INTERNATIONAL MARITIME ORGANIZATION
4 ALBERT EMBANKMENT
LONDON SE1 7SR

Telephone: 0171-735 7611
Fax: 0171-587 3210
Telex: 23588 IMOLDN G

IMO

E

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INTERPRETATION OF REQUIREMENTS FOR APPLICATION OF HYDROSTATIC BALANCE LOADING IN CARGO TANKS (RESOLUTION MEPC.64(36))

1 The Marine Environment Protection Committee, at its forty-first session (30 March to 3 April 1998), noted that a large number of tankers of 25 years of age and over would potentially use the hydrostatic balance loading operational alternative which is permitted by MARPOL regulation I/13G(7), in order to continue to trade for another five years, and recognized that there was a need to develop a unified interpretation with the purpose of avoiding any potential problems which might arise with the hydrostatic balance loading.

2 Subsequently, the Committee, at its forty-second session (2 to 6 November 1998), having considered the recommendation made by the Sub-Committee on Bulk Liquids and Gases, at its third session, regarding IACS Unified Interpretation MPC 7 "Hydrostatic Balance Loading", agreed to circulate this Unified Interpretation to Member Governments, as set out in the annex, subject to the following clarifications:

.1 all ballast tanks should be assumed empty when calculating EOS1 and EOS2, whereas ballast water allocation may be considered when calculating EOS3; and

.2 it is understood that ballast water may be taken on board during the voyage in order to maintain the draughts necessary for compliance and to satisfy trim, stability, strength and other requirements.

3 At its forty-third session (28 June to 2 July 1999), the Committee approved an IACS proposal to make a number of minor corrections to the original interpretations.

4 As a result, this Circular includes these corrections and replaces MEPC/Circ.347. For ease of reference, the location of the amendments are marked in the right hand column with a vertical line. However, it should be noted that there is only one change to the text and one paragraph that has been moved causing certain paragraphs to be renumbered.

5 Member Governments are invited to use the annexed Interpretation together with the above clarifications when applying the provisions of the Guidelines for approval of alternative structural or operational arrangements, as called for in regulation 13G(7) of Annex I of MARPOL 73/78 (resolution MEPC.64(36)), to tankers of 25 years of age and over referred to in regulation 13G(4) of Annex I to MARPOL 73/78.

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ANNEX

IACS UNIFIED INTERPRETATION MPC 7 - HYDROSTATIC BALANCE LOADING

MPC 7 Hydrostatic Balance Loading
(May 1998)

(Annex I, Regulation 13 G(7) - Guidelines for approval of alternative structural or operational method, IMO resolution MEPC.64(36))

Damage and outflow criteria (as per 4 of the IMO Guidelines)

.1 The original configuration is the configuration of the vessel, as covered by the IOPP certificate and the current G.A. plan prior to the application of MARPOL Regulation 13G(7).

In the case of a product/crude oil carrier which operates alternatively with CBT when trading as product tanker or with COW when trading as a crude-oil tanker, the assessment in accordance with MEPC.64(36) should be done for each mode separately.

Calculation of base EOS number as per 4.1 of the IMO Guidelines (EOS1)

.2 When calculating first EOS number (EOS1) as defined in 4.1 of the Guidelines, the ship is assumed to be loaded at Summer Water Line with zero trim, without consumable or ballast.

.3 For the purpose of calculating EOS 1, the volume of the cargo being carried by the ship is 98% of the volume of cargo and fuel oil tanks within L_t as per the original configuration of the ship.
Refer to the annex.

.4 Nominal density of the cargo, ρ_c
The nominal density of the cargo to be used in the calculation of EOS1, EOS2 and EOS3 is given by the following formula:

$$r_c = \frac{\Delta\,(summer) - LSW}{V_{98\%\ \text{(original cargo and fuel oil tanks configuration within Lt)}}}$$

where:

Δ (summer): Displacement of the ship corresponding to the maximum assigned summer load line with zero trim.
LSW: Light ship weight.
$V_{98\%\ \text{(original cargo and fuel oil tanks configuration within Lt)}}$: 98% of the cargo and fuel oil tanks volume within L_t, in ship's original configuration.

Footnote: Written applications for evaluation of tanker arrangements under MEPC.64(36) received on or after 8 MAY 1998 will be evaluated in accordance with this unified interpretation unless advised otherwise by the flag Administration.

MPC 7 (cont'd) **Calculation of second EOS number for the ship arranged with non-cargo side tanks as referred to in regulation 13 G(4) as per 4.2 of the IMO Guidelines (EOS2)**

.5 For the purpose of calculations, in the second EOS number (EOS2), the tanker is assumed to have side protection only as referred to in paragraph 4.2 of MEPC.64(36).

