

T9640-AB-DDT-010/HAB

SHIPBOARD  
HABITABILITY  
DESIGN  
CRITERIA  
MANUAL



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PUBLISHED BY DIRECTION OF COMMANDER, NAVAL SEA SYSTEMS COMMAND

1 DEC 1995

# T9640-AB-DDT-010/HAB

## SHIPBOARD HABITABILITY DESIGN CRITERIA MANUAL


THIS MANUAL INCORPORATES THE UPDATED  
TECHNICAL PORTIONS, ENCLOSURES (1) AND (2),  
OF OPNAV INSTRUCTION 9640.1, SHIPBOARD  
HABITABILITY PROGRAM, DATED 13 OCT 1979.

NAVSEA 03H1 IS CUSTODIAN OF THIS MANUAL.


COMMENTS SHOULD BE FORWARDED TO

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**SHIPBOARD HABITABILITY DESIGN**  
**CRITERIA MANUAL**

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## **1.0 Introduction.**

**1.1 General.** This manual is invoked as reference (a) in the updated OPNAV INSTRUCTION 9640.1A, which stipulates the Chief of Naval Operations shipboard habitability program policy, and procedures and responsibilities for implementation.

**1.2 Purpose.** The purpose of this manual is to implement the provisions of OPNAV INSTRUCTION 9640.1A by establishing U.S. Navy shipboard habitability design criteria which will ensure unit mission readiness and provide an acceptable level of quality of life for sailors and marines.

**1.3 Scope.** This manual contains detailed shipboard habitability design criteria for developing specifications and drawings for new ship and submarine designs, and modifications to existing ships and submarines. When existing ships do not meet these criteria, degradation to existing shipboard habitability is not permitted.

**1.4 Applicability.** This manual applies to new ship and submarine designs, and existing ships and submarines greater than 150 feet long or having accommodations greater than 100. Design criteria for smaller ships shall be considered on a case basis, with criteria herein providing a foundation for habitability design of smaller ships.

## **1.5 Definitions.**

**1.5.1** "New ship designs" refers to ship and submarine designs sufficiently early in the design process when changes can reasonably be made to the Operational Requirements Document (ORD), or which have not completed preliminary design.

**1.5.2** "Existing ships" refers to ships and submarines that do not meet the new ship designs definition, *in* addition to those accepted and commissioned.

**1.5.3** "Accommodations" refers to the number of personnel permanently supported *in* a given ship by habitability spaces, systems, fixtures and equipment. Accommodations are provided for ship's company plus any of the following embarked personnel: troops, air wings, staffs, detachments, short-term assignments, indoctrination personnel, civilian technical representatives, and official visitors or guests. Accommodations for some personnel can be categorized as surge or transient depending on their function.

**1.5.4** "Surge" refers to personnel embarked for short durations for special operations, exercises, or mobilizations.

Surge personnel accommodations require provision for a berth only. When unqualified reference to troops is made herein, it excludes surge troops.

**1.5.5** "Transients" refers to personnel embarked for short durations who do not contribute to the host ship operational capability. Transients normally are waiting transfer to, or arrival at, another destination. Ships receiving a steady influx of transients require support for them so that habitability for permanently assigned personnel is not degraded.

**1.5.6** "Ship's company" refers to all Officer, CPO, and crew personnel assigned to the ship.

**1.5.7** "CPO/SNCO" refers to E7-E9 personnel

**1.5.8** "Crew/Troop" refers to E1-E6 personnel

**1.5.9** "Enlisted personnel" refers to CPO/SNCO and Crew/Troop

## **2.0 Environmental Control.**

**2.1 General.** Although the scope of this manual is habitability, specifically oriented toward systems and equipment which affect habitability spaces, certain environmental considerations which apply to working spaces as well, are included.

**2.2 Air Conditioning and Ventilation.** In all spaces, current OPNAVINST 5100.19C (Heat Stress) controls shall be applied. Machinery spaces shall employ spot cooling techniques at watch and work stations to provide adequate degrees of personal health and comfort. Intakes for ventilation and air conditioning systems shall be located so as to minimize introduction of contaminated air from sources such as topside exhausts, stacks and water spray.

**2.2.1 Air Conditioning.** All berthing, messing, medical, electronics, and necessary control spaces on surface ships shall be air conditioned to maintain as a maximum, 80 degrees Fahrenheit dry bulb and 62.5 degrees Fahrenheit dew point under external ambient conditions up to 90 degrees Fahrenheit dry bulb and 81 degrees Fahrenheit wet bulb and sea water temperature of 85 degrees Fahrenheit, with the personnel on board and normal machinery operating. Air conditioning of office, galley, recreation and lounge spaces shall be design goals to be considered on a case basis. Submarines shall be air conditioned in living, messing and control spaces to the same standards. For surface ships whose ORDs specify extensive tropical operations, the external ambient design temperature shall be increased to 105 degrees Fahrenheit dry bulb (87.5 degrees Fahrenheit wet bulb) and sea water temperature of 95 degrees Fahrenheit. Air to normally ventilated spaces in these ships shall be precooled to 90 degrees Fahrenheit dry bulb.

**2.2.2 Ventilation.** Normally occupied spaces in surface ships and submarines shall be treated in accordance with current NAVSEA Standards as to allowable temperature rise over external ambient temperature or required rate of air exchange. (In surface ships, minimum replenishment with outside air shall be five cubic feet per minute per person). Special attention shall be given to high heat producing spaces such as the galley, scullery and laundry, with design provisions to include exhaust hoods for specific equipments. Ventilation in all sanitary spaces shall be specifically designed to minimize high humidity, condensation and odor persistence including a minimum air exchange rate of 15 changes per hour, and, as a minimum, provision of one exhaust terminal located to service each shower group and water closet group.

