PLAN ENDORSED FOR IN-PRINCIPAL APPROVAL

SEE LETTER
E-126287-181890

REVIEWED
17-09-2021

COCHIN SHIPYARD - CT3370

70 T BOLLARD PULL ASD TUG -

PRELIMINARY STABILITY REPORT

Refer IRS Letter E-126287-181890 dated September 17, 2021

This design was developed by Cochin Shipyard Ltd. for Indian Ports Association as a part of ASTDS Package. CSL does not make any representation or warranties, express or implied as to the completeness, accuracy, suitability of the design and it shall be the responsibility of the respective builder/end-user to make its own assessment/evaluation of any such completeness, accuracy, suitability of the design prior to construction and any consequence thereof.

Revision No.	Date	Description	Sign
Rev. I	15 Sep 2021	For publishing on IPA website	ABK/HUR

TABLE OF CONTENTS

Refer IRS Letter E-126287-181890 dated, September 17, 2021

1. INTRODUCTION

This document summarizes the preliminary assessment of Intact Stability of 70 T Bollard Pull Tug variant for in-principle approval from Class. The stability of the vessel is checked against the requirement as per Intact Stability Code 2008.

Stability of the vessel during towing operation is checked as per amendment to part B of IS Code 2008, vide MSC Resolution 415(97), Section 2.8 – Ships Engaged in Towing Operations.

Stability of the vessel during FiFi operation is checked as per DNV RU-Ship, Part 5, Chapter 10, and Section 9. Overturning moment is calculated assuming that all the fire monitors are operated at their full capacity in transverse direction.

Only most onerous conditions are described in this stability report. Detailed stability booklet including all the necessary loading conditions, hydrostatics, cross curves etc. to the satisfaction of Class and regulatory authorities shall be submitted to class for approval by the builder during the time of vessel construction.

Stability calculations are performed in NAPA 2020.2-1 software.

Refer IRS Letter E-126287-181890 dated, September 17, 2021

2. VESSEL INFORMATION

The vessel shall be primarily tasked for ship handling and towing operations including berthing/unberthing, push pull, etc.

The vessel shall have unrestricted sea going capability.

The vessel shall have a static bollard pull of at least 70 tonnes at 100 % MCR of the engine in ahead condition.

Main Particulars

Length overall	abt. 33.0 m
Length between perpendiculars	abt. 31.3 m
Breadth moulded	abt. 11.9 m
Depth midships	abt. 5.4 m
Hull Draught	abt. 4.2 m
Max. Draught	abt. 5.4 m
Gross tonnage	<500 GT
Complement	14 Nos.
Class Notation	IRS - 𐊧 SUL, 𐊧 IY, TUG, AGNI 1 (2400 m^3/hr)

Refer IRS Letter E-126287-181890 dated, September 17, 2021

3. INTACT STABILITY CRITERIA

3.1 GENERAL CRITERIA (as per IS Code 2008 Ch. 2, 2.2)

- The area under the righting lever curve (GZ curve) shall not be less than 0.055 m-rad up to = 30°
- Area under GZ Curve shall not be less than 0.09 m-rad up to 40° or the angle of down-flooding, whichever is lesser.
- Area under GZ Curve between the angles of heel of 30° and lesser of 40° or the angle of down-flooding shall not be less than 0.03 m-rad.
- The righting lever GZ shall be at least 0.2 m at an angle of heel equal to or greater than 30°
- The initial metacentric height GM_0 shall not be less than 0.15 m.
- The maximum righting lever shall occur at an angle of heel not less than 25°.

3.2 SEVERE WIND AND ROLLING CRITERIA (as per IS Code 2008 Ch. 2, 2.3)

Ability of the ship to withstand combined effects of beam wind and rolling shall be demonstrated as follows, when subjected to wind loads as per IS Code Ch. 2, 2.3:

- Area b shall be equal to or greater than area a
- The angle of heel under action of steady wind should not exceed 16° or 80% of the angle of deck edge immersion, whichever is less.

