No. : 1006

香 港 商 船 通 告

HONG KONG MERCHANT SHIPPING NOTICE

The Loading and Stability Assessment of Passenger Ships

To : Shipowners, Masters, Agents and Classification Societies

Summary

The purpose of this Notice is to specify the type of equipment, information and procedures which would be acceptable to the Marine Department in the implementation of regulations 9B to 9I in the Merchant Shipping (Safety) (Passenger Ship Construction) (Ships Built Before 1 September 1984) Regulations and the Merchant Shipping (Safety) (Passenger Ship Construction and Survey) (Ships Built On or After 1 September 1984) Regulations to ensure that passenger ships and particularly ro-ro passenger ships of Class I, II and IIA maintain adequate stability during loading operation and also that prior to departure their stability is determined in an appropriate manner and shown to be of a permissible standard.

1. The primary requirements of the regulations 9B to 9I in the Merchant Shipping (Safety) (Passenger Ship Construction) (Ships Built Before 1 September 1984) Regulations and the Merchant Shipping (Safety) (Passenger Ship Construction and Survey) (Ships Built On or After 1 September 1984) Regulations are to ensure that passenger ships and particularly ro-ro passenger ships of Class I, II and IIA maintain adequate stability during loading operations and also that prior to departure their stability is determined in an appropriate manner and shown to be of a permissible standard.

2. The purpose of this Notice is to specify in the Annexes the type of equipment, information and procedures which would be acceptable to the Department in the implementation of the Regulations. The subjects addressed in the Annexes are as follows :-

2.1 automatic draught gauge systems (Annex 1);

2.2 loading and stability computers (Annex 2);

2.3 guidance on the preparation of the calculation of the ship's condition of loading (Annex 3);

2.4 action to be taken if significant differences occur between the mean draught observed and that derived from stability calculations (Annex 4); and

2.5 the method of determining the vertical centres of gravity and vertical moments of ro-ro cargo (Annex 5).

Marine Department
Multi-lateral Policy Division

4 November 1999

Marine Department
Harbour Building
38 Pier Road
G.P.O. Box 4155
Hong Kong

Telephone No. : (852) 2852 3001
Fax No. : (852) 2544 9241
Telex No. : 64553 MARHQ HX
E-mail : hkmpd@mardep.gcn.gov.hk
Web site : http://www.info.gov.hk/mardep

附件 1
Annex 1

Regulation 9I

AUTOMATIC DRAUGHT GAUGE SYSTEMS

The type of equipment required to be provided under regulation 9I should conform to the following standards :

1. Construction and Positioning

1.1 An automatic draught gauge system should comprise at least four measuring units directly connected to digital display units at the loading control positions at each cargo door.

1.2 It should be constructed of materials suitable for the environment in which its component parts are to be fitted and should be arranged so as to accommodate fluctuations in the ship's electrical power or other associated services supplying the system when appropriate. The arrangements should ensure, as far as practicable, that its operation will be accurate and reliable.

1.3 The measuring units should be positioned to provide readings during loading and unloading, on the digital displays, corresponding to the forward and after draught marks and both the midships draughts and the vertical distance between the subdivision load line mark and the waterline on both sides of the ship near to amidships.

1.4 The system should be installed in a manner which reduces the risk of flooding. Moreover, where a sea inlet pipe is used in association with a measuring unit an isolating valve with local control must be fitted on or as close to the shell as is practicable. The units shall be fitted in accessible positions within the ship.

1.5 The measuring units should be designed to give measurements over the entire range of draughts and trims likely to be encountered and be sufficient for all service and operational requirements.

1.6 The measuring units should be placed in positions where the readings obtained will not be significantly affected by turbulence.

1.7 Arrangements should be provided whereby the accuracy of the measuring units can be confirmed by comparison with established datum marks fitted within the ship.

1.8 The system should include an arrangement whereby a visual warning signal is given if it becomes inoperative.

1.9 A continual read out of the draught and the vertical distances to the subdivision load line marks calculated from the measuring units must be provided in metres graduated in centimetres at the display units located at the loading control positions at each cargo door.

2. Performance

2.1 The automatic draught gauge system should be capable of functioning efficiently for a period of not less than 2 years without the need to place the ship in dry dock.

