

CALCULATION OF STABILITY FOR VESSELS LOADING BULK GRAIN

GENERAL PARTICULARS

Name of vessel <p style="text-align: center;">M/V CEBIHAN</p>		Port of Registry <p style="text-align: right;">ISTANBUL</p>	
TYPE OF VESSEL <u>BULK CARRIER</u> TANKER		OFFICIAL NUMBER	
		CALL SIGN <p style="text-align: right;">TCTH6</p>	
APPROPRIATE LOADLINE <p style="text-align: center;">S W WNA</p>		DRAFT <p style="text-align: right;">13.02 M</p>	
		FREEBOARD <p style="text-align: right;">5.519 M</p>	
DEADWEIGHT <p style="text-align: right;">57318 tons</p>	F.W.A. <p style="text-align: right;">30.252 CMS</p>	T.P.C.M. <p style="text-align: right;">56.025</p>	
LOADING PORT(S) <p style="text-align: center;">Constanta</p>			
DISCHARGING PORT(S) <p style="text-align: center;">Port Said</p>			
GRAIN STABILITY INFORMATION, APPROVAL AUTHORITY AND DATE <p style="text-align: center;">Nippon Kaiji Kyokai</p>			
CARGO PLAN: Indicate holds, tween decks, coamings/trunks, type of grain, secured and unsecured surfaces and ballast.			
DEPARTURE CONDITION		TYPE OF STABILITY CALCULATION	
Crew & Stores (Constant) 258.6 Bunkers F.O : 820.5, D.O : 92.9 Fresh Water : 333.9	Ballast : 180.0 Cargo : 50977.0 Total DWT : 52707.9 Tons/ Tonnes		

I certify that the calculations shown on this document indicate the worst stability condition that will be experienced during the voyage.

06/02/2013

Date

Port

Master

TABLE II CALCULATION OF KG

For full compartments indicate whether cargo centres "C" or volumetric centres "V" are used. If your grain stability information does not describe which are used presume "V" values used.

Compartment Number	Grain Cubic Cu.Ft. / m	Weight Tons / Tonnes	KG Ft / m	Solid Moments = weight x kg	"C" or "V" Centes
Light Ship		10477.7	11.586	121394.7	
Crew & Stores		258.6	7.084	1831.7	

CARGO

NO.1 CARGO HOLD	12470.3	9520.2	10.043	95607.8	
NO.2 CARGO HOLD	13914.2	10622.6	9.927	105454.3	
NO.3 CARGO HOLD	12865.1	9821.7	9.635	94628.5	
NO.4 CARGO HOLD	14134.7	10790.9	10.053	108483.1	
NO.5 CARGO HOLD	13389.1	10221.7	10.284	105117.8	
Subtotal(1)		61713.3	Subtotal(2)	632517.9	

LIQUID'S WORST CONDITION

Tank Number	Weight Tons/Tonnes	Kg Ft / m	Liquid Moments = weight x kg	Free Surface Moments
F.P.TK(C)	24.0	0.287	6.9	492.9
NO.1 W.B.TK(P)[T/S&D/B]	24.0	0.040	1.0	4004.9
NO.1 W.B.TK(S)[T/S&D/B]	24.0	0.040	1.0	4004.9
NO.2 W.B.TK(P)[T/S&D/B]	24.0	0.032	0.8	5423.7
NO.2 W.B.TK(S)[T/S&D/B]	14.0	0.019	0.3	5257.1
NO.3 W.B.TK(P)[T/S&D/B]	14.0	0.019	0.3	5344.3
NO.3 W.B.TK(S)[T/S&D/B]	14.0	0.019	0.3	5344.3
NO.4 W.B.TK(P)[T/S&D/B]	14.0	0.019	0.3	5261.9
NO.4 W.B.TK(S)[T/S&D/B]	14.0	0.019	0.3	5261.9
NO.5 W.B.TK(P)[T/S&D/B]	5.0	0.012	0.1	1795.0
NO.5 W.B.TK(S)[T/S&D/B]	5.0	0.012	0.1	1795.0
A.P.TK(C)	4.0	8.236	32.9	11.0
F.O.Total	820.5	15.002	12309.3	1795.0
D.O.Total	92.9	4.538	421.6	66.7
L.O.Total	21.0	10.734	225.4	77.7
F.W.Total	333.9	15.527	5183.7	483.0
ETC Total	24.0	3.666	88.0	38.1
Sub-total	1472.3	Sub-total	18272.0	Total F.S
Sub-total(1)	61713.3	Sub-total(2)	632517.9	Moments
				46457.3
Displacement	63185.6	Total Moments	650789.9	

TABLE III CALCULATION OF KG & GM

Uncorrected Kg from:	<u>Total Moments (Table II)</u>	=	
	Displacement (Table II)		10.300
Liquid F.S. gain from:	<u>Total F. S. Moments (Table II)</u>	=	
	Displacement (Table II)		0.736
Corrected Kg		=	11.036
Km (from ship's stability information) for displacement shown in Table II			13.597
-> Least Gm =	Ft/m (Must not be less than 12 inches/0.3m)		2.561