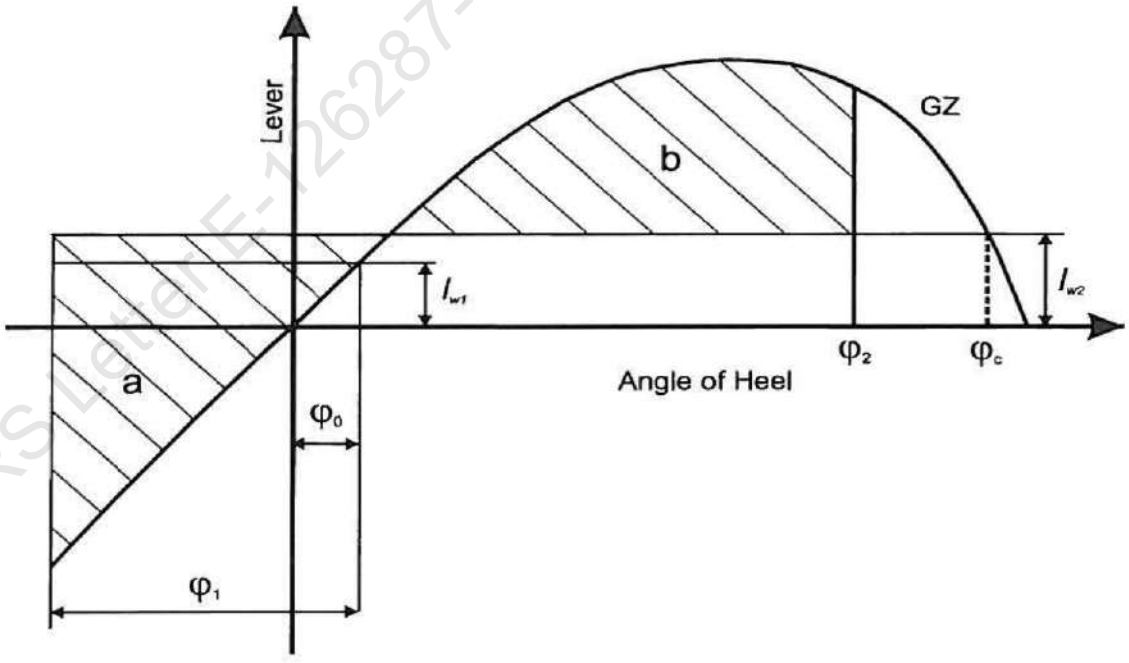


Figure 1 Severe Wind & Rolling Criteria

Refer IRS Letter E-126287-181890 dated September 17, 2021

3.3 STABILITY CRITERIA FOR TOWING (as per IS Code 2008, Ch.2, 2.8)

Stability of the vessel during towing operation has been checked iaw IS Code 2008, Ch. 2, 2.8.

- The area A between the righting lever curve and the heeling lever curve for self-tripping calculated iaw. 2.8.2.1 of IS Code, measured from equilibrium heel angle, (ϕ_e) to the angle of the second intersection, (ϕ_c) or the angle of down-flooding, (ϕ_f) whichever is less, should be greater than the area B contained between the heeling lever curve and the righting lever curve, measured from the heel angle ϕ= 0 to equilibrium heel angle (ϕ_e).

- The first intersection between the righting lever curve and the heeling lever curve for tow-tripping calculated iaw 2.8.2.2 should occur at an angle of heel less than the angle of down-flooding (ϕ_f).

Moment Calculation:
The location of propulsion units and towing point used for moment calculation are as indicated in Chapter 5-Tow Point Locations.

a. Self-Tripping Heeling Lever

$$HL_{\varphi} = \frac{BP \times C_T \times (h \times \cos\varphi - r \times \sin\varphi)}{g \times \Delta}$$

Where:

BP	bollard pull of the vessel in (kN) – 686.47 kN
C_T	0.5, for ships with conventional, non-azimuth propulsion units; $0.90/(1 + l/L_{LL})$ for ships with azimuth propulsion units installed at a single point along the length. CT should not be less than 0.7 for ships with azimuth stern drive towing over the stern or tractor tugs towing over the bow, and not less than 0.5 for ships with azimuth stern drive towing over the bow or tractor tugs towing over the stern;
Δ	displacement, in (t);
l	longitudinal distance, in (m), between the towing point and the vertical centreline of the propulsion unit(s) relevant to the towing situation considered;
h	vertical distance, in (m), between the towing point and the horizontal centreline of the propulsion unit(s) as relevant for the towing situation considered; gravitational acceleration, in (m/s^2), to be taken as 9.81;
r	transverse distance, in (m), between the centre line and the towing point, to be taken as zero when the towing point is at the centre line.
L_{LL}	length (L) as defined in the International Convention on Load Lines in force.

b. Tow Tripping Heeling Lever

$$HL_{\varphi} = \frac{C_1 \times C_2 \times \gamma \times V^2 \times A_p \times (h \times \cos\varphi - r \times \sin\varphi + C_3 \times d)}{2 \times g \times \Delta}$$

Where:

C_1	Lateral traction coefficient- $2.8 \frac{L_S}{L_{PP}} - 0.1$	$0.10 \leq C_1 \leq 1.00$

Refer IRS Letter EL/126281-181290 dated, September 17, 2021

C_2	Correction of C_1 for angle of heel = $\frac{\varphi}{3\,\varphi_D} + 0.5$	$C_2 \geq 1.00$
φ_D	Angle to deck edge = $\tan^{-1}\frac{2f}{B}$	
C_3	Distance from the center of A_P to the waterline as fraction of the draught related to the heeling angle= $\frac{\varphi}{\varphi_D} \times 0.26 + 0.30$, $0.50 \leq C_3 \leq 0.83$	
γ	Specific gravity of water, in (t/m^3);	
V	Lateral velocity, in (m/s), to be taken as 2.57 (5 knots);	
A_P	Lateral projected area, in (m^2), of the underwater hull;	
r	the transverse distance, in (m), between the center line and the towing point, to be taken as zero when the towing point is at the center line;	
L_S	The longitudinal distance, in (m), from the aft perpendicular to the towing point;	
L_{PP}	Length between perpendiculars, in (m);	
φ	Angle of heel;	
f	Freeboard amidship, in (m);	
B	Moulded breadth, in (m);	
h	Vertical distance, in (m), from the waterline to the towing point;	
d	Actual mean draught, in (m);	

3.4 STABILITY CRITERIA FOR CRANE OPERATION (as per IS Code 2008, Ch.2, 2.9)

Stability of the vessel has been checked for a heeling moment calculated iaw IS Code 2.9.6, the vessel has to meet the below stability criteria, as per IS Code 2.9.7.

- The residual righting area below the righting lever and above the heeling lever curve between ϕ_e and the lesser of 40° or the angle of the maximum residual righting lever should not be less than 0.080 m rad.

- The equilibrium angle is to be limited to 10 degrees or the angle of immersion of the highest continuous deck enclosing the watertight hull.

The heeling lever should be calculated using the following formulae:

$$HL_\varphi = \frac{P_L \times y \times \cos\varphi}{\Delta}$$

where:

P_L	vertical load, in (t), of the lift, 3 t
y	transverse distance, in (m), of the lift, 15.0 m.
φ	angle of heel;
HL_φ	the heeling lever, in (m) due to the lift at ϕ; and
Δ	the displacement, in (t) of the ship with the load of the lift.

Refer IRS Letter E-126281-181890 dated, September 17, 2021

3.5. STABILITY CRITERIA DURING EXTERNAL FIFI OPERATIONS (as per DNV GL, Rules for Fire Fighters)

Stability of the vessel during FiFi operation is checked as per DNV Part 5 Ch.10. Section 9, 9.1.3.

The monitor heeling lever (F), shall be less 0.5 times the maximum GZ corresponding to maximum allowable VCG. If the maximum GZ occurs after 30°, the GZ at 30° shall be used instead of the maximum GZ.