**2.3 Heating.** The criterion for all surface ships and submarines shall be the capability to sustain space temperature of at least 65 degrees Fahrenheit dry bulb in all living, sanitary, messing, medical, control spaces, and normal working stations, in ambient external conditions as low as 10 degrees Fahrenheit dry bulb, and sea water temperature of 28 degrees Fahrenheit, with the personnel on board and normal machinery operating. For surface ships whose ORDs specify extensive cold weather operations, the ambient external design temperature shall be reduced to minus 20 degrees Fahrenheit dry bulb. Air to normally ventilated spaces in these ships shall be preheated to 10 degrees Fahrenheit, except where there is a danger of freezing liquids, in which case the minimum preheat temperature shall be 40 degrees Fahrenheit.

**2.4 Noise.** Airborne noise criteria for Navy ships and submarines are expressed as acceptable compartment noise levels. They are categorized according to personnel functional requirements and apply under all ship operating conditions. These criteria apply to steady-state noise and do not apply to impact or impulsive type noise.

**2.4.1 Definitions of Airborne Noise Categories.**

**2.4.1.1 Category A.** Spaces in which direct speech communication must be understood with minimal error and without need for repetition. Acceptable noise levels are based on approximate talker-listener distances of either 3 feet or 12 feet. Category A-3 shall be assigned when extreme talker-listener distance is less than 6 feet. Category A-12 shall be assigned when the extreme talker-listener distance is 6 feet or greater. A-3 or A-12 designators are dependent on compartment size and arrangement which influence talker-listener distances.

**2.4.1.2 Category B.** Spaces in which comfort of personnel is the primary consideration and where communication considerations are secondary.

**2.4.1.3 Category C.** Spaces in which it is essential to maintain especially quiet conditions.

**2.4.1.4 Category D.** High noise level areas in which voice communication is not normally important and prevention of hearing loss is the primary consideration.

**2.4.1.5 Category E.** High noise level areas in which voice communication is at high vocal effort and short distance and where amplified speech mechanisms and telephones are normally available.

**2.4.2** Noise Category Assignments. Airborne noise categories are based upon the functional requirements of shipboard spaces. Typical assignments are identified below. Ship spaces not specifically listed shall be assigned the same airborne noise category as a listed space which supports a similar function.

**2.4.2.1** Category A.

- CIC
- Chart room
- All offices
- Pilothouse
- Damage control central
- Training spaces
- Briefing rooms
- Squadron ready rooms
- Maneuvering room
- TV station (internal)
- Control room
- Missile compartment
- Missile control center
- Radio room
- Propulsion plant enclosed operating stations (1)

**2.4.2.2** Category B.

- All berthing and living spaces
- Recreation areas
- Lounges
- Wardrooms (2)
- Messrooms (2)
- Barber shops

**2.4.2.3** Category C.

- Sonar control rooms
- Medical spaces
- Chapel and chaplain offices
- Libraries

**2.4.2.4** Category D.

- Machinery rooms
- Engine rooms
- Fire rooms
- Laundry
- Auxiliary machinery rooms
- Steering gear room
- All workshops (with repair equipment secured)



**2.4.2.5 Category E.**

Bridge wings  
Open bridge  
Torpedo room  
Propulsion plant maneuvering areas  
(non-enclosed)(1)

- NOTES:
- (1) Propulsion plant enclosed operating stations will be either category A or E depending upon the function of the space and the feasibility of installing acoustic treatments.
  - (2) For ships and submarines without training spaces, briefing rooms, or chapels, Category A shall apply.

**2.4.3 Acceptable Airborne Noise Levels.** Table 1 indicates acceptable "A" weighted airborne noise levels for all shipboard categories.

TABLE 1

ACCEPTABLE "A" WEIGHTED AIRBORNE NOISE LEVELS <sup>(1)</sup>

<u>Noise Category</u>	<u>Sound Pressure Level (dBA)</u>
A-3	70
A-12	60
B	70
C	65
D	84 (2)
E	80

- NOTES:
- (1) For design, engineering, and procurement purposes, other more detailed or specific criteria, such as octave band, may be used to supplement these A-weighted criteria.
  - (2) Refer to OPNAVINST 5100.23 Series for hearing conservation program requirements in high noise level environments.

**2.5 Lighting.** Fluorescent lighting shall be the primary source of general illumination in living and work spaces. Wherever general illumination is inadequate for efficient performance of specific tasks, detail illumination shall be provided for the specific functions. Lighting fixtures shall be arranged to provide uniform illumination so that the ratio of maximum footcandles under a lighting fixture to the minimum footcandles between it and the nearest adjacent fixture shall not be greater

than two to one. Excessive brightness contrasts between "seeing task" and background immediately surrounding such task shall not exceed a ratio of ten to one. Arrangement of lighting fixtures shall be coordinated with ventilation terminals and other overhead interferences and integrated with equipment arrangement to achieve the best possible illumination within these requirements.

Compartment illumination levels shall meet the following:

SPACE	AVERAGE INITIAL FOOT CANDLES
<u>General Lighting (30 inches above deck)</u>	
Passageways	7
Living spaces, except as follows:	14
Staterooms	7
Recreation areas	28
Berthing areas	7
Sanitary spaces, except as follows:	14
Shower area	
Foodservice and messing spaces	28
Refrigerated and dry provision storerooms	14
Lounge, recreation and welfare spaces, except as follows:	14
Library	28
Personal service spaces, except as follows:	14
Ship store and snack bar	28
Post office	28
Vending machine area	7
<u>Detail Lighting</u>	
Bulletin boards	14
Desk and writing tables	42
Food preparation counter, range tops, off-loading end of dishwashers, and food serving lines	42
Barber shop chair	42
Laundry press area	28

**2.6 Materials.** All interior finish materials and furnishings in surface ships and submarines shall conform to the fire performance requirements of MIL-STD-1623. Materials and applications which ease cleaning efforts and improve facilities maintenance shall be utilized throughout, with special emphasis

in messing, food preparation, sanitary and medical spaces. Additionally, the following apply:

**2.6.1** Carpeting. Shipboard carpeting shall be of approved material and installation shall be limited to Flag and Commanding Officer quarters, quarters of other officers of equivalent rank, Executive Officer quarters, wardrooms and CPO lounges, libraries and chapels.

