ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်အစိုးရ
ပို့ဆောင်ရေးနှင့်ဆက်သွယ်ရေးဝန်ကြီးဌာန
ရေကြောင်းပို့ဆောင်ရေးညွှန်ကြားမှုဦးစီးဌာန

ညွှန်ကြားချက်အမှတ် ၆ /၂၀၂၀

၁၃၈၂ ခုနှစ်၊ ပထမဝါဆိုလဆန်း ၅ ရက်

(၂၀၂၀ ပြည့်နှစ်၊ ဇွန်လ ၂၄ ရက်)

ပို့ဆောင်ရေးနှင့်ဆက်သွယ်ရေးဝန်ကြီးဌာန၊ ရေကြောင်းပို့ဆောင်ရေးညွှန်ကြားမှုဦးစီးဌာန သည် မြန်မာနိုင်ငံကုန်သည်သဘော်အက်ဥပဒေ ပုဒ်မ ၂၉၄-ခ ပုဒ်မခွဲ (ခ) အရ အပ်နှင်းထားသော လုပ်ပိုင်ခွင့်ကိုကျင့်သုံး၍ **"သဘော်တည်ငြိမ်မှု အချက်အလက်များဆိုင်ရာ ညွှန်ကြားချက်"** ကို ထုတ်ပြန်လိုက်သည်။

၁။ မြန်မာအလံလွှင့်ထူထားသည့် အပြည်ပြည်ဆိုင်ရာခရီးစဉ်သွား သဘော်များ၏ သဘော် ပိုင်ရှင်များ၊ အလံတင်နိုင်ငံ၏တိုင်းတာစစ်ဆေးရေးမှူးများနှင့် အသိအမှတ်ပြုအဖွဲ့အစည်းများ သည် ၁၉၇၄ ခုနှစ်၊ ပင်လယ်ပြင်၌ အသက်အန္တရာယ်ကင်းရှင်းရေးအတွက် အပြည်ပြည်ဆိုင်ရာ ကွန်ဗင်းရှင်း(SOLAS, 74)နှင့် ယင်း၏နောက်ဆက်တွဲများ (Protocols) ၏ အပိုင်း(ခ)၊ အခန်း ၂-၁၊ စည်းမျဉ်း ၅-၁ ပါ သဘော်တည်ငြိမ်မှုအတွက် ရေယာဉ်မှူးသို့ ပေးရမည့် အချက်အလက်များနှင့် စပ်လျဉ်းသည့် ပြဋ္ဌာန်းချက်များအရ ထုတ်ပြန်ထားသော နောက်ဆက်တွဲ(က)တွင် ဖော်ပြ ထားသည့် ဆုံးဖြတ်ချက် အမ်အက်စီ/ဆာကြူလာ-(၄၅၆)၊ နောက်ဆက်တွဲ (ခ) တွင် ဖော်ပြထား သည့် ဆုံးဖြတ်ချက် အမ်အက်စီ/ ဆာကြူလာ-(၇၀၆) နှင့် နောက်ဆက်တွဲ (ဂ)တွင် ဖော်ပြ ထားသည့် ဆုံးဖြတ်ချက် အမ်အက်စီ.၁/ဆာကြူလာ-(၁၂၅၈) တို့ပါ အချက်အလက်များအား လိုက်နာကျင့်သုံးရမည်။

၂။ ရေကြောင်းပို့ဆောင်ရေးညွှန်ကြားမှုဦးစီးဌာန၏ ၂၀၁၆ ခုနှစ်၊ ဒီဇင်ဘာလ ၃၀ ရက်နေ့ ရက်စွဲပါ ညွှန်ကြားချက်(၂၄/၂၀၁၆) ကို ဤညွှန်ကြားချက်ဖြင့် လွှမ်းမိုးပယ်ဖျက်လိုက်သည်။

24/6/20

စိုးနိုင်

ညွှန်ကြားရေးမှူးချုပ် (ပူးတွဲတာဝန်)

စာအမှတ်၊ ရည်ရွယ်/ညွှန်ကြားချက်/ ၀၆၂၇

ရက်စွဲ၊ ၂၀၂၀ ပြည့်နှစ်၊ ဇွန်လ ၂၄ ရက်

ဖြန့်ဝေခြင်း

မြန်မာ့ကြယ်ငါးပွင့်သင်္ဘောလုပ်ငန်းကုမ္ပဏီလိမိတက်

နိုင်ငံခြားသွားသင်္ဘောပိုင်ရှင်များအသင်း

ကမ်းရိုးတန်းသွားရေယာဉ်ပိုင်ရှင်များအသင်း

ညွှန်ကြားရေးမှူးချုပ်
ပုံနှိပ်ရေးနှင့်ထုတ်ဝေရေးဦးစီးဌာန } ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်ပြန်တမ်း အပိုင်း(၁)တွင် ထည့်သွင်းကြေညာ ပေးပါရန် မေတ္တာရပ်ခံချက်ဖြင့် ပေးပို့ပါသည်။

မိတ္တူကို

- ပို့ဆောင်ရေးနှင့်ဆက်သွယ်ရေးဝန်ကြီးဌာန၊
- ပြည်ထောင်စုရှေ့နေချုပ်ရုံး၊
- ရုံးလက်ခံ။

The Republic of the Union of Myanmar

Ministry of Transport and Communications

Department of Marine Administration

Directive No. 6/ 2020

The 5th Waxing Day of First Waso, 1382 M.E.

(24th June, 2020)

The Department of Marine Administration (DMA) issues this directive relating to **"Stability Information to be supplied to Master"** in the exercise of the power conferred by sub-section (b) of section 294-(B) of Myanmar Merchant Shipping Act-

1. Shipowners of Myanmar flagged ships engaged on international voyage, flag State surveyors and Recognized Organizations shall comply with the information prescribed in stability information to be supplied to master adopted by Resolution MSC/Circ.456 prescribed in Annex (A), Resolution MSC/Circ.706 prescribed in Annex (B) and Resolution MSC.1/Circ.1228 prescribed in Annex (C) of the International Maritime Organization(IMO) to apply the provisions relating to Part B of Chapter II-1, Regulation 5-1 of the International Convention for the Safety of Life at Sea, 1974 (SOLAS 74) and its protocols.