Heeling moment is calculated with all the fire monitors operating at their full capacity in transverse direction. The calculation is as below:

$$\mathrm{HL} = \frac{F \times \mathrm{a}}{\Delta}$$

F heeling force, assumed in transverse direction based on the full capacity of the fire monitors, *n x R*

n Number of monitors, *2 Nos.*

R Reaction force from one monitor, when operating in transverse direction, *16.5 kN**

a Monitor heeling arm, taken as the vertical distance between the centre of the thruster and the centreline of the monitor, *10.221 m*

** Indicative Reaction force from monitor - Estimated based available data at this point. The builder/designer to estimate actual reaction based on binding data from OEMs during construction stage.*

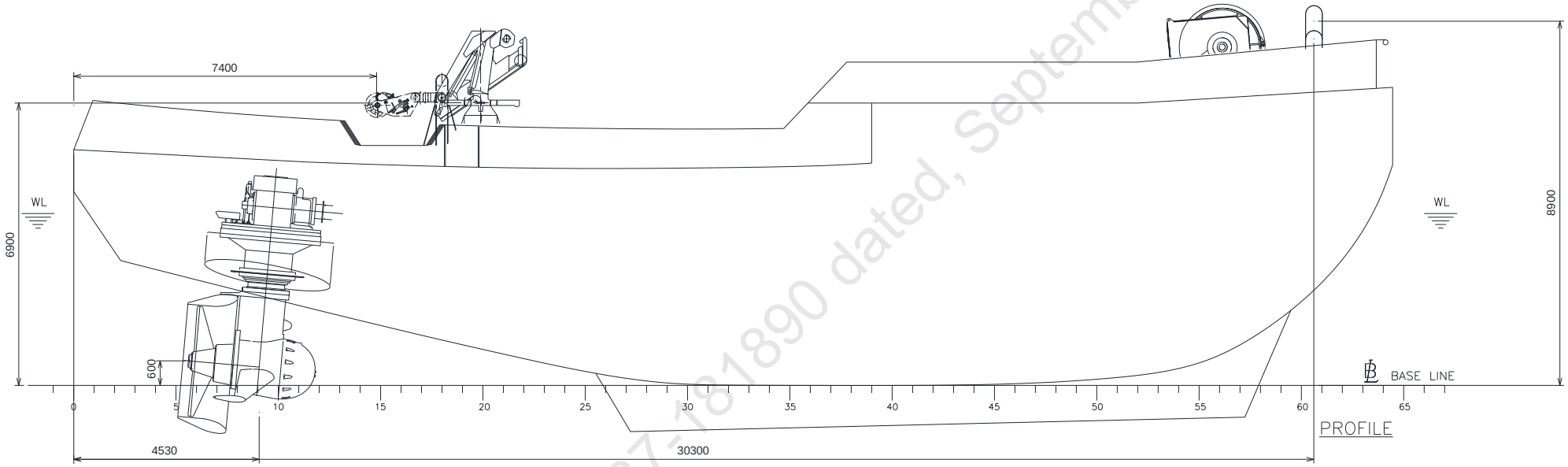
Refer IRS Letter E-126287-181890 dated, September 17, 2021

4. GENERAL ARRANGEMENT

Ref. drawing number CT3370-101-001 General Arrangement.