2.2 The system should be capable of providing steady readings continuously throughout the loading and unloading of the ship to an accuracy of one centimetre.

2.3 The system and the manner in which it is fitted must be to the satisfaction of the Director of Marine.

附件 2
Annex 2

Regulation 9F(3)

LOADING AND STABILITY COMPUTERS

If to satisfy the requirement of regulation 9F(3) an owner decides to use a loading and stability computer then it should conform to the following standards :

1. Construction and Positioning

1.1 The loading and stability computer should be an electronic device constructed in a manner which will give satisfactory service in the environment in which it is intended to be operated and any remote ancillary units must be similarly constructed.

1.2 The electrical components should be suitable for use in hazardous situations where applicable and be such that the computer is capable of storing information in the case of any electrical power failure.

1.3 When the computer is fitted on the ship it should be constructed in a manner which will accommodate satisfactorily fluctuations in the ship's electrical supply.

1.4 The computer should be located in a suitable position and have the capability of visual displays of the information generated at position(s) readily accessible to the master and the officer in charge of loading except that equivalent arrangements may be accepted. Provided that a shore-based computer system which complies with regulation 9F(3) may be accepted as an alternative to a computer fitted on the ship if the Director of Marine is satisfied that such a system is fully equivalent in all respects and that the arrangements made for the transmission of the input information to the computer and of the completed calculations to the ship are sufficient.

2. Performance

2.1 The program used in the computer should incorporate permanent information as to the relevant characteristics of the ship and all the information required by regulation 9C.

2.2 The computer program should be designed in such a way that it will enable the ship's personnel or, where appropriate, the person or persons appointed by the company which provides a shore-based computer service, to enter the weight and position of the components of the ship's deadweight expeditiously and with the necessary accuracy.

2.3 The computer program should provide for the display of the appropriate limiting value of the ship's vertical centre of gravity, or transverse metacentric height, as may be appropriate to the ship, for each stage in the entry of components of the deadweight. The limiting value so displayed must be that value adjusted for the draught or displacement of the ship and its trim.

2.4 The computer should be programmed to provide a clear visual warning if any of the limiting criteria for the safe loading of the ship are exceeded.

2.5 The computer program should provide for the monitoring of the stability of the ship during loading and unloading when required and must be capable of giving visual warning of inadequate stability or the risk of flooding through open shell doors during those operations.

2.6 The computer should provide a facility to predict the effects of loading any item of cargo on the ship's condition prior to its actual loading onto the ship and the effects of proposed transfer of liquids within the ship, or taking on or discharging such liquids.

2.7 Arrangements should be made for components of the calculations of the ship's loading condition to be shown on demand at the visual display positions provided in accordance with paragraph 1.4 of this Annex.

2.8 The computer should be arranged to provide a printed identifiable record of the calculations performed for each departure condition and any other loading condition which is more critical when required by the master.

2.9 The number of passengers carried must be entered on the record of loading.

2.10 The computer program should incorporate within the calculation system a simple check procedure which can be readily employed to show that the device or system incorporating the device is operating satisfactorily.

2.11 The loading and stability computer system and the manner in which it is constructed, fitted and located, must be to the satisfaction of the Director of Marine.

附件 3
Annex 3

Regulations 9F, 9G and 9H

GUIDANCE ON THE PREPARATION OF THE CALCULATION OF THE SHIP'S CONDITION OF LOADING

The primary aim of these particular regulations is to try to ensure that passenger ships always depart with sufficient stability to enable them to operate safely in adverse weather conditions or withstand the possible effects of any collision damage for which they have been designed. It therefore follows that the requirements of regulations 9F, 9G and 9H are of fundamental importance and need to be considered and applied by the master in conjunction with the Owner's designated person (regulation 9F(6) refers) in the case of ships of Class II and IIA who should be satisfied with the procedures being followed. In particular, they need to decide on the most effective means of making the required stability calculation (regulation 9F(3) refers). To reach such a decision, regard will need to be paid to the complexity of the ship's loading pattern, its margin of stability and the time which will be available to make the calculations.

Once the means of making the calculations has been decided, arrangements should then be made to ensure that the information listed in Section 1 below is readily available and that the procedures described in Section 2 are adopted. Finally, when loading has been completed, the master should be satisfied that the ship is not overloaded and has an adequate standard of stability before it departs on its voyage (regulation 9H refers).