2. Directive (24/2016) issued by DMA on 30th December 2016 is repealed.

24/6/20

Director General (Acting)

Department of Marine Administration

Annex (A)

နောက်ဆက်တွဲ (က)

MSC/Circular. 456

Guidelines for the Preparation of Intact Stability Information

(adopted on 13 October 1986)

MSC/Circular.456 - Guidelines for the Preparation of Intact Stability Information - (adopted on 13 October 1986)

GUIDELINES FOR THE PREPARATION OF INTACT STABILITY INFORMATION

1 The Maritime Safety Committee at its fifty-third session, adopted Guidelines for the preparation of intact stability information for the master which are set out in the annex.

2 Member Governments are invited to ensure their widespread circulation and in particular to:

.1 utilize these guidelines to decide the extent of intact stability information necessary and appropriate to the type of ship and mode of operation;

.2 encourage designers and owners to use these guidelines in the preparation of all necessary documentation for the proper operation of the ship;

.3 encourage designers to provide a simplified but meaningful summary of the intact stability information, derived from data collected under the preceding paragraph to assist the master in the routine operation of his ship and to provide him with the means of evaluating the stability of his ship in other conditions;

.4 acknowledge the availability of electronic aids and their use in the more complicated operating conditions as a supplement to the information otherwise provided.

ANNEX

GUIDELINES FOR THE PREPARATION OF INTACT STABILITY INFORMATION

1 INTRODUCTION

Intact stability information covering the general operation of the ship is required for most ships by regulation II-1/22 of the International Convention for the Safety of Life at Sea, 1974, as amended, and by regulation 10 of the International Convention on Load Lines, 1966. Additional specific intact stability information is recommended by other international instruments. The following guidelines are offered to assist Administrations, ship designers, ship owners, masters and all others concerned with the proper design, construction and operation of ships to decide the proper extent of stability information required and necessary.

2 CATEGORIES OF INFORMATION

Information included in a stability document should be classified as follows:

2.1 Category 1A

Information which includes all basic data necessary to obtain the trim and stability characteristics of the ship. It may be necessary however to supplement this information to meet current requirements of the Administration concerned.

2.2 Category 1B

Optional information which is deemed by owners to be useful material appropriate to the operation of the ship.

2.3 Category 2

Information which provides the master with ready means of ensuring that the ship's stability parameters for a given service and condition of loading lie within the limits

dictated by the Administration. Included also in this category is information which will enable the master by using data provided under category 1 to obtain further information as may be required by the Administration or by himself for the proper working of the ship. Information within this category may be simplified if in the opinion of the Administration, or government recognized organization, the ship is not critical in terms of the required stability criteria within the range and type of loading conditions and for the service intended.

3 GENERAL

3.1 An index of contents should precede all information in the document.

3.2 The pages of the stability document should be numbered to facilitate access to data in association with the index of contents and appropriate reference.

3.3 Units of measurement should be consistent throughout the stability document. The main units of measurement may however be transposed to other units for reference purposes provided this does not conflict with consistent use of the data provided. All units of measurement should be clearly and unambiguously stated.

3.4 Computations which support the data included under categories 1 and 2 should not be included in the stability document.

3.5 The accuracy and correctness of the information included in the document under category 1B should be the responsibility of the owners.

3.6 Information provided under different categories need not be physically separated within the document, however, any information provided under category 1B should be clearly identified.

3.7 Longitudinal, vertical and transverse centres of mass, volume, buoyancy and flotation should be given relative to common reference planes.

3.8 A description of each category should be included in the stability document. (see section 2)

4 CATEGORY 1A

Information under this category should include the following:

4.1 General information

.1 ship's name;

.2 type of ship (e.g. general cargo ship, container ship, oil tanker etc.);

.3 name of builders and yard number;

.4 date of build/conversion;

.5 particulars of classification;

.6 nationality, port of registry and official number;

.7 principal dimensions (length, breadth and depth);

.8 maximum mean permissible draught corresponding to the summer freeboard assigned;

.9 maximum mean permissible draught corresponding to the summer timber freeboard (if appropriate);

.10 displacement in salt water (at stated density) corresponding to .8 and .9 at the designed trim;

.11 the minimum recommended draught at the forward perpendicular for any sailing condition.

4.2 Arrangement drawing

A scaled drawing showing clearly the use and distribution of the various cargo compartments, tanks, stores as well as machinery, crew and passenger accommodation spaces. Names of compartments used in the text of the document should be clearly indicated.

4.3 Weights and centres of mass

Estimated total weight and centre of mass of items such as:

.1 passengers and their effects;

.2 crew and their effects;

.3 vehicles in the case of car ferries;

.4 deck cargoes;

.5 hanging loads;

.6 container cargoes.

In the case of ships intended for the carriage of containers, a container stowage plan should be included using a numbering system to enable the weight and centre of every container on board to be obtained. The maximum and minimum (unloaden) weight of all containers should be given. Where necessary, guidance should be given as to the methods used in assessing weights and centres of mass.

4.4 Volumes and centres of volume

A table of capacities with centres of volume (longitudinal, vertical and transverse) for every compartment available for the carriage of cargo, fuel, stores, feed water, domestic water and water ballast. Where applicable, tables or curves giving capacity and centre of volume as functions of compartment depth or ullage should be included. When ullage is used, the ullage reference point should be stated.

4.5 Free surface effects

Tables and/or curves for every tank as a function of volume showing the effect on the stability of the ship of liquids in partially filled tanks. These tables/curves should give the free surface moments necessary to correct the initial metacentric height and those to correct the righting lever values when the ship is inclined.