**2.6.2** Bulkhead and Overhead Sheathing. In all applications, sheathing shall be installed in a manner which will not impede damage control efforts. Full visibility and accessibility shall be provided for damage control fittings and other vital system components requiring access for inspection, maintenance and operation. Sheathing in way of valves, test fittings, electrical junction boxes and other such system components requiring access, shall be provided with hinged access panels having quick-acting flush catches and having label plates which identify the enclosed component. To eliminate fire hazard accumulation behind and above sheathing, it shall not be used to create a ventilation plenum. Sheathing installations shall have openings suitable to allow full access to enclosed ventilation systems for routine cleaning. Bulkhead sheathing shall not be applied along the shell of the ship in any space below the damage control deck.

**2.6.2.1** Surface Ships. Overhead and bulkhead sheathing shall be provided for health and sanitary purposes, in food preparation spaces, sculleries, garbage disposal rooms, medical and dental operating rooms, bacteriological laboratories, and dedicated battle dressing stations. Installation for humidity control and protection of insulation shall be provided in shower and shower drying areas. Installation for aesthetic purposes shall be confined to Flag and Commanding Officer quarters, quarters of officers of equivalent rank, Executive Officer quarters, chapels, wardroom messrooms, CPO messrooms, and lounges.

**2.6.2.2** Submarines. Provision shall be considered on a case basis.

**2.6.3** Aesthetic improvements in spaces such as Flag and Commanding Officer quarters, Executive Officer quarters, chapels, officer messrooms, CPO messrooms, and lounges shall include:

**2.6.3.1** Emphasis upon austerity, combat capability and survivability.

**2.6.3.2** All materials and furnishings shall conform to the fire performance requirements noted above.

**2.6.3.3** All sheathing shall conform to the standards noted above.

**2.6.4** Color (Surface Ships and Submarines). Officer, CPO and crew living and work spaces shall have an adequate number of different color schemes to provide personnel with a visual change in environment in their daily routines. The total number of different colors of paint and deck coverings used, however, should be kept small to minimize logistics support. When practicable, selection of color schemes for senior officers quarters, messrooms and lounges may be made by the prospective commanding officers. Paints and other materials used on large surface areas shall be of appropriate color and reflectance to ensure proper lighting. Curtains, draperies and other accent materials need not be standard in color or pattern.

**2.7 Passageway and Overhead Clearances.** Unobstructed headroom in habitability associated walking areas and passageways in surface ships shall be not less than 6 feet 5 inches (6 feet 3 inches in submarines). Minimum unobstructed width of main passageways in surface ships shall be 36 inches (27 inches in submarines).

**2.8 Fresh Water.** All ships shall have a distilling capacity adequate to provide, in addition to boiler make-up feed and other non-habitability requirements, thirty gallons (surface ships)/twenty-five gallons (submarines) per ship's company accommodation, per day, of fresh water of satisfactory quality to support habitability (drinking, galley, scullery, sanitary spaces. and laundry). Amphibious ships shall have an additional capacity to provide twenty-five gallons per troop (officer, SNCO, and other enlisted) accommodation, per day. For surface ships only, two distilling plants shall be provided, one shall be equal to required design capacity and the second being a full redundant plant. As an alternative, three plants may be provided, two of which shall equal required design capacity and the third being a redundant plant with the same capacity as one of the two plants. All ships and submarines shall maintain a stowage capacity for a minimum of forty gallons per accommodation for habitability purposes.

**2.8.1** Water coolers shall be provided for living and work spaces. Where several small spaces are closely grouped and share a common passage, one cooler may service the group. Water coolers for living and messing spaces shall be based on the following:

	Accommodations per cooler in living spaces	Mess seats per cooler in messing spaces
<u>Surface ships:</u>		
Officers	40	75
CPO/SNCO	40	75
Crew/Troop	100	50

Submarines

One cooler per 40 accommodations

**2.8.2** Ice making facilities capable of furnishing 1.25 pounds of ice per accommodation per day shall be provided.

**2.8.3** Water heaters shall be provided in numbers sufficient to ensure an adequate supply of hot water at all washbasins and showers and shall include a system which insures a hot water supply to showers and washbasins within 10 seconds. Water heaters shall be provided for galley, pantry, scullery, laundry and medical spaces. Water heaters supplying washbasins and showers shall not support work spaces that have higher water temperature requirements.

**2.8.4** Automatic potable water disinfection equipment shall be provided in surface ships.

### **3.0 Habitability Facilities**

**3.1 General**. The number of accommodations referred to herein shall be that number stated in the ORD.

#### **3.2 Berthing**. (Surface Ships and Submarines)

**3.2.1** There shall be at least one berth per accommodation.

**3.2.2 Type**. Berths shall be of the pan bottom or locker bottom type, and shall be permanently installed, except where designated as surge berthing in excess of designed accommodations. Surge berths shall be of a removable type to allow for expansion of recreation and lounge space during periods when not occupied.

#### **3.2.3 Personnel Groupings.**

**3.2.3.1** Officers, CPOs and crew shall be accommodated in separate berthing compartments.

**3.2.3.2** On amphibious ships, embarked troop Officers, SNCOs, and other enlisted shall be accommodated in separate berthing compartments.