1. The Loading Information Needed to Make the Calculation

The following information will be needed to calculate the ship's loaded condition:

1.1 the most up-to-date approved information as to the lightweight of the ship and the associated vertical and longitudinal centres of gravity;

1.2 the contents of all tanks in the ship. Moreover, the master must ensure that tanks are regularly sounded and that large void compartments and tanks which are assumed to empty are in fact empty by requiring frequent checks of such spaces;

1.3 the weight and vertical centre of gravity of the goods vehicles and units of cargo to be carried, such information to be determined as indicated in Annex 5;

1.4 with respect to the weights which should be allotted to the above mentioned vehicles it should be noted that the recommended practice of applying a 7 per cent uplift to declared weights of commercial vehicles should be used in the moment calculations for stability;

1.5 the weights of motor cars, to be taken as 1.25 tonnes in all cases;

1.6 the weights of coaches, excluding the weight of passengers, to be taken as:

(i) for 2 axle coaches...14 tonnes

(ii) for 3 axle coaches....19 tonnes

1.7 the number of passengers and their assumed weight and position;

1.8 the weight and assumed position of the crew and their baggage; and

1.9 the weight and assumed position of the stores on board.

2. Procedures to be Adopted when Calculating the Loading Condition of the Ship

2.1 the master or, where appropriate, the designated person responsible for the shore based computer system, should arrange for the information specified in sub-paragraphs 1.1-1.8 inclusive to be entered in the loading and stability computer or in the adopted method of calculating the ship's loading condition.

2.2 Unless the displacement and hydrostatic particulars of the ship in the level trim condition can be used without affecting significantly the accuracy of the subsequent calculations it will be necessary to derive such particulars from trimmed data.

2.3 The free surface effects of liquids in the ship's tanks should be calculated from the information entered in the computer or as otherwise provided, and taken either:

2.3.1 at the appropriate liquid level in the tanks; or alternatively

2.3.2 as the maximum value which can occur, in which case the maximum value shall be assumed both during the filling of the tank and whenever the tank is not completely filled.

2.4 To cater for late arrivals of cargo, the complete calculation sequence required by paragraphs 2.2, 2.6, and 2.7 should be capable of being completed rapidly.

2.5 Where a computer is fitted it should provide on demand a visual display or record of the progress of loading.

2.6 The computer or the adopted method of making the calculation of the loading condition should also provide for the rapid determination of the appropriate limiting value of the ship's vertical centre of gravity or transverse metacentric height, as may be appropriate to the ship. The limiting value is to be adjusted for the draught or displacement of the ship and its current trim by using the information provided in the approved Stability Information Book.

2.7 The calculation procedure should permit the master to predict the effect of loading any item(s) of cargo, the effects of proposed transfer of liquids within the ship, or the taking on or discharging of such liquids.

2.8 The computer or the adopted method of making the calculation of the loading condition should provide an identifiable record of the calculations performed for each departure condition.

2.9 The computer or the adopted method of making the calculation of the loading condition should be arranged to permit the entry of the readings of the draughts and the vertical distances from the waterline to the subdivision load line mark on each side of the ship. Using this information, the draught at the forward and after perpendiculars, the mean draught, the trim and the displacement at the draught and trim should be determined. [If the master has reason to believe that the automatic draught gauge system is not functioning correctly, visual readings or a practical alternative means of determining the draughts may be substituted if, in the conditions prevailing, the draughts can be measured with an accuracy of plus or minus two centimetres].

2.10 The comparison between the displacement and draught obtained from the calculation of the loading condition and the similar values derived in accordance with paragraph 2.9 should be made. A record should be made of any discrepancy between the values obtained by calculation and those obtained using the actual draught readings. The method of dealing with such a discrepancy is given in Annex 4 of this Notice.

附件 4
Annex 4

Regulations 9E and 9F

ACTION TO BE TAKEN IF SIGNIFICANT DIFFERENCES OCCUR BETWEEN THE DRAUGHTS OBSERVED AND THAT DERIVED CALCULATED FROM THE SHIP'S CONDITION OF LOADING

If the ship's mean draught as obtained under regulation 9E (by observed draughts) is shown to differ significantly from that calculated under the requirements of regulation 9F then the following action should be taken :

1. Observed draughts are those obtained either from the automatic draught gauge system or, where such a system is not fitted, from careful visual reading of the draught marks.