4.5.1 In the case of tanks containing liquids which may be consumed, discharged or transferred to and from other compartments whiles the ship is at sea, including anti-rolling tanks and/or heeling tanks, the maximum free surface moments which may be developed should be given. For the purpose of correcting the initial metacentric height, the data provided for such tanks should be a function of the maximum attainable second moment of liquid surface area about the principal axis of rotation parallel to the centerline of the ship when not inclined. Corresponding data for correcting the righting lever values may be computed using the method described in section 3 of appendix I to resolution A.167(ES.IV). This method provides a means for calculating the maximum free surface moments of tanks which are approximately trapezoidal in cross-section. In the case of

irregularly shaped tanks such free surface moments should be obtained independently by direct calculation.

4.5.2 When holds or deep tanks containing liquids are maintained partially filled whilst the ship is at sea, the free surface moments used may be based upon the actual quantity of fluid contained. If due to the service of the ship different amounts of liquids are carried, the free surface moments for such a space may be calibrated against volume and depth of filling. Alternatively, the method described in 4.5.1 may be used.

4.5.3 Where it can be shown that by using methods which do not correctly obtain the free surface moments for a particular space but which nevertheless show the ship's critical stability parameters to be more onerous than they are in practice, such methods may be used subject to agreement by the Administration.

4.6 Lightship particulars and rolling coefficient

Details resulting from the inclining experiment as follows:

.1 lightship weight;

.2 longitudinal centre of gravity of lightship;

.3 vertical centre of gravity of lightship;

.4 transverse centre of gravity of lightship if necessary;

.5 place at and date on which inclining experiment was conducted;

.6 name of organization responsible for the approval of results obtained during the inclining experiment.

The position of the reference planes should be stated for items specified in .2, .3 and .4. If dispensation from carrying out an inclining experiment has been given, the name of the authority and the reasons should be stated. If details of the lightship have been based on a sister ship, the builder and builders number of the sister ship should be stated together with items specified in .1 to .6. In such a case details corresponding to .1, .2, .4, .5 and .6 which apply to the lightship check should be given. If differences in values of items specified in .1 to .4 from the sister ship have been used and there are known reasons, these should be stated together with a summary showing how the adopted values have arisen. If permanent ballast is included in the lightship particulars, a description of such ballast should be included giving the material, its mass and distribution relative to the common reference planes. A sketch showing the distribution of such ballast should be included. If a rolling period test is required by the Administration, details of the result should be given.

4.7 Hydrostatic particulars

Hydrostatic particulars of the ship at the designed trim drawn in curves or tabulated to a base of mean draught measured to the bottom of the keel over a range covering the lightship and maximum draughts. When tabulated, these should correspond to evenly-spaced rounded units of draught at intervals appropriate to the size and type of ship. If the hydrostatic particulars are presented in the form of curves their scales and accuracy should be to the satisfaction of the Administration or government recognized organization. The particulars should include:

.1 extreme displacement in salt water at stated density;

.2 immersion (displacement per unit interval of draught);

.3 moment to change trim one unit;

.4 transverse metacentric height;

.5 longitudinal metacentric height;

.6 vertical centre of buoyancy;

.7 longitudinal centre of floatation;

.8 longitudinal centre of buoyancy.

Position of reference planes should be stated in the case of items specified in .4 to .8. Where operation of the ship results in loading conditions having significant trim, additional hydrostatic particulars should be included for a suitable range of trim.

4.8 Deadweight particulars and details of draught marks

If required by the Administration, a diagram or tabular presentation giving the relationships between:

.1 mean draught;

.2 extreme displacement;

.3 immersion (displacement per unit interval of draught);

.4 deadweight.

If desired, in lieu of the above, the deadweight information may be included in the hydrostatic particulars. If required, the positions of the draught marks should be defined in relation to the ship's perpendiculars.

4.9 Form stability particulars

Form stability data at the designed trim showing the relationship between righting lever, angle of heel and displacement drawn in curves or tabulated. The data should cover the full range of displacement extending from light to maximum draughts with a range of inclination appropriate to the type of ship and stability criteria adopted. If the data is given in the form of curves, the scale and accuracy should be to the satisfaction of the Administration or government recognized organization. Intervals of displacement and righting lever when tabulated and angles of inclination should be sufficient to meet the accuracy demanded by the stability criteria. Below 500 the intervals of inclination should not exceed 100 , however, closer spacing may be required according to the ship form and proportions, also to the stability criteria adopted. A statement should be appended to the data indicating the erections and/or timber deck loads which are included. Where the operating trim or the form and arrangement of the ship are such that change in trim has an appreciable effect on righting arms, additional form stability data should be included for a suitable range of trim.

5. CATEGORY 2

Information under this category should include the following:

5.1 Stability criteria

Full details of the stability criteria appropriate to the ship under all anticipated conditions of service should be clearly stated in text supplemented, as necessary, by diagrams using the nomenclature adopted for the data given in category 1. Where requirements for wind

and/or wave forces and ice accretion are specified by the Administration, full details should be given.

5.2 Details relating to the assigned load line

.1 a statement giving the type of load line assigned (type A, B, etc);

.2 the displacement of the ship on the summer load waterline at the designed trim in water at a density of 1.025 metric tons per cubic metre;

.3 the maximum permissible draught at the forward perpendicular if necessary for bow height consideration;

.4 the minimum permissible freeboard at the stern if required by Administration;

.5 a diagram of the load line marks showing:

.5.1 the position of the deck line relative to the ship;

.5.2 the draught to the summer load waterline;

.5.3 the draught to the summer timber load waterline if appropriate);

.5.4 the corresponding freeboards.

5.3 Critical stability data

A pre-calculated table and/or diagram from which the master can determine if the stability of the ship is acceptable for a given loading condition under the governing stability criteria. This information should show, for example, the maximum allowable height of the loaded ship's centre of gravity or the maximum allowable static (displacement or deadweight) moment about the bottom of keel as a function of draught or displacement. The form of the data and the parameters used should be to the satisfaction of the Administration taking into account the stability criteria adopted, the ship type and the service intended. The data should extend from the lightest anticipated sea-going draught to the minimum freeboard assigned. If two or more independent governing stability parameters or conditions of service are included in the stability criteria the information should provide for any combination. Where the operating trim or the form and arrangement of the ship are such that a change in trim has an appreciable effect on righting arms additional pre-calculated tables/diagrams should be included for a suitable range of trim.