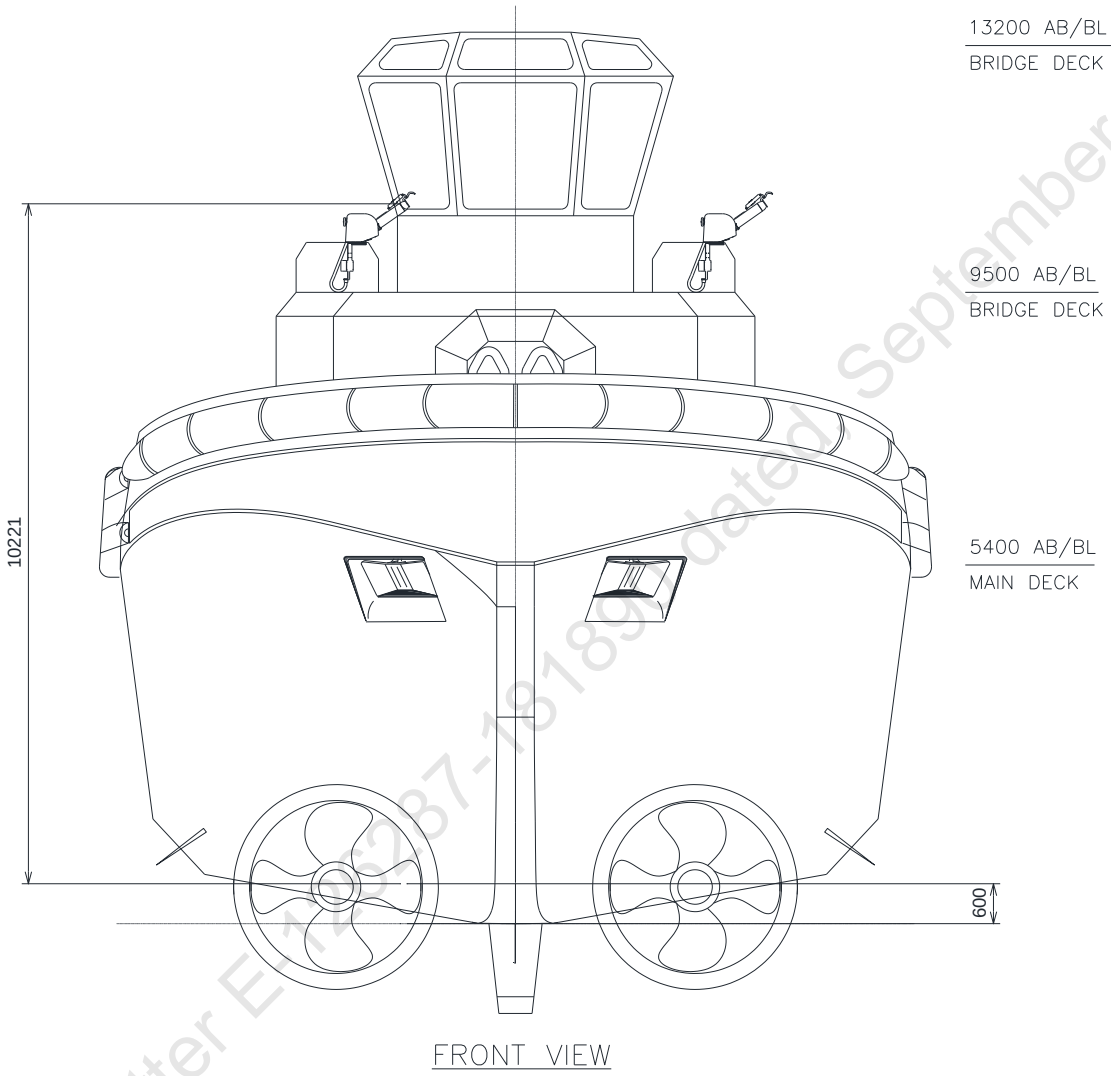
Refer IRS Letter E-126287-181890 dated, September 17, 2021

5. TOW POINT LOCATIONS



Refer IRS Letter E-126287-181890 dated, September 17, 2021

6. EXTERNAL FIFI ARRANGEMENT



Refer IRS Letter E-142237-181899 dated September 17, 2021

7. OPENINGS

The position of the lower corner farthest from the centreline of the ER ventilation are as below:

Name	Length to Fr. 0 [m]	Dist. From C.L [m]	Height from Baseline [m]	Opening Type
ER – Supply "PS/SB"	12.37	2.3	6.3	Unprotected
ER – Out "PS/SB"	14.0	1.5	8.4	Unprotected

Note:

Openings required for continuous supply to Engine room which are not conforming to ICLL Reg. 17(3) may be accepted subject to provision of alternate arrangements below and concurrence of flag.