.6 For the purpose of calculating EOS2, hypothetical side protection may be considered provided that the assumed positions of the longitudinal and transverse bulkheads provide at least the minimum side protection required by Reg.13G(4) and are placed in the locations which lead to the lowest EOS2.
For volumes and measurement of parameters, please refer to figure 1 below.

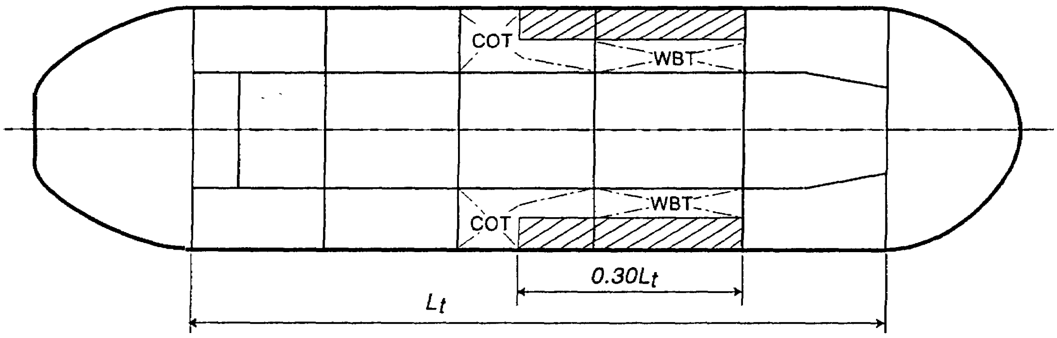

FIGURE 1

The remaining volumes of the tanks covered by hypothetical side protection are assumed to carry the same type of contents as before (i.e. water ballast tanks remain water ballast tanks and cargo oil tanks remain cargo oil tanks in remaining part).

The size of the remaining part of cargo oil and/or fuel oil tanks are as follows:

l_i: not modified.

b_i: reduced if hypothetical side protection is provided throughout the entire l_i. Not modified if hypothetical side protection is provided for partial l_i.

V_i: volume of cargo in the remaining cargo oil and/or fuel oil tanks.

.7 Draft and trim requirements of MARPOL, Annex I need not be taken into account for the purpose of calculating EOS2.

Refer to the annex.

MPC 7 .8 When calculating EOS2, the ship is assumed even keel at the draft of the loaded condition corresponding to the ship so arranged to comply with Reg. 13G(4) without any consumable nor ballast.
Refer to paragraph .6 and to the annex.

Calculation of third EOS number for hydrostatic balance method as per 4.3 of the IMO Guidelines (EOS3).

.9 For the purpose of calculating EOS3, the draft is that corresponding to the Hydrostatic Balance Loading (HBL) configuration. Ballast may be used to achieve an increased draft only in determining EOS3.

Filling levels in the tanks identified for HBL should be equal to the maximum level determined by the formula shown in the Appendix to the Guidelines using uniform nominal oil density and corresponding draft.
Refer to the annex.

Calculation of outflow in case of side damage as per 5.2 of the IMO Guidelines.

.10 Distance from the hull boundary to the tank plating, s_i :

s_i is the minimum distance from the hull plating to the tank boundary measured at right angle to the centreline and at the level corresponding to the maximum assigned summer load line.

.11 Cargo volume in tank number i, V_i :

The maximum volume of V_i is 98% of the volume of the tank.

Calculation of outflow in case of bottom damage as per 5.3 of the IMO Guidelines.

.12 Width of tank i, b_i :

- for tanks adjacent to the side shell, b_i is the width of the tank, measured inboard at $1_i/2$, at right angle to the centre line and at the level of the maximum assigned summer load line

- for a centre tank, b_i is the width of the tank bottom measured at $l_i/2$.

.13 Width of the cargo tank area, B_t:

B_t is the maximum breadth as defined by Annex I, Regulation 1(21) measured within L_t.

.14 Height of double bottom, h_i:

h_i is the minimum height of the double bottom measured from the baseline.

Refer to figures 2 and 3.

MPC7 (cont'd) .15 Height of the cargo column above the cargo tank bottom, h_c:

h_c is the height of the cargo column measured from the cargo tank bottom at the point where h_i is measured. Refer to figure 2.

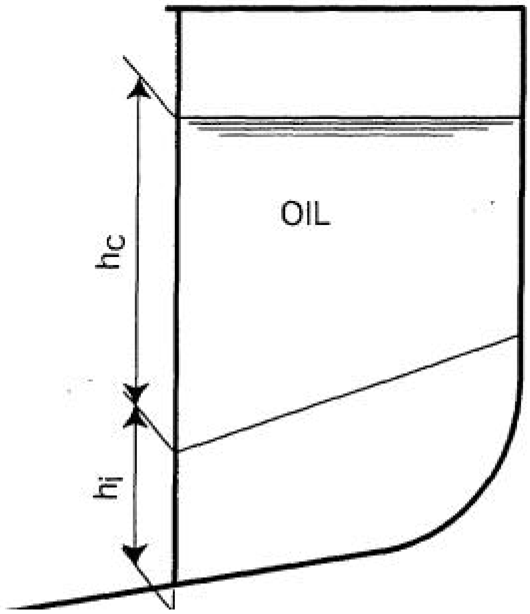

FIGURE 2

Where a double bottom does not exist, then h_c is to be taken at its maximum value considering any deadrise of the ship. Refer to figure 3.