5.4 Conditions of loading

Conditions of loading appropriate to the operation of the ship should be included showing the practical limits of service for which the ship is intended and to demonstrate the stability characteristics in relation to the specified stability criteria. The following conditions of loading should also be included unless they are clearly inappropriate:

.1 light condition;

.2 docking condition;

.3 the conditions of loading stipulated in section 1 of appendix II to resolution A.167(ES.IV);

.4 departure and arrival conditions of loading for which the ship has been specially designed (e.g. alternate hold loading, timber deck cargoes, containers on deck etc.). Where icing is likely to occur the loading conditions should take this into account.

5.4.1 Each condition of loading should include:

.1 a sketch of the ship indicating, pictorially, the main items of deadweight included in the displacement.

.2 a table showing the lightship particulars, the distribution of all components of the deadweight, the positions of their centres relative to the defined reference planes, corresponding static moments and a summation giving the result. The result should show the full weight of displacement and the position of its centre.

.3 a table listing the free surface effects of liquids in all compartments which may be partly filled.

.4 a diagram showing the curve of righting levers (GZ) plotted against angle of inclination. The righting levers are to be corrected for free surface effects (see .3). Wind and/or other heeling lever curves are to be superimposed on the diagram as appropriate and it should be demonstrated that all the stability criteria have been met. The scales used in this diagram should be the same for each loading condition.

.5 a summary of the appropriate condition giving:

.5.1 displacement;

.5.2 corresponding designed trim draught at longitudinal centre of floatation;

.5.3 moment to change trim one unit;

.5.4 longitudinal position of centre of buoyancy;

.5.5 longitudinal position of centre of gravity;

.5.6 trimming lever;

.5.7 total trim over perpendiculars;

.5.8 longitudinal position of centre of floatation;

.5.9 trim at forward perpendicular;

.5.10 trim at after perpendicular;

.5.11 draught at forward perpendicular;

.5.12 draught at after perpendicular;

.5.13 draught at the forward draught mark (if required);

.5.14 draught at the after draught mark (if required);

.5.15 mean draught amidships;

.5.16 the total free surface moment for initial stability;

.5.17 the vertical position of the transverse metacentre;

.5.18 the vertical position of the ship's centre of gravity uncorrected and corrected for free surface effects;

.5.19 the transverse metacentric height (GM) uncorrected and corrected for free surface effects;

.5.20 a statement giving the limiting value or values of stability parameters taken from the data provided under

5.1 together with corresponding values achieved.

5.2 Master's instructions

Instructions to the master in the use of the data provided under category 1 to obtain the draught, trim and stability characteristics appropriate to a loading condition meeting the requirements of 5.1 and the draught limitations in 5.2. These instructions should refer to numerical examples which may be drawn-up specifically for the purpose or to conditions of loading provided under 5.4. The instructions are to be precise and unambiguous. Sources of data within the document and other information should be clearly identified. Specific instructions should be given with regard to the following items;

.1 calculations of displacement and centres of gravity;

.2 calculation of draughts and trim;

.3 correct use of the data provided under 4.5 in obtaining free surface moment data for a given loading condition;

.4 lifting of form stability data from the information provided under 4.9 and correction to that data to account for the position of the ship's vertical centre of gravity (see .1) and for free surface effects (see .3);

.5 calculation of initial stability parameter (GM) corrected for the initial free surface effect (see .3);

.6 calculation of the ship's vertical centre of gravity corrected for the initial free surface effect (see .3);

.7 construction of righting lever (GZ) curves;

.8 construction of a heeling lever curve (as appropriate) relative to and on the same diagram as the righting lever (GZ) curve;

.9 evaluation of the GZ curve (also the heeling lever curve if appropriate) in relation to the specified stability criteria;

.10 evaluation of stability parameters, if appropriate, in relation to assumed wind and/or wave forces;

.11 where ballasting during a voyage is necessary, the master should be provided with guidance to ensure the stability of the ship;

.12 the correct operation of anti-rolling devices and/or heeling tanks and limitations on their use;

.13 use of the data provided under 5.3;

.14 use of any other data provided under category 1A which is required by the Administration to be included as necessary information in evaluating the stability of the ship;

.15 if information is provided under category 1B, instructions should be given as to its use if appropriate.

6 ADDENDUM

Use of computers in assessing the stability of a loading condition. If a computer is provided for calculating stability parameters it should be regarded, unless deemed otherwise by the Administration, as an aid to the master. It should not replace approved documentation.

Annex (B)

နောက်ဆက်တွဲ (ခ)

MSC/Circ.706

GUIDELINES ON INTACT STABILITY OF EXISTING TANKERS DURING LIQUID TRANSFER OPERATIONS

INTERNATIONAL MARITIME ORGANIZATION

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IMO

MSC/Circ.706
MEPC/Circ.304
3 October 1995

Ref. T1/2.04

GUIDANCE ON INTACT STABILITY OF EXISTING TANKERS DURING LIQUID TRANSFER OPERATIONS

1 The Maritime Safety Committee (MSC) and the Marine Environment Protection Committee (MEPC), noting concerns expressed regarding stability problems in the operation of existing tankers having cargo and/or ballast tanks without subdivision by longitudinal bulkheads, instructed the Sub-Committee on Stability and Load Lines and on Fishing Vessels Safety (SLF) to develop guidance for the master to enable liquid transfer operations and tank cleaning operations to be carried out safely.

2 The MSC, at its sixty-fifth session (9 to 17 May 1995) and the MEPC, at its thirty-seventh session (11 to 15 September 1995), approved the Guidance on intact stability of existing tankers, given in the annex, for use by ship's personnel engaged in liquid transfer operations at sea and in port.

