



DEPARTMENT OF THE NAVY

NAVAL SEA SYSTEMS COMMAND  
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IN REPLY TO  
NAVSEAINST 9096.3D  
Ser 05P5/016  
16 August 2001

NAVSEA INSTRUCTION 9096.3D

From: Commander, Naval Sea Systems Command

Subj: WEIGHT AND MOMENT COMPENSATION AND LIMITING DRAFTS  
FOR NAVAL SURFACE SHIPS

Ref: (a) OPNAVINST 9096.1 of 12 Nov 85 (NOTAL)

Encl: (1) List of Naval Ships Showing Status for Weight and  
Moment Compensation and Limiting Drafts

1. Purpose. To provide the ship stability status and characteristics that form the basis for weight and moment compensation. To revise the current instruction, and update enclosure (1). Parenthesis and change symbol at the left or right margin indicates where text has been changed. (R)  
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2. Cancellation. NAVSEAINST 9096.3C of 14 October 1997. (R)

3. Weight and Moment Compensation. By reference (a) the Chief of Naval Operations (CNO) has directed that the Navy's ships will be kept within naval architectural limits to ensure that essential survivability features are maintained. For each ship class, the Naval Sea Systems Command (NAVSEA) is to keep track of the weight and stability status, limiting draft and other limitations including identification of weight and moment compensation necessary to adhere to the established limits. This requires that weight and moment compensation be obtained for alterations, allowance list changes, and other changes in loading, as found necessary by this Command to protect buoyancy and stability of naval ships. In enclosure (1), each ship is assigned a status which indicates the nature of compensation, if any, which is required for changes in weight and moment. For each ship the height of the center of gravity above bottom of keel (KG) corresponding to the greatest height within the class for the full load condition is also shown. (R)  
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4. Factors Which Determine Assignment of Status. Each naval ship is provided with sufficient stability and buoyancy to withstand the effects of certain hazards such as underwater damage, beam winds combined with rolling, heel while turning, lifting weights, and crowding of personnel. In addition, for certain types, protection of cargo deadweight, ability to land on a beach at specified drafts, structural strength, freeboard and dryness and speed requirements are considerations which enter into status assignment. The magnitude of the hazards and the extent to which naval ships can withstand such hazards vary with the ship type, size of ship, number of crew and passengers, and absence or presence of side protective systems for torpedo defense.



\* 0693-LD-100-8286 \*

a. Ability to Withstand Underwater Damage. In most cases, ability to withstand underwater damage is the governing factor in status assignment. Sufficient reserve buoyancy and initial stability are provided so that the ship will remain afloat without excessive heel after underwater damage (extent of flooding varies with ship type). Buoyancy after damage is affected by the ship form, bulkhead arrangement, weight of ship and loads. Stability after damage is affected by the ship form, bulkhead arrangement, extent of unsymmetrical flooding, loading and freeboard, and the vertical position of the center of gravity. As a guide against overloading, limiting draft marks are painted on the sides of the ship. To protect stability, liquid loading instructions are issued and, where applicable, limitations are placed on the vertical distribution of cargo and other loads. As the ship's actual drafts in the Full Load Condition approach the limiting drafts the ship is assigned a status requiring weight compensation for weight addition. Stability after assumed underwater damage for the ship type determines whether a ship is assigned a status requiring vertical moment compensation for moment changes.

b. Ability to Withstand Beam-Winds Combined with Rolling. For certain destroyer types, cruisers, and small auxiliaries, the ability of the intact ship to withstand beam winds combined with rolling may actually require more stability than that required to withstand underwater damage. The extent of stability margin a ship has with respect to this criterion is a factor in status assignment.

c. Landing Drafts, Structural Strength, Speed, Cargo Deadweight, Dryness, Side Protective Freeboard. A status requiring weight compensation is generally assigned to those types where it is important to avoid exceeding specified landing drafts, where structural strength or speed limits the full load displacement, where the cargo deadweight must be maintained (as on oilers) and to those large combatant types with layers of side protective tanks for torpedo defense.

##### 5. Stability and Buoyancy Margins

a. Damage stability and reserve buoyancy analyses are not exact because of the assumptions which have to be made regarding the extent of flooding and the loading of the ship prior to damage. In addition, the basic weight and vertical center of gravity determined from inclining experiments are subject to experimental error. Factors of safety are included in the analysis to account for these uncertainties. Thus, when a ship

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is assigned a status requiring weight and moment compensation, it does not mean that the next ton added high in the ship will cause the ship to capsize; however, the ship will be in a condition such that it is close to or exceeds stability criteria developed after years of experience. It does mean that insufficient buoyancy and stability margins exist to permit further weight and moment increases. It also means that accumulations are as serious as a single large increase.

b. It is not uncommon for ships of the same class having the same status to differ as to weight and stability. However, the stability and buoyancy margins with respect to the criteria which govern for the ship are approximately the same for all ships of the class. Differences in margins exist, but are not of sufficient magnitude to warrant a change in status.

c. Where damage stability is the governing factor in status assignment, intact stability will generally be well within limits and the reason for assignment of a status requiring moment compensation may not be readily apparent to the operating personnel. Consideration must be given to the damage stability requirements.

#### 6. Definition of Status, KG, and Limiting Drafts

a. The definitions for the status listings in enclosure (1) are:

(1) STATUS 1. An increase in weight and a rise of the ship's center of gravity are acceptable. Added weight and moment resulting from changes will not require any compensation unless the magnitude of the additions is so large as to make the ship approach stability limits.