**3.2.3.3** Female officers, CPO and crew berthing accommodations shall be separate from those of their male counterparts.

#### **3.2.4 Sea Cabins.**

**3.2.4.1** On all surface ships, destroyer/frigate size or larger, a sea cabin shall be provided for the Commanding officer in the immediate vicinity of the bridge/control station if his stateroom is not in the immediate vicinity of the bridge/control station.

**3.2.4.2** On all surface ships specifically configured to carry embarked Flag Officers and/or Unit Commanders requiring immediate access to bridge/control stations, such cabins shall be provided if staterooms are not in the immediate vicinity of the respective control station.

#### **3.2.5 Berthing Clearances.**

**3.2.5.1** Minimum clearance requirements to insure freedom of rotation of individuals in their berths, access to berths and traffic flow between berths, shall be the following:

**3.2.5.1.1** Vertical unobstructed clearance above mattress top: 20 inches for crew/troops, 23 inches for CPO/SNCO, 23 inches for officers assigned to three-high berths, and 25 inches for officers assigned to two-high berths. In submarines, hull curvature may reduce the outboard vertical clearance above mattresses for berths fitted along the shell.

**3.2.5.1.2** Unobstructed secondary passage width at berth tier ends: 30 inches (18 inches for submarines). The term "tier" as used herein denotes the berth structure of two, three, or four high berths.

**3.2.5.1.3** Unobstructed passage width along accessible side of berth: 27 inches (18 inches for submarines).

**3.2.5.2** Distance from the underside of the bottom berth mattress to the deck shall be not less than 6 inches, except submarines shall be 2 inches.

**3.2.5.3** Access: Means for easy access to all spaces within locker bottom type berths, shall be provided.

**3.2.5.4** The number of berths per tier shall not exceed three, except in amphibious ships, on which, in troop spaces, four-high berth tiers may be authorized and the fourth berth used as a surge berth, if all other clearance and access standards are maintained.

**3.2.6** Berths. The following features shall be included for each berth except surge berths and as noted:

**3.2.6.1** One light per berth.

**3.2.6.2** Full privacy partitions between berths and at ends of berth tiers where opening onto passageways.

**3.2.6.3** Privacy curtains for each berth, except officer single berths.

**3.2.6.4** HVAC terminal within each berth cubicle.

**3.2.6.5** Main ship passageways in surface ships shall not bisect berthing spaces. Where this is not feasible, berthing spaces shall be isolated from main passageways by joiner bulkheads.

**3.2.7** Space Considerations. Berths shall be oriented primarily fore-and-aft; however, athwartship berthing may be used where the compartment arrangement is improved. Where the

athwartship orientation is used, it shall be limited to not greater than 30 percent of the berths per compartment.

### **3.2.7.1 Enlisted personnel.**

**3.2.7.1.1** Berthing spaces shall accommodate the fewest number of personnel, within the constraints of available berthing space and consistent with maintaining, as a minimum, the other berthing standards otherwise established in this instruction.

**3.2.7.1.2** In surface ships, berth tiers shall be arranged in cubicles accommodating six or fewer persons per cubicle. All cubicles shall have a secondary means of egress, via a kick-out panel if necessary, which will allow personnel to escape in the event the primary access to the berth cubicle is obstructed.

**3.2.7.1.3** In surface ships, ten percent of berth tiers in berthing spaces with 15 or more persons shall be sized to fit an 80 inch long mattress. All other berths shall accommodate at least a standard 76 inch mattress. In submarines, thirty percent of berth tiers in berthing spaces shall fit a 76 inch mattress and all other berths shall accommodate at least a 72-1/2 inch mattress.

**3.2.7.2** Officers. Officers shall be accommodated in one- or two-person staterooms (or three-person for submarines) except in unique cases in which bunkroom berthing cannot be avoided. In this event, there shall be no more than six berths per bunkroom (12 berths per transient officer bunkroom). Unobstructed walking and working areas in officer berthing spaces will conform, as a minimum, to Table 2. Columns in Table 2 specifying ship length refer to length overall. Spaces assigned for Commanding Officer, Commanding Officer of Troops, Landing Force Commander, Unit Commanders, and other senior operational commanders shall be commensurate with and appropriate to the rank of the individuals concerned.



TABLE 2

UNOBSTRUCTED AREA IN SQUARE FEET PER OFFICER BERTH<sup>(1)</sup>

OFFICERS ACCOMMO- DATIONS	SHIP LENGTH 150'-300'	SHIP LENGTH 301'-600'	SHIP LENGTH over 600'	TROOP OFFICERS	SUBMARINE OFFICERS
C. O. Single Stateroom	45-50 <sup>(2)</sup>	55-70 <sup>(2)</sup>	65-90 <sup>(2)</sup>	55-70	12
X. O. Single Stateroom	35-40 <sup>(3)</sup>	40-55	45-70	55(3)	12 <sup>(3)</sup>
Dept. Head Single Stateroom	30 <sup>(3)</sup>	30-45	45-60	45 <sup>(3)</sup>	NA
Single Stateroom	NA	35 <sup>(3)</sup>	35-50	30 <sup>(3)</sup>	NA
Double Stateroom	20	22	35	18	6 <sup>(4)</sup>
Officers Bunkroom	20 <sup>(5)</sup>	20 <sup>(5)</sup>	20 <sup>(5)</sup>	12	5

NOTES: (1) The lower figure is the minimum limit. The higher figure is the design goal.  
(2) Does not include sea cabin space, when provided.  
(3) When such spaces are provided. Optimum ship construction considerations may preclude provision in every case.  
(4) And submarine officer 3-person stateroom.  
(5) Transient officer bunkroom: 12 square feet.  
NA = Not Applicable