2. If there is a significant difference between the displacement determined using the observed draughts and that by calculation (ie by summation of known weights of the ship, its cargo and other items of dead-weight) the displacement derived from the observed draughts is paramount except where the master has reason to believe that the automatic draught gauge system is not functioning correctly. In such circumstances, visual readings or a practical alternative means of determining the draughts may be substituted if, in the conditions prevailing, the draughts can be measured with an accuracy of plus or minus 2 centimetres. In all cases, the displacement obtained should be corrected for density where appropriate. (A significant difference in displacement should be taken as that representing more than 2 centimetres difference in mean draught as calculated).

3. Where there is a significant difference between the calculated and observed mean draughts such that the displacement obtained by the calculated draughts gives a lesser displacement, then the discrepancy shall be treated as an additional increment of cargo weight. This additional increment of cargo weight shall then be assumed to be acting at the mean vertical centre of gravity position for the total cargo weight being carried before the addition of this increment.

If the calculated mean draught gives a greater displacement than that obtained from the observed draughts then the KG of the ship should be that obtained from the calculations of the loading condition but the displacement should be taken as that obtained from the observed draughts.

附件 5
Annex 5

Regulation 9F

METHOD OF DETERMINING THE VERTICAL CENTRES OF GRAVITY AND VERTICAL MOMENTS OF WEIGHT OF VEHICLES/CARGO IN THE MAIN VEHICLE SPACES

In order to perform the stability calculations required by regulation 9F the method of accounting for the vehicles and cargo carried in the main vehicle spaces should be determined using the information given in Sections 1 and 2 of this Annex :

1. The information in Section 1, relating to the vertical centres of gravity (vcgs) to be used for various categories of vehicles, was obtained from manufacturers and organisation associated with the vehicle industry.

2. The information in Section 2 indicates the various optional methods of calculating the vertical moment of vehicles and other cargo units carried in the vehicle spaces. There are four options, each of which will be fully acceptable, i.e.:

2.1 Option 1 which requires that the weights and vcgs of individual groups of vehicles of each category on each discrete part of the deck be entered separately in the calculation;

2.2 Options 2 and 3 which permit certain simplifying assumptions to be made; and

2.3 Option 4 which allows all the weights on a deck to be aggregated and a common (and highest) vcg to be used for the cargo on that deck.

3. It will be noted that Option 1 is the more accurate method whilst the simplifying assumptions in Options 2, 3 and 4 will result in the production of vcg(s) and vertical moment(s) which err on the side of safety.

SECTION 1

CATEGORIES OF VEHICULAR CARGO ON RO-RO PASSENGER FERRIES AND RESPECTIVE CENTRES OF GRAVITY ABOVE DECK

	vcg above deck
Category 1 Laden freight (lorries, road tankers, articulated lorries, drops, vans of 750 kgs payload and above)	1.9m
Category 2 Unladen freight (as above)	1.1m
Category 3 Motor cars (saloons, pickups, caravans, dormobiles, minibuses and vans below 750 kgs payload)	0.7m
Category 4 Coaches all types	1.5m
Category 5 Special freight (eg low loaders carrying machinery, steel carriers, cattle carriers). The vertical centre of gravity for such units to be determined by the master or his loading officer. Where no information is available, it is recommended that the vcg above deck is taken as being at half the maximum heights of the unit carried.	'x' m

SECTION 2

ACCEPTABLE METHODS OF CALCULATING THE VERTICAL CENTRES OF GRAVITY AND VERTICAL MOMENTS OF VEHICULAR CARGO

Option 1

This Option uses the weights of each individual category of vehicles on each part of the deck acting at a vcg above the keel:

$(H_1, H_2, H_3 \ldots H_n)$ + vcg of the individual category above the deck

then

the Total Vertical Moment (M_T) =

$= W_{c1}(H_1 + 1.9) + W_{c2}(H_1 + 1.1) + W_{c3}(H_1 + 0.7) + \ldots\ldots$

$+ W_{c5}(H_1 + x) + W_{c1}(H_2 + 1.9) + W_{c2}(H_2 + 1.1) + \ldots.$

$\ldots\ldots\ldots\ldots\ldots\ldots\ldots + W_{c5}(H_n + x).$

Option 2

Each Category of vehicle units is assumed distributed over the total cargo area A, acting at appropriate vcg's above the keel;

(H_a + vcg of the individual category above the deck)

then

the Total Vertical Moment (M_t) =
$= W_{c1}(H_a + 1.9) + W_{c2}(H_a + 1.1) + W_{c3}(H_a + 0.7) + W_{c4}(H_a + 1.5) + W_{c5}(H_a + x)$.

Option 3

This option may be used when the height of the deck varies and/or the 'tween deck height limits the categories of vehicles carried. The weight of cargo on any part of the deck is assumed to be proportional to the fraction of the total area of the deck represented by that part.

The weight on each part is assumed to act at the highest vcg (G_1, G_2 ....G_n) of any category of vehicles which can be carried on that part.

Therefore the vcgs of cargo above the keel on the parts of the deck are :

$(H_1 + G_1)$, $(H_2 + G_2)$, $(H_3 + G_3)$, ... $(H_n + G_n)$ respectively,

then

the Total Vertical Moment (M_T) =
$= W/A\ [A_1 (H_1 + G_1) + A_2 (H_2 + G_2) + ... + A_n (H_n + G_n).]$

Option 4

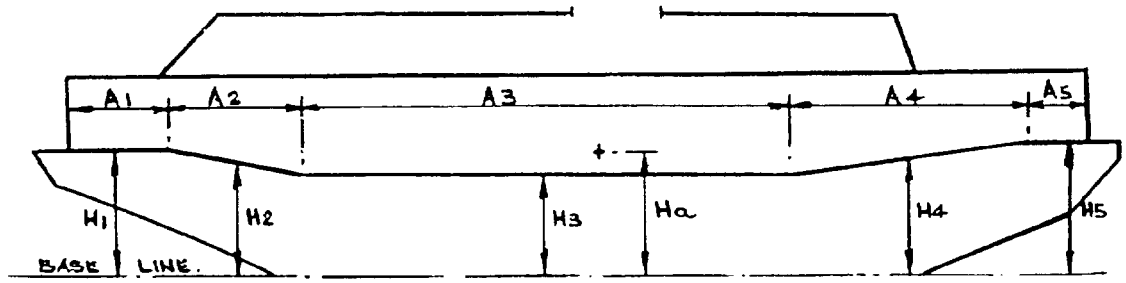
The total weight of cargo on the deck is assumed to act at the highest vcg of any of the categories of vehicles which can be carried. The vcg of cargo above the keel is therefore :

$H_a + G$

then

the Total Vertical Moment (M_T) = $W(H_a + G)$.

Definitions



A = Total cargo area of deck.
A_1, A_2, A_3 .....A_n = Part cargo deck area, longitudinally and/or transversely determined.
H_1, H_2, H_3 ..... H_n = Height of the centre of the part cargo deck area above base line.
H_a = mean height of deck above baseline as defined by :

$1/A\ [A_1H_1 + A_2H_2 + A_3 H_3 + ... + A_n H_n.]$

G = the greatest vcg value of any of the vehicle or cargo units which can be carried on deck.

$G_1, G_2, G_3 \ldots G_n$ = the greatest vcg of any of the vehicle or cargo units which can be carried on each area ($A_1, A_2, A_3 \ldots A_n$) of deck.

W = the total weight of vehicle units carried on deck.

$W_1, W_2, W_3 \ldots W_4$ = that portion of the total weight of vehicle units carried on individual areas ($A_1, A_2, A_3 \ldots A_n$) of deck and calculated as

W_1 = WA1/A, W2 = WA2/A, W3 = WA3/A, Wn = WAn/A.

W_{c1} = total weight of laden freight (excluding special freight).
W_{c2} = total weight of unladen freight (excluding special freight).
W_{c3} = total weight of motor cars.
W_{c4} = total weight of coaches.
W_{c5} = total weight of special freight.

and the vcg obtained from that shown in Section 1.