3 Member Governments are invited to bring this Guidance to the attention of all concerned and to implement its provisions at the earliest.

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ANNEX

GUIDANCE ON INTACT STABILITY OF EXISTING TANKERS DURING LIQUID TRANSFER OPERATIONS

1 Member Governments are advised that the intact stability of double hull tankers and other tanker designs, which are subject to significant free surface effect during liquid transfer operations including lightering operations and tank cleaning operations, require special consideration.

2 Mandatory requirements to address such difficulties for new ships are being considered by the Committees. Such requirements are unlikely to become mandatory before the year 1998.

3 It is recommended that owners and operators should:

.1 ensure that an oil tanker:

.1 in port, has the initial metacentric height GMo, corrected for free surface measured at 0° heel, not less than 0.15 m; and

.2 at sea, complies with the requirements specified in paragraphs 3.1.2.1 to 3.1.2.4 of the Intact Stability Code (resolution A.749(18)), the initial metacentric height GMo being corrected for free surface measured at 0° heel; and

.2 adopt appropriate operational methods, where necessary, for the oil tanker to comply with the above requirements.

4 Where operating methods are necessary, simple operating instructions which supplement existing stability information should be prepared for the master, including:

.1 the number of tanks which may be slack under all conditions of liquid transfer; and

.2 the tanks (cargo and ballast) which may be slack under any specific condition of liquid transfer, including possible ranges of cargo densities. The slack tanks may vary during the liquid transfer operations and be of any combination which satisfies the criteria.

5 In the context of this recommendation, simple operating instructions to the ship's operating personnel mean instructions which:

.1 are understandable to the officer-in-charge of transfer operations;

.2 provide for planned sequences of cargo/ballast transfer operations;

.3 allow comparisons of attained and required stability using stability performance criteria in graphical or tabular form;

.4 require no extensive mathematical calculations by the officer-in-charge;

.5 provide for corrective actions to be taken by the officer-in-charge in case of departure from recommended values and in case of emergency situations; and

.6 are prominently displayed in the approved trim and stability booklet and at the cargo/ballast transfer control station and in any computer software by which stability calculations are performed.

Annex (C)

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MSC.1/Circ.1228

REVISED GUIDANCE TO THE MASTER FOR AVOIDING DANGEROUS SITUATIONS IN ADVERSE WEATHER AND SEA CONDITIONS

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11 January 2007

REVISED GUIDANCE TO THE MASTER FOR AVOIDING DANGEROUS SITUATIONS IN ADVERSE WEATHER AND SEA CONDITIONS

1 The Maritime Safety Committee, at its eighty-second session (29 November to 8 December 2006), approved the Revised Guidance to the master for avoiding dangerous situations in adverse weather and sea conditions, set out in the annex, with a view to providing masters with a basis for decision making on ship handling in adverse weather and sea conditions, thus assisting them to avoid dangerous phenomena that they may encounter in such circumstances.

2 Member Governments are invited to bring the annexed Revised Guidance to the attention of interested parties as they deem appropriate.

3 This Revised Guidance supersedes the Guidance to the master for avoiding dangerous situations in following and quartering seas (MSC/Circ.707).

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ANNEX

REVISED GUIDANCE TO THE MASTER FOR AVOIDING DANGEROUS SITUATIONS IN ADVERSE WEATHER AND SEA CONDITIONS

1 GENERAL

1.1 Adverse weather conditions, for the purpose of the following guidelines, include wind induced waves or heavy swell. Some combinations of wave length and wave height under certain operation conditions may lead to dangerous situations for ships complying with the IS Code. However, description of adverse weather conditions below shall not preclude a ship master from taking reasonable action in less severe conditions if it appears necessary.

1.2 When sailing in adverse weather conditions, a ship is likely to encounter various kinds of dangerous phenomena, which may lead to capsizing or severe roll motions causing damage to cargo, equipment and persons on board. The sensitivity of a ship to dangerous phenomena will depend on the actual stability parameters, hull geometry, ship size and ship speed. This implies that the vulnerability to dangerous responses, including capsizing, and its probability of occurrence in a particular sea state may differ for each ship.

1.3 On ships which are equipped with an on-board computer for stability evaluations, and which use specially developed software which takes into account the main particulars, actual stability and dynamic characteristics of the individual ship in the real voyage conditions, such software should be approved by the Administration. Results derived from such calculations should only be regarded as a supporting tool during the decision making process.

1.4 Waves should be observed regularly. In particular, the wave period T_W should be measured by means of a stop watch as the time span between the generation of a foam patch by a breaking wave and its reappearance after passing the wave trough. The wave length λ is determined either by visual observation in comparison with the ship length or by reading the mean distance between successive wave crests on the radar images of waves.

1.5 The wave period and the wave length λ are related as follows:

$$\lambda = 1.56 \cdot T_W^2 \text{ [m] or } T_W = 0.8\sqrt{\lambda} \text{ [s]}$$

1.6 The period of encounter T_E could be either measured as the period of pitching by using stop watch or calculated by the formula:

$$T_E = \frac{3T_W^2}{3T_W + V\cos(\alpha)} \text{ [s]}$$

where V = ship's speed [knots]; and
α = angle between keel direction and wave direction ($\alpha = 0°$ means head sea)