**3.3 Stowage for Personal Effects.** The standards for personal stowage space displayed in Table 3 shall be provided.

TABLE 3

## STOWAGE PER ACCOMMODATION

TYPE STOWAGE/ TYPE SHIP	OFFICER			ENLISTED	
	SINGLE STATE ROOM	DOUBLE STATE ROOM <sup>(1)</sup>	BUNK- ROOM <sup>(2)</sup>	CPO <sup>(3)</sup>	CREW <sup>(4)</sup>
<u>Drawer Volume (cu ft)</u>					
Surface Ship	20	15	15	NR	NR
Troops	18	10	6	NR	NR
Submarine	6	6	6	NR	NR
<u>Locker Volume (cu ft)</u>					
Surface Ship	5.5	4.75	4.5	14	7.5
Troops	3.5	3.5	2.5	6.5	4
Submarine	9	8	8	10	3
<u>Hanging Space (in) <sup>(5)</sup></u>					
Surface Ship	24/24	24/12	24/12	12/6	10/0
Troops	12/12	6/6	6/6	3/3	3/3
Submarine	12/12	12/6	6/6	3/3	3/0
<u>Seabag Stowage (cu ft) <sup>(6)</sup></u>					
Surface Ship	3	3	3	2	1
Troops	NR	NR	NR	NR	NR
Submarine	NR	NR	NR	NR	NR
<u>Soiled Laundry Stowage (cu ft)</u>					
Surface Ship	NR	NR	NR	0.75	0.75
Troops	NR	NR	NR	0.56	0.56
Submarine	NR	NR	NR	NR	NR

- NOTES:
- (1) And submarine officer 3-person stateroom.
  - (2) In dedicated transient officer bunkrooms in surface ships, provide 7.5 cubic feet locker volume, 10 inches short hanging space and 2 cubic feet of suitcase stowage per berth. In dedicated technical representatives living spaces in surface ships, provide 7.5 cubic feet locker volume, 10 inches short hanging space, and 2 cubic feet of seabag stowage.
  - (3) In dedicated transient CPO living spaces in surface ships, provide 7.5 cubic feet locker volume, 10 inches short hanging space, and 2 cubic feet of seabag stowage per berth.
  - (4) In dedicated or multipurpose transient crew living spaces in surface ships, provide 4.0 cubic feet of locker volume and 3 inches of short hanging space (in community lockers).
  - (5) The first number represents short hanging space (minimum 37 inches high), and the second number represents long hanging space (minimum 65 inches high).

(6) Seabag stowage need not be in or adjacent to berthing space.

NR = Not Required.

**3.3.1** In addition to the foregoing requirements, secure stowage for troop hand-carried weapons, helmets and field packs shall be provided on all applicable ships (not necessarily in or immediately adjacent to the berthing space).

**3.3.2** Clothing lockers capable of containing one change of working uniform/one set of coveralls and shoes shall be provided in each main engineering/machinery space on surface ships, sufficient to accommodate each watchstander in a watch section.

**3.3.3** On aircraft carriers and other ships designed to accommodate aviation personnel, stowage space in addition to that in Table 3, shall be provided for officer and enlisted aircrewmen, capable of accommodating individual flight equipment (helmet, flight suit, harness, survival equipment and boots). This shall take the form of hanging space or lockers within berthing spaces or briefing/ready rooms and/or additional locker rooms convenient to briefing/ready rooms.

#### **3.4 Sanitary.** (Surface ships and submarines)

##### **3.4.1** General.

**3.4.1.1** In sanitary facilities associated with living spaces, facilities for female personnel shall be separate from those for male personnel.

**3.4.1.2** Water heaters shall be located outside of sanitary and berthing spaces and provided adequate insulation and exhaust ventilation to prevent high space temperature in their location.

**3.4.1.3** Access to washroom facilities in surface ships (and in submarines, where practicable) shall be designed to eliminate the need for passing through a water closet area enroute to or from the washroom facility.

**3.4.1.4** In surface ships (and in submarines where practicable), sanitary spaces shall be located in the vicinity of and on the same deck level as the living space served.

**3.4.1.5** Access to sanitary spaces from berthing areas on surface ships (and submarines, where practicable) shall be such that there is no need to traverse public areas.

**3.4.1.6** In amphibious ships, separate sanitary facilities shall be provided for troops (officer, SNCO, and other enlisted).

**3.4.1.7** Within each sanitary space, fixtures shall be arranged so as to allow for one section to be secured for cleaning while the other section is in use, if reasonably convenient alternate facilities do not exist.

**3.4.2** Sanitary Facilities in Work Spaces. A water closet and washbasin shall be provided in the immediate proximity of the bridge, combat information center and communications spaces for use by watchstanders. In ships in which female accommodations/watchstanders are anticipated, an enclosed water closet shall be provided. If feasible, considering marine sanitation device (MSD) system limitations, similar facilities shall be provided in surface ships in, or adjacent to, the accesses to firerooms, enginerooms, and other normally manned main machinery spaces. In submarines, a urinal shall be provided in the engineering compartment.

**3.4.3** Major Sanitary Fixtures.

**3.4.3.1** Lavatories (Washbasins).

**3.4.3.1.1** At least one lavatory shall be provided in each water closet space.

**3.4.3.1.2** Lavatories in washrooms and washroom areas shall be spaced 24 inches center to center and shall be of the continuous countertop type. A mirror, toilet shelf and two electrical outlets shall be provided for each lavatory. Mirrors shall extend the full length of the counter top installation, but shall be segmented to facilitate replacement. Complete, easy access to lavatory plumbing for cleaning, maintenance and damage control, shall be provided.

**3.4.3.1.3** In surface ships, one lavatory unit with built-in toilet case, mirror, light and receptacle shall be provided in each officer and troop officer stateroom which does not have a private bath. Equivalent lavatory units shall be provided in officer, troop officer and transient officer bunkrooms on a basis of one per four, one per five, and one per six berths or increment thereof, respectively.