(2) STATUS 2. Neither an increase in weight nor a rise of a ship's center of gravity can be accepted.

(3) STATUS 3. An increase in the ship's weight is acceptable, but a rise of the ship's center of gravity must be avoided.

(4) STATUS 4. A rise of the ship's center of gravity is acceptable, but increase in weight must be avoided. Compensation for added weight may be obtained by removal of an equal or greater weight at any level.

b. The column headed KG in enclosure (1) indicates the height of the ship's center of gravity above the bottom of the keel amidships. These values correspond to the greatest height within the class for the full load condition and have been rounded off to the nearest foot. They are intended for use in

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NAVSEAINST 9096.3D

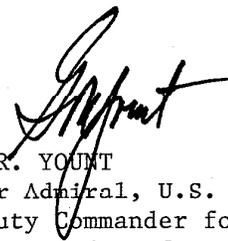
determining required moment compensation and should not be used for other purposes; specifically, these values should NOT be used as the Limiting KG.

c. The columns headed LIMITING DRAFTS in enclosure (1) indicate the maximum allowable drafts before damage at which the ship can still survive the expected damage, as explained in paragraph 4a above, or as necessary to meet the requirements in paragraph 4c above. These values have been rounded off to the nearest inch. In general, limiting drafts forward and aft correspond to reserve buoyancy limits. Amidships limiting drafts are generally for longitudinal strength limits. It is Navy practice not to base limiting drafts on ship speed considerations.

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7. Procedures to Maintain Weight Control. NAVSEA administers the weight and moment compensation program. Each approved ShipAlt or allowance list change indicates the magnitude of the weight and moment changes. Required compensation is dealt with in the Fleet Modernization Program authorization letter for regular overhauls (ROH), and in similar letters for restricted availabilities (RAV). In certain cases, where compensation is not available, but the item to be added has important military value, NAVSEA may authorize installation without compensation. Such a decision is reached after the CNO has been advised of the resultant reduction in the approved naval architectural characteristics. The NAVSEA Weight Control and Stability Division (SEA 05P5) shall determine when it becomes necessary to change the status of a class of ships. NAVSEA shall notify the Type Commanders and CNO when the status of a class of ships is changed; and will issue a revision to ship stability status via naval message annually.

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SHIP  (No. in Class)	STATUS	KG (feet)	LIMITING DRAFT (feet)		
			Forward	Amidships	Aft
LPD 4-6, 12, 13, 15 (6)	2	28	23'-0"		23'-0"
LPD 7-10 (4)	2	29	23'-0"		23'-0"
LPD 14 (1)	2	27	23'-0"		23'-0"
LSD 36, 37, 39 (3)	1	29	20'-0"		20'-0"
LSD 41-48 (8)	2	33	20'-9"	20'-2"	20'-7"
LSD 49-52 (4)	1	33	20'-4"	20'-9"	21'-0"
LST 1184 (1)	2	21	13'-9"	16'-2"	18'-7"
MCM 1-14 (14)	2	17	12'-9"		11'-11"
MCS 12 (1)	2	30	26'-6"		29'-6"
MHC 51-52, 55, 58-62 (8) <sup>1</sup>	1	4.8m	3.34m	3.26m	3.41m
MHC 53, 54, 56, 57 (4) <sup>1</sup>	4	4.8m	3.34m	3.26m	3.41m

NOTES: <sup>1</sup> These ships are reported in meters

**LIST OF NAVAL SURFACE SHIPS SHOWING STATUS FOR  
WEIGHT AND MOMENT COMPENSATION AND LIMITING DRAFTS**

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SHIP  (No. in Class)	STATUS	KG (feet)	LIMITING DRAFT (feet)		
			Forward	Amidships	Aft
AGF 3 (1)	3	30	22'-6"		22'-6"
AGF 11 (1)	3	29	23'-0"		23'-0"
AOE 1-4 (4)	1	33	41'-0"		41'-0"
AOE 6-8,10 (4)	1	34	40'-8"		40'-8"
ARS 50-53 (4)	3	20	17'-10"	17'-1"	17'-10"
AS 39-40 (2)	1	32	26'-5"	26"-5"	28'-5"
CG 47-73 (27)	2	23	23'-2"		23'-2"
CV 63-64 (2)	2	48	37'-10"		37'-10"
CVN 65 (1)	2	48	38'-5"		38'-5"
CV 67 (1)	2	48	36'-9"		36'-9"
CVN 68-75 (8)	2	47	40'-11"		40'-11"
DD 963-965, 967-969, 972, 973, 975, 977, 978, 982, 985, 987-989, 991,992 (18)	3	23	22'-5"		22'-5"
DD 997 (1)	2	23	23'-2"		23'-2"
DDG 51-71 (21)	1	25	22'-3"		22'-3"
DDG 72-78 (7)	1	25	23'-7"		23'-7"
DDG 79-81 (3)	1	25	23'-7"		23'-7"
FFG 8, 32-33, 36-37, 39-43, 45-61 (27)	2	19	16'-2"	16'-2"	16'-8"
FFG 9, 12-15, 28-29, 38 (8)	2	19	15'-8"	15'-8"	16'-4"
LCC 19-20 (2)	3	30	28'-0"		29'-0"
LHA 1-5 (5)	2	41	27'-0"		27'-0"
LHD 1-4 (4)	3	41	27'-6"		27'-6"
LHD 5-6 (2)	1	41	27'-6"		27'-6"

Enclosure (1)