1.7 The diagram in figure 1 may as well be used for the determination of the period of encounter.

1.8 The height of significant waves should also be estimated.

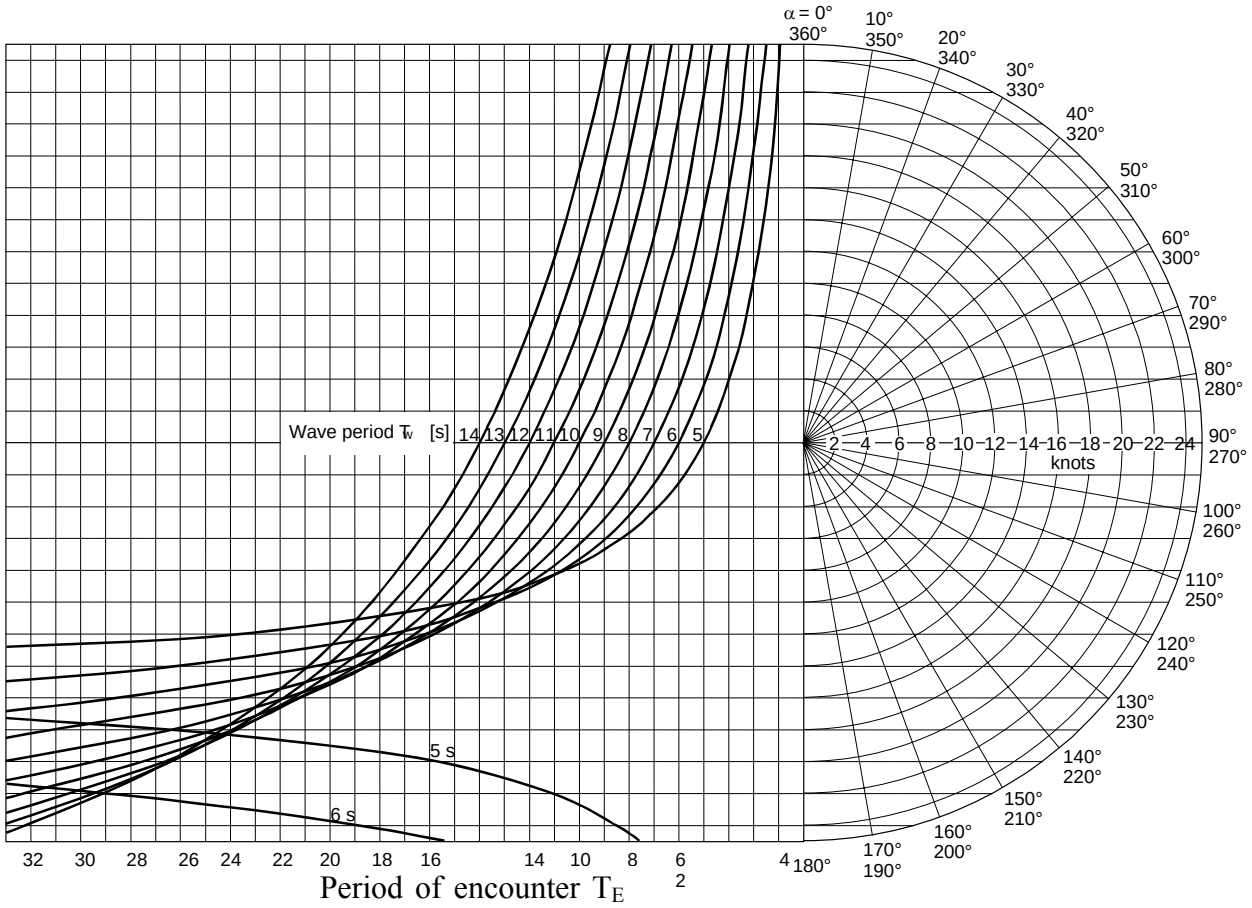

Figure 1: Determination of the period of encounter T_E

2 CAUTIONS

2.1 It should be noted that this guidance to the master has been designed to accommodate for all types of merchant ships. Therefore, being of a general nature, the guidance may be too restrictive for certain ships with more favourable dynamic properties, or too generous for certain other ships. A ship could be unsafe even outside the dangerous zones defined in this guidance if the stability of the ship is insufficient. Masters are requested to use this guidance with fair observation of the particular features of the ship and her behaviour in heavy weather.

2.2 It should further be noted that this guidance is restricted to hazards in adverse weather conditions that may cause capsizing of the vessel or heavy rolling with a risk of damage. Other hazards and risks in adverse weather conditions, like damage through slamming, longitudinal or torsional stresses, special effects of waves in shallow water or current, risk of collision or stranding, are not addressed in this guidance and must be additionally considered when deciding on an appropriate course and speed in adverse weather conditions.

2.3 The master should ascertain that his ship complies with the stability criteria specified in the IS Code or an equivalent thereto. Appropriate measures should be taken to assure the ship's watertight integrity. Securing of cargo and equipment should be re-checked. The ship's natural period of roll T_R should be estimated by observing roll motions in calm sea.

3 DANGEROUS PHENOMENA

3.1 Phenomena occurring in following and quartering seas

A ship sailing in following or stern quartering seas encounters the waves with a longer period than in beam, head or bow waves, and principal dangers caused in such situation are as follows:

3.1.1 Surf-riding and broaching-to

When a ship is situated on the steep forefront of a high wave in following or quartering sea conditions, the ship can be accelerated to ride on the wave. This is known as surf-riding. In this situation the so-called broaching-to phenomenon may occur, which endangers the ship to capsizing as a result of a sudden change of the ship's heading and unexpected large heeling.

3.1.2 Reduction of intact stability when riding a wave crest amidships

When a ship is riding on the wave crest, the intact stability can be decreased substantially according to changes of the submerged hull form. This stability reduction may become critical for wave lengths within the range of 0.6 L up to 2.3 L, where L is the ship's length in metres. Within this range the amount of stability reduction is nearly proportional to the wave height. This situation is particularly dangerous in following and quartering seas, because the duration of riding on the wave crest, which corresponds to the time interval of reduced stability, becomes longer.

3.2 Synchronous rolling motion

Large rolling motions may be excited when the natural rolling period of a ship coincides with the encounter wave period. In case of navigation in following and quartering seas this may happen when the transverse stability of the ship is marginal and therefore the natural roll period becomes longer.