**3.4.3.1.4** For lavatories in submarines, see Table 5.

**3.4.3.2** Urinals. Shall be spaced 27 inches center to center with privacy partitions between units and at the ends of

each group (if not otherwise provided by permanent structure or bulkhead).

**3.4.3.3 Water Closets (Toilets).** Shall be enclosed in cubicles, with a privacy door. In all surface ships and submarines, the minimum cubicle size shall be 30 inches wide by 21 inches deep (door to front of water closet) for both single and double door installations. The design goal for surface ship installations shall be 30 inches wide by 30 inches deep (door to front of water closet).

**3.4.3.4 Showers.** Shall be of the individual stall type. Minimum size shall be 30 inches wide by 30 inches deep. In community sanitary spaces for surface ships, showers shall be grouped around a common shower drying area and separated from washroom and water closet areas by joiner bulkheads and door.

**3.4.4 Accommodations per Major Fixture.** The numbers of accommodations to be served per major fixture, for surface ships and submarines, are shown in Table 4 and Table 5, respectively. Calculations for each community sanitary space are to be based on the accommodations locally served by that space. If the result, when the number of accommodations is divided by the "accommodation per fixture" factor is not an integer, then the number of fixtures shall be the next highest integer.

TABLE 4

NUMBER OF ACCOMMODATIONS PER FIXTURE  
FOR SURFACE SHIPS  
COMMUNITY SANITARY SPACES<sup>(1)(2)</sup>

FIXTURE	SHIP OFFICER	TROOP OFFICER	CPO	SNCO	CREW	TROOP
Lavatories	30-35	30-35	7-12	8-13	15-20	15-20
Urinals <sup>(3)</sup>	20-25	30-35	30-35	30-35	40-45	50-55
Water Closets for males	8-13	10-15	10-15	10-15	23-28	25-30
Water Closets for females	The number of WCs shall equal the sum of urinals plus WCs provided for an equal number of males.					
Showers	10-15	20-25	12-17	20-25	25-30	40-50

NOTES: (1) The higher number is the ratio limit not to be exceeded (including transients). The lower number is the design goal for each category (including transients).

- (2) Paper towel dispensers shall be provided in each space. These may be augmented by electric hand dryers, but not to the extent of exclusion of paper towel dispensers.
- (3) Only for male sanitary spaces for more than six accommodations

TABLE 5

NUMBER OF ACCOMMODATIONS PER FIXTURE  
FOR SUBMARINES  
COMMUNITY SANITARY SPACES<sup>(1)</sup>

FIXTURE	OFFICER	CPO	CREW
Lavatories	(2)	8	15
Urinals	(3)	(3)	(3)
Water closets	10	12	20
Showers	10	20	50

- NOTES:
- (1) At least one electric hand dryer shall be provided in each community sanitary space.
  - (2) One lavatory unit with built-in washbasin, toilet case, mirror, light, and receptacle shall be provided in each stateroom.
  - (3) No specified requirement. Constraints of individual ship design shall control this feature.

**3.5 Food Service.** (Surface Ships and Submarines)

**3.5.1 General.**

**3.5.1.1 Secondary Function.** All messrooms shall be designed to support recreation (including movies) and training, as well as their primary messroom function.

**3.5.1.2 Mess Lines.** Messroom access shall be designed to prevent personnel in the mess line from standing on the weather decks, and from passing through visible garbage disposal areas while progressing through the serving line.

**3.5.1.3 Clearance in Messrooms.** As a minimum, the following unobstructed clearances within messrooms, shall be provided:

**3.5.1.3.1 Primary passages:** In all surface ships and submarines, not less than 27 inches. The design goal for surface ships shall be 36 inches.

**3.5.1.3.2** Secondary passages: In all surface ships and submarines, not less than 24 inches. The design goal for surface ships shall be 30 inches.

**3.5.1.3.3** Back to back clearance between diners seated at adjacent tables, and between the backs of seated diners and adjacent bulkheads: In all surface ships and submarines, not less than 15 inches. The design goal for surface ships is 24 inches. Note: this requirement does not apply where booth or fixed outrigger type seating is installed and adequate side access is provided.

### **3.5.2 Personnel Grouping.**

**3.5.2.1** In surface ships destroyer/frigate size or larger, separate messrooms shall be provided for officers, CPOs and crew.

**3.5.2.2** In submarines, a messroom for CPOs and crew combined shall be provided, with a separate messroom for officers.

**3.5.2.3** In amphibious ships, messrooms for troop officers, SNCOs and other enlisted shall be combined with those provided to their ship's company counterparts.

**3.5.2.4** In ships designed to accommodate Flag Officers, separate flag messrooms shall be provided.

**3.5.2.5** Personnel grouping for messing purposes in ships smaller than destroyer/frigate size shall be considered on a case basis, providing for separate officer messroom and CPO messroom wherever possible.

**3.5.2.6** Separate officer galleys shall be provided in surface combatants, aircraft carriers, amphibious assault ships and auxiliaries with the following exceptions: frigates, mine warfare ships, patrol combatants, salvage ships/tugs, and submarine rescue ships.

### **3.5.3 Messroom Seating.**

**3.5.3.1** Crew/Troop messrooms shall be designed on the basis of 21 inches table space per seat. The number of mess seats provided shall be in accordance with Table 6.

TABLE 6

## CREW/TROOP MESS SEATS

SHIP TYPE	CREW MESS SEATS AS A PERCENTAGE OF ACCOMMODATIONS
Amphibious	15
Submarines	35 <sup>(1)</sup>
Aircraft Carriers	14
All Others	30

NOTE: (1) Includes CPO accommodations.

