

**INCH-POUND**  
MIL STD-2189(SH)  
13 November 1987

**MILITARY STANDARD**  
**DESIGN METHODS FOR NAVAL SHIPBOARD SYSTEMS**



AMSC N/A

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DEPARTMENT OF THE NAVY  
NAVAL SEA SYSTEMS COMMAND

Washington, DC 20362-5101

### Design Methods for Naval Shipboard Systems

1. This Military Standard is approved for use by the 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 5523, 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

Purpose. The purpose of this standard and the supporting sections is to provide textbook-type information and guidance for use in the design and construction of ships. The supporting sections illustrate typical design and calculation methods and procedures which are acceptable to the Government.

Background. The need for standardized ship design methods and procedures has become apparent as ships and their equipment have grown more complex. Previously an internal Design Data Book consisting of individual design data sheets was used to compile design methods and procedures applicable to the Navy. This standard extends that concept and provides ready access to those involved in Naval ship design.

Design. System and equipment design present the engineer with complex and unique problems. Many methods and design procedures exist which may be used in designing a given system or equipment. The intent of this standard is to establish the methods and procedures which the Navy will accept as valid. A designer employing these methods and procedures will have his work considered acceptable from the standpoint of form and method. This is not to imply that other methods and procedures are not acceptable to the Navy, but the burden of proof resides with the contractor.

Concept. This standard will be developed in depth over a period of time through the medium of supporting sections to cover the spectrum of ship design methods and procedures. Such sections will be issued as they are prepared. Each section will be self-sufficient in technical coverage. They must be applied, however, in consideration of how they are invoked in an acquisition. Generally, they will be invoked as an acceptable method or procedure in designing a system or equipment. In some instances they may be invoked as mandatory requirements.

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## 1. GENERAL, SCOPE, AND APPLICABILITY

1.1 General. This standard consists of a general basic document and supporting sections. Each section addresses a specific design selection or calculation method or procedure applicable to ship systems or equipment. When using these methods and calculations, the section which addresses the particular design and MIL-STD-2189 shall be considered as an integral single document.

1.2 Scope. This standard establishes, as applicable, one or more of the following:

- (a) Standard methods of calculation, and presentation of methods useful in the design of Naval ships.
- (b) Design standards for those systems or equipment which are in accordance with Naval practice.
- (c) Standards to permit investigation and comparison of ship, system and equipment designs submitted by various contractors.
- (d) Background information and general concepts applicable to Naval ship design and construction.

1.3 Applicability. The methods and procedures specified in the support sections are considered valid and acceptable to the Navy for their respective applications.

## 2. REFERENCED DOCUMENTS

2.1 Government publications. The following Government publications form a part of this standard to the extent specified herein.

### PUBLICATIONS

#### NAVAL SEA SYSTEMS COMMAND (NAVSEA)

- S9040-AA-IDX-010/SWBS 5D Vol. 1 - Expanded Ship Work Breakdown Structure for All Ships and Ship/Combat Systems (ESWBS).
- S9040-AA-IDX-020/SWBS 5D Vol. 2 - User's Guide for Expanded Ship Work Breakdown Structure for All Ships and Ship/Combat Systems.

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

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.

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### 3. DEFINITIONS

3.1 Ship design methods. Ship design methods are textbook type information and guidance for use in the design and construction of ships which illustrate typical design and calculation methods and procedures acceptable to the Government.

### 4. GENERAL REQUIREMENTS

4.1 Application. This standard applies to all activities involved in ship and equipment design, construction and installation and requires that consideration be given to use of its methods and procedures by such activities.

4.1.1 Invoking standard. While the use of this standard is not mandatory, it shall be considered when specifying ship design requirements. Requirements shall be carefully considered by all ship design activities involved in ship construction, modernization and conversion throughout the entire ship life cycle. Other methods or procedures shall be specified only where it can be shown that such methods and procedures are clearly more appropriate for a given application.

4.1.2 Design methods not covered. Design activities, in consonance with the objectives of this standard, shall establish a dialogue in a timely manner which will establish acceptable design methods and procedures in areas not covered by this standard.

### 5. DETAILED REQUIREMENTS

5.1 Relationship to Expanded Ship Work Breakdown Structure (ESWBS). The ESWBS, NAVSEA S9040-AA-IDX-010/SWBS 5D, is a two-digit expansion of the former NAVSEA Ship Work Breakdown Structure (SWBS). The SWBS was promulgated to provide a single language for the diverse areas of endeavor associated with shipbuilding through the entire ship life cycle from early design and cost studies through production and subsequent layup. This includes such areas as cost, weight, specifications, system function and effectiveness, design, production and maintenance. The ESWBS consists of a structural 5-digit numeric system. Sections of MIL-STD-2189 will be identified by the first 3-digits of the ESWBS number corresponding with the primary design element under consideration. In cases where various aspects of the same subject are addressed, sections will be designated as section XXX Part 1, 2, and so forth. Where a section covers several ESWBS elements such sections will be numbered at the sub group or even the group level.

### 6. NOTES

6.1 Intended use. This standard is used to specify acceptable methods procedures and calculations for design of ship systems.

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6.2 Subject term (key word) listing.

Calculation methods  
Ship construction  
Ship conversion  
Ship modernization

Preparing activity:  
Navy - SH  
(Project 1990-N055)

## STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER MIL-STD-2189 (SH)		2. DOCUMENT TITLE DESIGN METHODS FOR NAVAL SHIPBOARD SYSTEMS	
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one)	
b. ADDRESS (Street, City, State, ZIP Code)		<input type="checkbox"/> VENDOR <input type="checkbox"/> USER <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> OTHER (Specify): _____	
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	
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