3.3 Parametric roll motions

3.3.1 Parametric roll motions with large and dangerous roll amplitudes in waves are due to the variation of stability between the position on the wave crest and the position in the wave trough. Parametric rolling may occur in two different situations:

.1 The stability varies with an encounter period T_E that is about equal to the roll period T_R of the ship (encounter ratio 1:1). The stability attains a minimum once during each roll period. This situation is characterized by asymmetric rolling, i.e. the amplitude with the wave crest amidships is much greater than the amplitude to the other side. Due to the tendency of retarded up-righting from the large amplitude, the roll period T_R may adapt to the encounter period to a certain extent, so that this kind of parametric rolling may occur with a wide bandwidth of encounter periods. In quartering seas a transition to harmonic resonance may become noticeable.

.2 The stability varies with an encounter period T_E that is approximately equal to half the roll period T_R of the ship (encounter ratio 1:0.5). The stability attains a minimum twice during each roll period. In following or quartering seas, where the encounter period becomes larger than the wave period, this may only occur

with very large roll periods T_R, indicating a marginal intact stability. The result is symmetric rolling with large amplitudes, again with the tendency of adapting the ship response to the period of encounter due to reduction of stability on the wave crest. Parametric rolling with encounter ratio 1:0.5 may also occur in head and bow seas.

3.3.2 Other than in following or quartering seas, where the variation of stability is solely effected by the waves passing along the vessel, the frequently heavy heaving and/or pitching in head or bow seas may contribute to the magnitude of the stability variation, in particular due to the periodical immersion and emersion of the flared stern frames and bow flare of modern ships. This may lead to severe parametric roll motions even with small wave induced stability variations.

3.3.3 The ship's pitching and heaving periods usually equals the encounter period with the waves. How much the pitching motion contributes to the parametric roll motion depends on the timing (coupling) between the pitching and rolling motion.

3.4 Combination of various dangerous phenomena

The dynamic behaviour of a ship in following and quartering seas is very complex. Ship motion is three-dimensional and various detrimental factors or dangerous phenomena like additional heeling moments due to deck-edge submerging, water shipping and trapping on deck or cargo shift due to large roll motions may occur in combination with the above mentioned phenomena, simultaneously or consecutively. This may create extremely dangerous combinations, which may cause ship capsize.

4 OPERATIONAL GUIDANCE

The shipmaster is recommended to take the following procedures of ship handling to avoid the dangerous situations when navigating in severe weather conditions.

4.1 Ship condition

This guidance is applicable to all types of conventional ships navigating in rough seas, provided the stability criteria specified in resolution A.749(18), as amended by resolution MSC.75(69), are satisfied.

4.2 How to avoid dangerous conditions

4.2.1 For surf-riding and broaching-to

Surf-riding and broaching-to may occur when the angle of encounter is in the range $135° < \alpha < 225°$ and the ship speed is higher than $\left(1.8\sqrt{L}\right)\Big/\cos\left(180-\alpha\right)$ (knots). To avoid surf riding, and possible broaching the ship speed, the course or both should be taken outside the dangerous region reported in figure 2.

