

SURFACE VEHICLE INFORMATION REPORT

Submitted for recognition as an American National Standard

(R) GENERAL ENVIRONMENTAL CONSIDERATIONS FOR MARINE VEHICLES

Foreword—This Document has also changed to comply with the the new SAE Technical Standards Board format.

1. Scope

1.1 Scope—This Hydrospace Information Report (HIR) identifies the general environmental considerations for the design, development, evaluation, and testing of advanced surface craft, submersible vehicles, and other marine craft. This HIR provides criteria on the environmental limits within which marine vehicles, related components, and associated equipment should operate satisfactorily and reliably.

1.2 This HIR is intended for use as a guide for the development of specific environmental requirements to be included in detailed specifications for marine vehicles and associated equipment. Specific requirement. Specific requirements are in a state of continual change as our knowledge of the ocean environment increases. The ocean environment varies with location and time. Changes in the ocean environment can occur not only on a seasonal basis but also monthly, weekly, daily, and in some cases even hourly.

1.3 Classification—Marine vehicles may be classified by operating depth as follows in Table 1:

TABLE 1—CLASSIFICATION OF VEHICLES BY OPERATING DEPTH

Class	Type Vehicle	Operating Depth
0	Surface ships, hydrofoil craft, Surface effect ships	0 – 15 m
1	Shallow depth submersible vehicles	0 – 100 m
2	Medium depth submersibles	0 – 2000 m
3	Deep depth submersibles	0 – to over 2000 m

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2. References

2.1 Applicable Publications—The following publications form a part of this information report to the extent identified herein. Many of the referenced documents identify environmental requirements and conditions. The user is cautioned that he must determine the applicability of these requirements to the particular application under consideration. The latest issue of all SAE referenced documents shall apply. For other documents it is recommended that the use of the latest revision be considered.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

HIR1528—Seawater System Design Criteria for Advanced Marine Vehicles

HIR1622—Noise Control in Fluid Power Systems of Marine Vehicles

HIR1694—Materials for Fluid Systems of Marine Vehicles

2.1.2 ASTM PUBLICATIONS—Available from American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM D 665—Standard Test Method for Rust Preventing Characteristics of Inhibited Mineral Oil in the Presence of Water

2.1.3 U.S. GOVERNMENT PUBLICATIONS—Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094 and should be utilized as a guide only.

2.1.3.1 Federal Standards

FED-STD-151—Metals; Test Methods

2.1.3.2 Military Specifications

MIL-S-901—Shock Tests, H.I. (High-Impact), Shipboard Machinery Equipment and Systems, Requirements for (Navy)

MIL-T-5422—Testing, Environmental, Aircraft Electronic Equipment

MIL-T-18404—Torpedoes, Environmental Requirements, General Specification for

MIL-E-22403—Environmental Requirements and Test (for Torpedo MK 45, Mods 0 and 1 Components and Assemblies)

2.1.3.3 Military Standards

MIL-STD-167/1—Mechanical Vibrations of Shipboard Equipment (Type I - Environmental and Type II - Internally Excited)

MIL-STD-461—Electromagnetic Interference Characteristics, Requirements for Equipment

MIL-STD-740-1—Airborne Sound Measurements and Acceptance Criteria of Shipboard Equipment

MIL-STD-740-2—Structureborne Vibratory Acceleration Measurements and Acceptance Criteria of Shipboard Equipment

MIL-STD-810—Environmental Test Methods and Engineering Guidelines

MIL-STD-889—Dissimilar Metals

MIL-STD-1399—Interface Standard for Shipboard Systems

NOTE—This document contains a number of sections. The following sections may be of particular interest in determining environmental conditions for marine vehicles:

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Section 070—Part 1 D.C. Magnetic Field Environment (Metric)
Section 204—Ambient Air Conditions in Surface Ship Compartments (Metric)
Section 301—Ship Motion and Attitude (Metric)
Section 302—Weather Environment

2.1.4 OTHER PUBLICATIONS—American Bureau of Shipping, New York, Guide for the Classification of Manned Submersibles, 1968

SS521-AA-MAN-010, U.S. Navy Diving and Manned Hyperbaric Systems Certification Manual, Oct. 1987

3. Definitions—For the purpose of this document, the following definitions will apply:

3.1 Vehicle—A submersible or other marine craft in an assembled state with its related components or associated equipment.

3.2 Related Components—Assemblies, subassemblies and parts which comprise the vehicle.

3.3 Associated Equipment—That equipment appended to the vehicle for carrying, launching, supporting, and for assisting purposes.

3.4 Vehicles, Related Components And Associated Equipment Condition

3.4.1 INERT STORAGE—The condition of the vehicle, related components, and associated equipment, when stored, transported or handled, assembled or not, and not ready for immediate operation.

3.4.2 READY, NONOPERATING—The condition of the vehicle, related components, and associated equipment, when prepared (fueled and checked out), issued, transported, or handled, and ready for immediate operation.

3.4.3 OPERATING—The condition of the vehicle, related components, and associated equipment, when operating or present at the environmental sea condition.

4. General Environmental Conditions—This section presents the general conditions under which marine vehicles are operated. For small submersibles and surface craft, general environmental conditions for storage, transportation, and handling of the vehicles are included.

4.1 General Natural On-Land, On-Ship and at Air-Sea Interface—The environmental requirements for nonoperating and operating conditions are presented in this section as well as these for the air-sea interface. The air-sea interface is one of never-ending action and interaction as it is constantly affected by the winds, mass water movement, waves, ice formation, and general meteorological conditions. This is the everchanging, often violent and frequently unpredictable part of the ocean environment, which plays a key role in the success or failure of any surface support in underwater mission. Components as well as the entire system must be protected from the natural and artificial environments encountered during their manufacture and long-term deployment.

4.1.1 CORROSION CONTRIBUTION ENVIRONMENTS—This section presents important mechanisms involved in the corrosive deterioration of vehicle and submarine systems hardware excluding mechanical deterioration. The vehicles must be preserved during handling and storage prior to operational use and also at air-sea interface. Corrosion assumes many insidious forms and is defined as any type of chemical deterioration caused by or contributed to by the environment. Thus, reactions of vehicle materials with environment, such as the rusting or oxidation of steels, the pitting of aluminum, electrolytic reaction between dissimilar metallic substances, may be broadly categorized as corrosion.