### 3.5.3.2 Officer and CPO/SNCO Messrooms.

**3.5.3.2.1** For each officer and CPO mess seat specified below, table space width of 24 inches shall be provided.

**3.5.3.2.2** In amphibious ships, since ship's company and troop officers and CPO/SNCO share the same respective messrooms, the number of mess seats shall be, at least, 80 percent of the accommodations for the ship's company element, or 40 percent of the combined ship's company and troop element accommodations, whichever number is larger, within the respective messroom spaces.

**3.5.3.2.3** In submarines, mess seats shall be provided for 75 percent of the officer accommodations.

**3.5.3.2.4** In aircraft carriers, seats shall be provided for 40 percent of the officer and CPO accommodations in their respective messrooms. The Flag and Commanding Officer shall be provided with a separate mess.

**3.5.3.2.5** In all other ships, the number of officers and CPO mess seats, in their respective messrooms, shall be provided as a minimum, as specified in Table 7.



TABLE 7

## OFFICER AND CPO/SNCO MESS SEATS

NUMBER OF ACCOMMODATIONS	MESS SEATS
0-20	80% x N
21-50	16 PLUS 70% x (N - 20)
51 or more	37 PLUS 60% x (N - 50)

N = Number of accommodations

### **3.6 Lounge, Recreation, Religious Ministry, and Welfare.**

(Surface Ships and Submarines).

**3.6.1** The philosophy shall be to provide facilities and space to allow for a change of environment from watchstanding and working routine during off-duty hours. These elements fall into three broad categories:

**3.6.1.1** Lounge areas to satisfy personal needs for passive, quiet pursuits and personal entertainment such as reading, writing, off-duty education, listening to music, pursuing hobbies, etc.

**3.6.1.2** Recreational areas to satisfy personal needs for physical fitness and more active social and competitive events.

**3.6.1.3** Areas in which individuals may satisfy their spiritual welfare needs and attend religious services.

**3.6.2** The inherent constraints of warship design frequently restrict provision of unique space for these activities to less than that desired and possible in non-afloat applications. Each new design must be considered on a case basis, but shall stress maximum creation of single purpose spaces for these activities, over multifunctional use of other spaces.

**3.6.3** The design goal for surface ships is to provide sufficient space, exclusive of messrooms, for one-third of the accommodations to simultaneously participate in recreation, lounge and welfare activities.

**3.6.4** As a minimum amount of recreation, lounge and welfare space in surface ships, seating and writing space shall be provided, exclusive of messrooms, as follows:

**3.6.4.1** Officers: Seats and writing spaces shall be provided in officer, troop officer and transient officer quarters on a basis of one per one, one per two, and one per

three accommodations, respectively. Seating in the wardroom lounge shall be based on one per five officers when the total number of officer accommodations is 50 or fewer, and otherwise, 10 seats plus 15 percent of the number of officer accommodations in excess of 50.

**3.6.4.2 CPO/SNCO:** One writing surface for every ten accommodations, plus three seats/seating spaces for every ten accommodations. One of these seats/seating spaces shall be provided at each writing surface.

**3.6.4.3 Crew/Troop:** One writing surface for every ten accommodations, plus three seats/seating spaces for every ten accommodations. One of these seats/seating spaces shall be provided at each writing surface. Note: Seating space may be space mutually usable for other habitability purposes, including physical fitness facility, library, chapel, and training room.

**3.6.5** Unique submarine constraints require case basis consideration for optimizing available space for these purposes, however, as a minimum, seating and writing space, exclusive of messrooms, shall be provided as follows: One each for every two officer accommodations and one each for every three CPO accommodations. As a design goal, one seat and writing space shall be provided for every ten crewmember accommodations.

**3.6.6** The following shall be included within the broad category of lounge, recreation, religious ministry, and welfare space aboard surface ships and submarines:

**3.6.6.1** All ships and submarines shall have physical conditioning equipment adequate to provide personnel with three, 30-minute exercise periods per week, based on an equipment availability of 112 hours per week. Physical conditioning equipment should permit aerobic, flexibility and strength training. Surface ships with 200 or more accommodations shall have a dedicated physical fitness facility. Other surface ships and submarines shall have fittings for mounting and using such equipment in either multipurpose spaces or other open spaces where its use will not interfere with other ship functions. Adequate space shall be provided for the stowage of all physical conditioning equipment.

**3.6.6.2** Library.

**3.6.6.2.1** Surface ships with fewer than 300 accommodations shall have as a minimum a central stowage for books, plus a bookshelf or locker in the wardroom lounge, CPO lounge and crew lounge or messroom.

**3.6.6.2.2** Surface ships with more than 300 accommodations shall have a separate library with shelving, tables and chairs.

**3.6.6.2.3** Book and magazine stowage for submarine officers, CPO and crew shall be provided within the constraints of available space.

**3.6.6.3** Religious Ministry.

**3.6.6.3.1** All ships and submarines shall have space sufficient to stow all gear required for the command religious program, including lockable space appropriate for the stowage of Eucharistic elements.

**3.6.6.3.2** All ships and submarines shall have sufficient space to conduct religious services. All ships with more than 1,000 accommodations shall have a separate space configured as a chapel with minimum seating capacity of 30 persons. All aircraft carrier chapels shall have a minimum seating capacity of 45 persons. Space configured as a chapel may be used for other activities compatible with its primary purpose.

**3.6.6.4** Audio Visual.

**3.6.6.4.1** In surface ships and submarines, a Shipboard Information, Training and Entertainment (SITE) System shall be provided that supports the mission of the Armed Forces Radio and Television Service (AFRTS). A closed circuit television cable system with distribution outlets shall be provided as a minimum, in cabins, lounges, and recreation spaces/areas. This system shall consist of internally/externally produced training and entertainment via video/audio tape players/recorders with two independently programmable closed circuit television channels for submarines, small combatants, mobile logistics support and amphibious ships and four independently programmable closed circuit television channels for all major combatants, aircraft carriers and battleships. External system interfaces include broadcast television via both demountable antenna and pierside cable television system (CATV). This system shall have a priority disable feature which secures it when the LMC general or other special alarm circuits are energized.