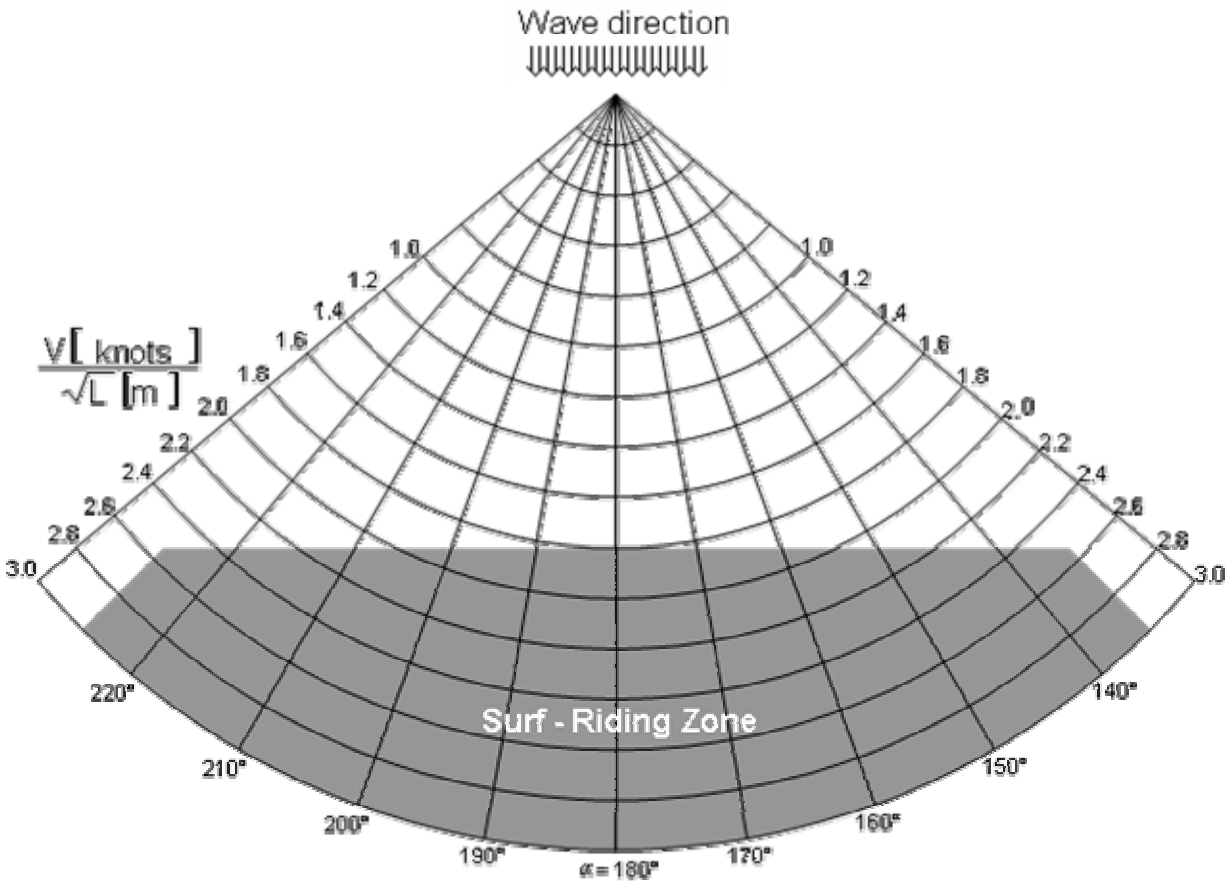

Figure 2: Risk of surf-riding in following or quartering seas

4.2.2 For successive high-wave attack

4.2.2.1 When the average wave length is larger than 0.8 L and the significant wave height is larger than 0.04 L, and at the same time some indices of dangerous behaviour of the ship can be clearly seen, the master should pay attention not to enter in the dangerous zone as indicated in figure 3. When the ship is situated in this dangerous zone, the ship speed should be reduced or the ship course should be changed to prevent successive attack of high waves, which could induce the danger due to the reduction of intact stability, synchronous rolling motions, parametric rolling motions or combination of various phenomena.

4.2.2.2 The dangerous zone indicated in figure 3 corresponds to such conditions for which the encounter wave period (T_E) is nearly equal to double (i.e., about 1.8-3.0 times) of the wave period (T_W) (according to figure 1 or paragraph 1.4).

4.2.3 For synchronous rolling and parametric rolling motions

4.2.3.1 The master should prevent a synchronous rolling motion which will occur when the encounter wave period T_E is nearly equal to the natural rolling period of ship T_R.

4.2.3.2 For avoiding parametric rolling in following, quartering, head, bow or beam seas the course and speed of the ship should be selected in a way to avoid conditions for which the encounter period is close to the ship roll period ($T_E \approx T_R$) or the encounter period is close to one half of the ship roll period ($T_E \approx 0.5 \cdot T_R$).

4.2.3.3 The period of encounter T_E may be determined from figure 1 by entering with the ship's speed in knots, the encounter angle α and the wave period T_W.

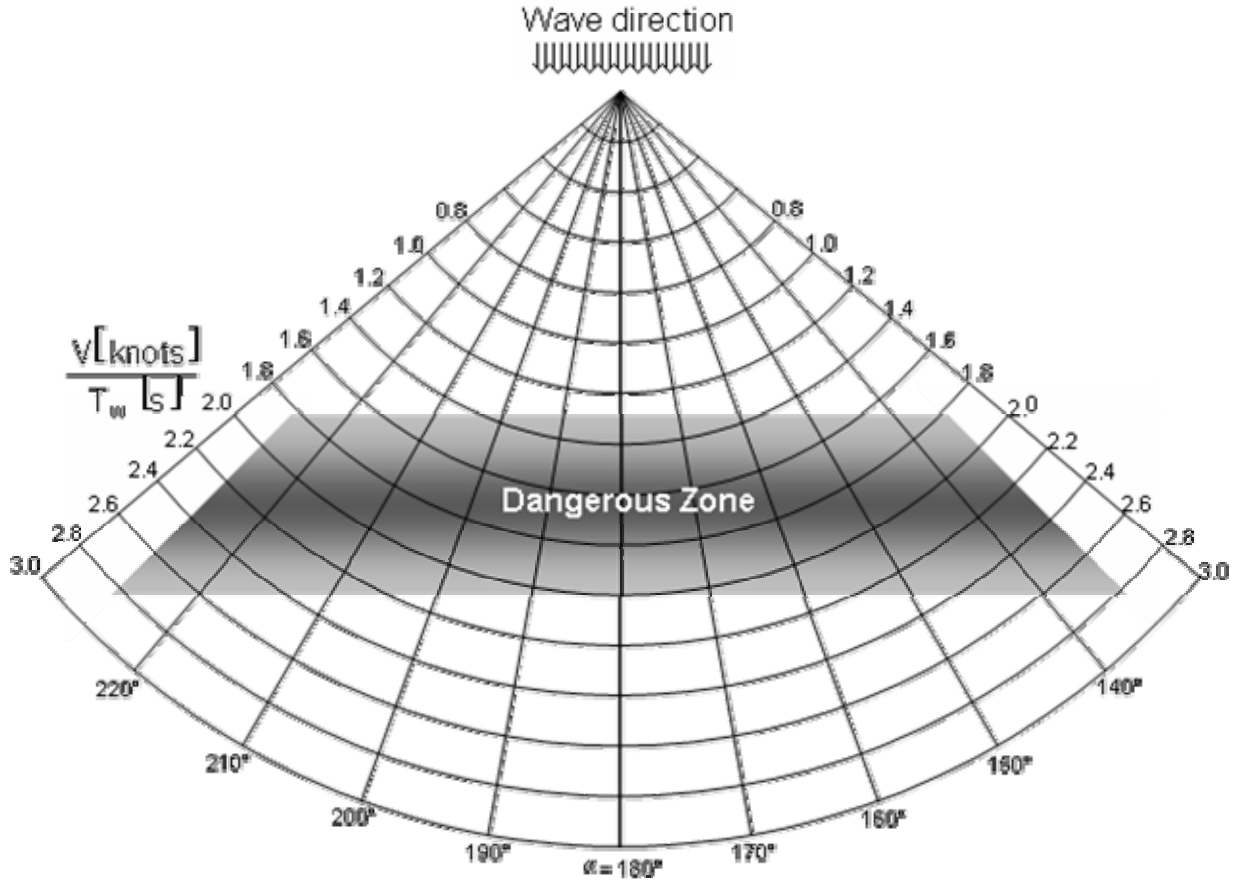

Figure 3: Risk of successive high wave attack in following and quartering seas

Abbreviations and symbols

Symbols	Explanation	Units
T_W	wave period	s
λ	wave length	m
T_E	encounter period with waves	s
α	angle of encounter (α = 0° in head sea, α = 90° for sea from starboard side)	degrees
V	ship's speed	knots
T_R	natural period of roll of ship	s
L	length of ship (between perpendiculars)	m