TABLE IV UPSETTING MOMENTS

Compartment Number	Grain Depth ft/m or Ullage	Stowage Factor cu.ft. per ton cu.m. tonnes	Volumetric Upsetting Moment ft4 / m4	Upsetting Moment ft.tons / m. tonnes
NO.1 CARGO HOLD	2.65	0.7634	8654.4	6607.1
NO.2 CARGO HOLD	2.27	0.7634	7750.6	5917.1
NO.3 CARGO HOLD	3.23	0.7634	11315.6	8638.7
NO.4 CARGO HOLD	1.73	0.7634	6000.6	4581.0
NO.5 CARGO HOLD	2.07	0.7634	7211.4	5505.4
Use this total for Table VIIA, and for Table VIIB only when the 12% correction for the vertical shift of G in slack compartments is incorporated in the ships data otherwise complete Table V to calculate angle of heel in Table VIIB.			Total Upsetting Moment	31249.3

TABLE V UPSETTING MOMENT CORRECTION FOR VERTICAL SHIFT OF G IF NOT INCLUDED IN SHIPS DATA

1. Total upset moments for slack compartment Table IV multiply	
$\frac{31249.3}{\hspace{10em}} \times 1.12$	34999.2
2. Total upset moments for full	0.0
Total Corrected Value of Upsetting Moments	34999.2

TABLE VI MAXIMUM ALLOWABLE UPSETTING MOMENTS

Corrected Kg (from Table III) =	11.036
Displacement (from Table II) =	63185.6
(A) Maximum allowable upsetting Moment (from Ship's stability book)	37609.7
(B) Actual corrected value of upsetting Moments from (Table V)	
If (A) exceeds (B) vessel complies	34999.2

TABLE VIIA ANGLE OF HEEL CALCULATION (FOR 5 DEG. CRITERION)

Nat Tan Angle of Heel = $\frac{\text{Sum of Upsetting Moments (Table IV)*}}{\text{Displacement(Table II) x GM (Table III)}}$ *12% Correction does not apply in this case

= $\frac{31249.3}{63185.6 \times 2.561} = 0.193$

Angle of Heel = 11.061 degree

If Angle is less than 5 deg. vessel complies

TABLE VIIIB ANGLE OF HEEL CALCULATION (FOR 12 DEG. CRITERION)

Nat Tan Angle of Heel = $\frac{\text{Sum of Upsetting Moments (Table IV) or (Table V)}}{\text{Displacement(Table II) x GM (Table III)}}$

= $\frac{34999.2}{63185.6 \times 2.561} = 0.216$

Angle of Heel = 12.389 degree

If Angle is less than 12 deg. vessel complies

TABLE VIIC ANGLE OF HEEL CALCULATION FOR TANKERS (5 DEG. CRITERION)

Total Combined Length of All Wing Tanks to be Loaded(L)
(P. and S. Tanks Both Counted) =

Maximum Breadth of Wing Tanks to be Loaded(B) =

Total Combined Length of All Centre Tanks to be Loaded(L1) =

Maximum Breadth of Centre Tanks to be Loaded(B1) =

Wing Tanks Upsetting Moment

= $\frac{\text{S.F}}{\text{S.F}}$

Centre Tanks Upsetting Moment

= $\frac{\text{S.F}}{\text{S.F}}$

Total Upsetting Moment

Nat Tan of Heel = $\frac{\text{Total Upsetting Moment}}{\text{Displacement(Table II) x GM(Table III)}}$

Angle of Heel = _____

If Angle of Heel less than 5 deg. vessel complies

If cargoes having different stowage factors are loaded, separate calculations are required for each. use space under Table VIII

TABLE VIII CORRECTED RIGHTING ARM AT 40 DEG. HEEL USING CROSS CURVES

GZ from Cross Curves (Ship's stability information)		=
GZ obtained using KG value of (_____)ft/m		
Correction for KG difference		=
GZ at 40 deg. Heel or $GZ = KN - KG(\sin 40 \text{ deg.})$		=
Upsetting arm correction = $0.8 \times \frac{\text{Corrected Upsetting Moment}}{\text{Displacement}}$		
= $\frac{\text{Table IV or Table V}}{\text{Table II}} \times 0.8$	= _____	x 0.8 =
Corrected GZ at 40 deg. Heel		=
Minimum Required GZ at 40 deg. Heel		=
Exceeds Minimum by		=

If GZ curve in the nearest typical loaded condition shown in stability booklet is of normal form and maximum GZ occurs at not less than 40 deg. then vessel complies if not then Table IX must be completed. If volumetric moments are carried from Table V they must be divided by the stowage factor before use in this Table

Space for calculations or procom information as required.