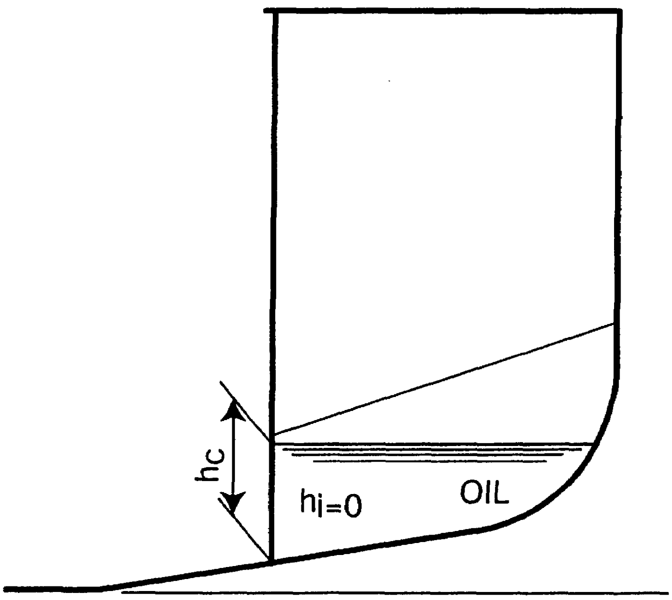

FIGURE 3

MPC 7 (cont'd) **Calculation of total hypothetical outflow as per 5 of the IMO Guidelines.**

.16 When investigating outflow due to side damage, the side offering the more unfavourable EOS number should only be used.

Requirements for application of hydrostatic balance loading in cargo tanks as per the Appendix to the IMO Guidelines.

.17 The number of tanks to be HBL is determined by the conditions underlined by EOS3 not being greater than EOS2 for the ship arranged with non-cargo side tanks and furthermore not being greater than 85% of the EOS1. Once it has been established that these conditions have been met, with zero trim, adjusted V_i, nominal density and maximum cargo level as per the Appendix formula, the configuration is considered having been validated and there is no need to recalculate EOS3 for the actual loading conditions corresponding to that configuration.

Filling levels in HBL tanks for the actual loading conditions are determined by the HBL formula of the Appendix to the Guidelines using actual density and draught at each HBL tank location.

.18 Partial filling less than HBL height may alternatively be considered. In such conditions, the cargo height in the selected cargo tanks is to be determined based on EOS3 compliance with the criteria, with zero trim, nominal density, and draught corresponding to adjusted V_i.

Where cargo levels less than maximum cargo level calculated by the HBL formula of the Appendix to the Guidelines are used for EOS3 calculation, the actual filling levels will be calculated as follows:

$$(h_c \text{ x } K) \text{ x } \rho_c \text{ x } g + 100\Delta P \leq (d - h_i) \text{ x } \rho_s \text{ x } g$$

where K is a correction factor $h_{(HBL)} / h_{(PF)}$ with:

$h_{(PF)}$: maximum cargo height in partial filling condition, leading to a satisfactory EOS3 for the selected configuration (with nominal density, assumed zero trim, corresponding draught $d_{(PF)}$, adjusted V_i).

$H_{(HBL)}$: maximum HBL cargo height for the selected configuration at draught $d_{(PF)}$.

Thus :

$$K = ((d_{(PF)} - h_i) \text{ x } \rho_s \text{ x } g - 100\ \Delta P) / (\rho_n \text{ x } g \text{ x } h_{(PF)}))$$

MPC 7
(cont'd)

ANNEX

MATRIX OF PARAMETERS

EOS (see note 1)	**Assumed trim**	**Draught**	**Density**	**Loaded oil volume**	**Consumables and ballast**
EOS 1	0	Maximum assigned summer water line	Nominal	V_1	none
EOS 2	0	Corresponding draught	Nominal	V_2	none
EOS 3	0	Corresponding draught	Nominal	V_3	See note 2

Where:

V_1: 98% of cargo and fuel oil tanks volumes within L_t in the original configuration.
V_2: V_1 minus 98% volume of side protection tanks corresponding to 13 G(4), in way of cargo tanks.
V_3: Oil volume of full cargo and fuel oil tanks within L_t (at 98 %) and of HBL and/or partially loaded tanks.

Note 1:

$$EOS = \frac{o_{tot}}{v_1}$$

Note 2: Ballast may be used to achieve an increased draught only in determining EOS3.