.2 Deviation procedure. When invoking deviations to this section, reports shall be made in accordance with 8.1.

8. REPORTS AND CORRESPONDENCE

8.1 Reports, correspondence and similar information shall be submitted by the contracting activity to NAVSEA for action with copies to:

- (a) NAVSEA 56Y31
- (b) Program manager

9. NOTES

9.1 Subject term (key word) listing.

Air flask
Air main
Flow capacity

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

Review activities:
AS, EC, OS

User activities:
YD, CC

Preparing activity:
Navy - SH
(Project 1990-N065)

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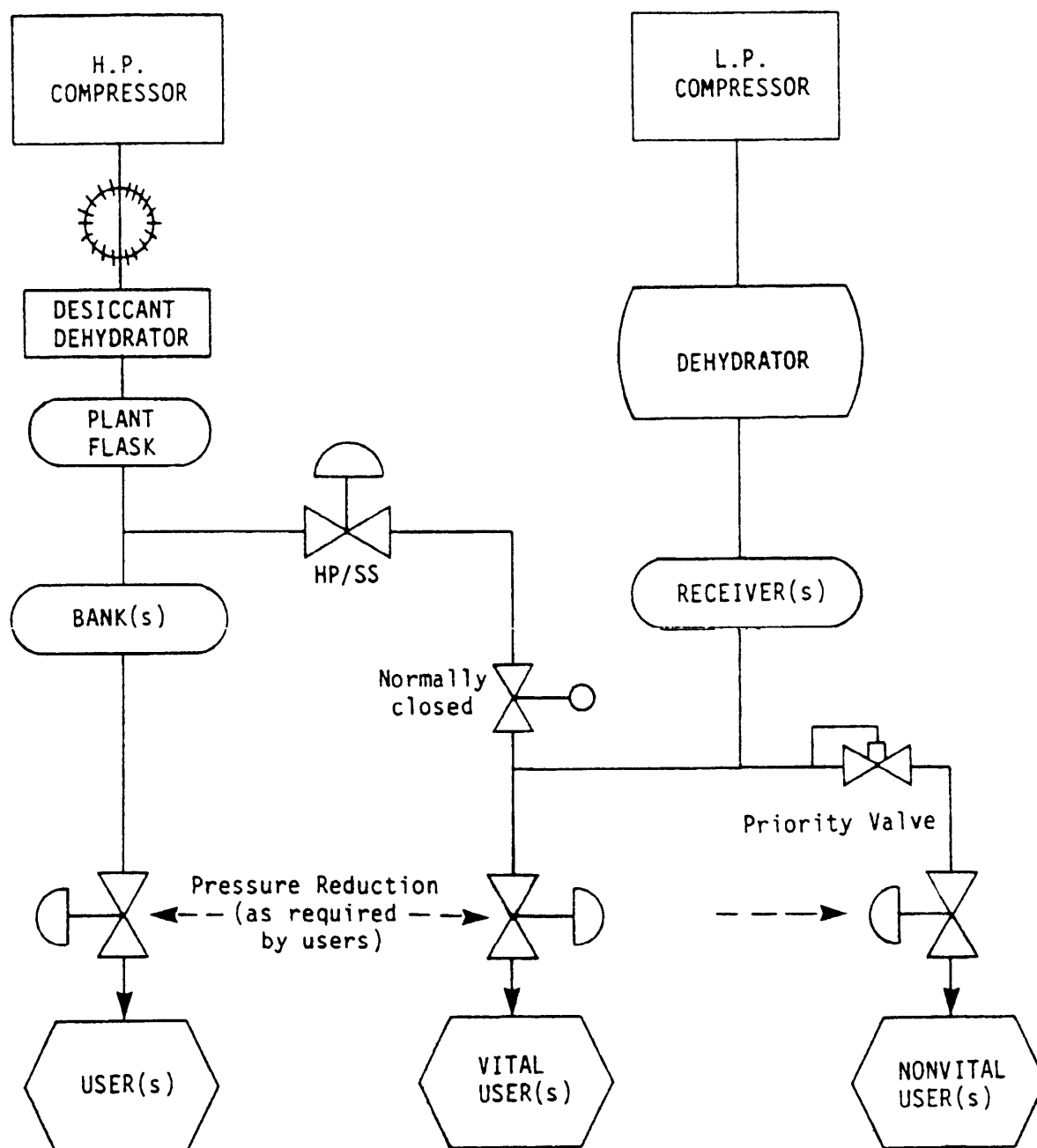
FIGURE 2. Basic elements, typical compressed air service system.

FIGURE 3. Sample format for reporting compressed air requirements.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1 DOCUMENT NUMBER MIL-STD-1399(NAVY) SECTION 106B		2 DOCUMENT TITLE INTERFACE STANDARD FOR SHIPBOARD SYSTEMS COMPRESSED AIR SERVICE FOR SURFACE SHIPS	
3a. NAME OF SUBMITTING ORGANIZATION		4 TYPE OF ORGANIZATION (Mark one)	
		<input type="checkbox"/> VENDOR <input type="checkbox"/> USER <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> OTHER (Specify) _____	
b ADDRESS (Street, City, State, ZIP Code)			
5 PROBLEM AREAS			
a Paragraph Number and Wording			
b Recommended Wording			
c Reason/Rationale for Recommendation			
6. REMARKS			
7a. NAME OF SUBMITTER (Last, First, MI) - Optional		b WORK TELEPHONE NUMBER (Include Area Code) - Optional	
c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional		8 DATE OF SUBMISSION (YYMMDD)	