**3.6.6.4.2** A multi-channel audio distribution system shall be provided on all surface ships and submarines. various audio signals: Armed Forces Satellite Transmitted Radio Service (AFSTRS - small combatants, mobile logistics support, amphibious ships, major combatants, aircraft carriers, and

battleships only), FM radio, tape recorder, compact disc player, etc., shall be provided as a minimum in each cabin, stateroom, wardroom, messroom, berthing space, lounge, medical space, dental space, recreation space/area, barber shop, chapel, library and physical fitness facility. The signal output will be available in these areas on either television, FM radio receivers, amplified speakers, or personal headphone sets. This system shall have a priority disable feature which secures it when the ILC, general, or other special alarm circuits are energized.

### **3.7 Personal Services.**

#### **3.7.1 Barber Shop.**

**3.7.1.1** Surface ships with 100 or fewer accommodations and all submarines, shall have portable barber facilities and a designated locker for its stowage.

**3.7.1.2** Surface ships with 101-300 accommodations shall have a barber shop with one chair.

**3.7.1.3** In ships with over 300 total accommodations, an additional barber chair shall be provided for each 300 accommodation increment or fraction thereof.

**3.7.1.4** Submarine tenders shall be provided two additional barber chairs beyond that number required by ship's company accommodations, in order to provide barber service to ship's company of tended submarines.

**3.7.1.5** Ships which are eligible for assignment of female personnel shall have barbering facilities unique to female requirements incorporated into existing barber spaces.

**3.7.1.6** In aircraft carriers and large amphibious ships, a separate officer barber shop shall be provided.

#### **3.7.2 Post Office.**

**3.7.2.1** Surface Ships with fewer than 150 accommodations and all submarines shall be provided post office facilities and stowage space within the ships office.

**3.7.2.2** Surface ships with 150 or more accommodations shall be provided a separate post office with secure storage for mail and parcel post.

**3.7.2.3** Aircraft carriers and other surface ships whose normal duties require accommodation of mail and parcel

post for further transfer to other fleet units, shall be provided with adequate secure stowage for this purpose.

### **3.7.3 Ship Store.**

**3.7.3.1** All surface ships shall have a ship store or other sales outlet for items of personal necessity and hygiene, appropriate to the size of the ship.

**3.7.3.2** Surface ships with fewer than 300 accommodations shall provide, as a minimum, over-the-counter service. Walk-in facilities shall be provided on larger ships.

**3.7.3.3** In large ships (1000 or more accommodations), an appropriate mix of over-the-counter and walk-in facilities shall be provided, in order to control individual space size for security reasons.

**3.7.3.4** A snack bar, shall be provided on ships having greater than 500 accommodations, and shall be located in a high traffic area separate from messrooms but readily accessible to personnel.

**3.7.3.5** Appropriately sized areas, separate from messrooms, shall be provided to accommodate vending machine installations.

**3.7.3.6** Submarine design constraints preclude provision of ship store facilities.

### **3.7.4 Laundry.**

**3.7.4.1** All surface ships with 100 or fewer accommodations, shall be provided self-service facilities to include as a minimum, one 16 lb. capacity washer, one 16 lb. capacity dryer, 3 hand irons, and 3 ironing boards.

**3.7.4.2** Submarines shall be provided with self service laundry facilities on the basis of one 16 lb. capacity washer and one 16 lb. capacity dryer, per each 125 accommodations and at least one hand iron and one ironing board.

**3.7.4.3** Surface ships with more than 100 accommodations shall be provided laundry facilities capable of processing 24 pounds per week per accommodation. Facilities for finished work shall be adequate to handle 12 pounds per week per officer and CPO/SNCO accommodation, and 7 pounds per week per crew/troop accommodation. These capacities are based on satisfying the following requirements as a minimum, within a 96 hour (laundry operation) week:

**3.7.4.3.1** One change of work clothing, underwear, socks, and one towel per day, per accommodation.

**3.7.4.3.2** One change of berth linen per accommodation, and one change of officer and CPO messroom linen, per week.

**3.7.4.3.3** Finish press three work uniform shirts and trousers per officer and CPO/SNCO accommodation per week.

**3.7.4.3.4** Finish press one dress uniform shirt and trousers per crew/troop accommodation per week.

**3.7.4.3.5** Holding space shall be provided for receiving and stowing incoming and outgoing laundry for the foregoing requirements.

**3.7.4.4** Tenders and repair ships shall have laundry capacities capable of supplementing facilities of two tended ships in addition to the requirements of their own ship's company.

**3.7.4.5** In surface ships, ironing boards and iron stowage shall be provided in all crew/troop berthing spaces.

### **3.7.5 Dry Cleaning.**

**3.7.5.1** These criteria are applicable only to surface ships with a laundry capability, and are based upon a 96 hour laundry operation per week.

**3.7.5.2** Ships with more than 1500 accommodations shall have a dry cleaning equipment and press capability sufficient to clean and finish press one dress uniform per accommodation per month (4 pounds/accommodation/month).

**3.7.5.3** Surface ships without dry cleaning capability shall have, as a minimum, press capability sufficient to finish press one dress uniform per accommodation per month.

**3.7.5.4** Tenders and repair ships shall have a dry cleaning capability, in addition to that required for ship's company, to supplement facilities of two tended ships.

**3.7.5.5** All ships with dry cleaning capabilities shall have adequately vented stowage space for dry cleaning fluids.