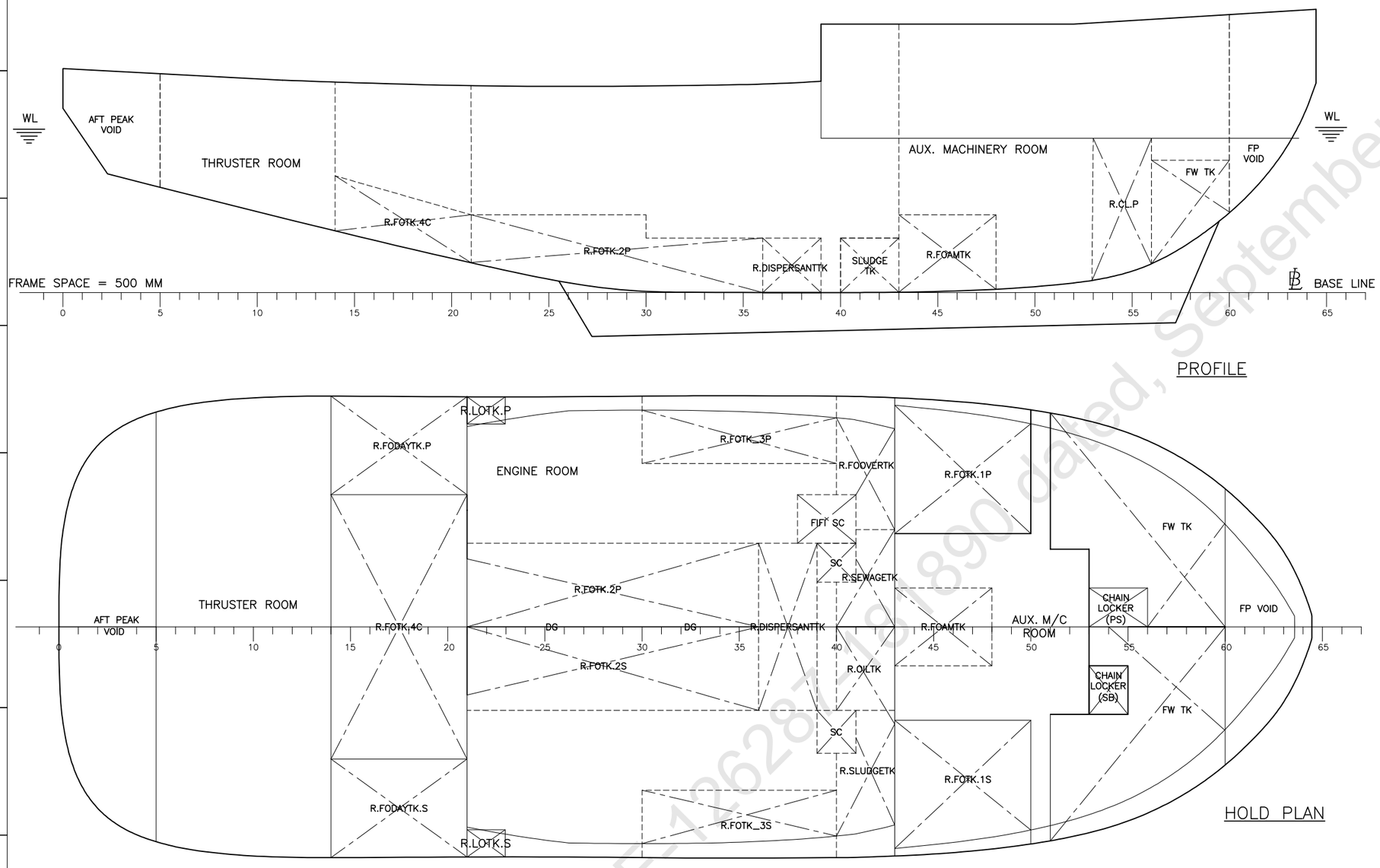
a. Shall be considered as unprotected openings in the stability calculation.
b. Suitable weathertight closing arrangements shall be provided for the ventilators.
c. Louvre shall have a coaming height of not less than 900 mm above main deck.
d. Suitable drain shall be provided in way of the ventilators.

It shall be the responsibility of the respective builder/designer to get approval from Class/Flag for the alternate arrangements for lower coaming heights.

Refer IRS Letter E-126287-181890 dated September 17, 2021

8. TANK PLAN

Refer IRS Letter E-126287-181890 dated, September 17, 2021



PROFILE

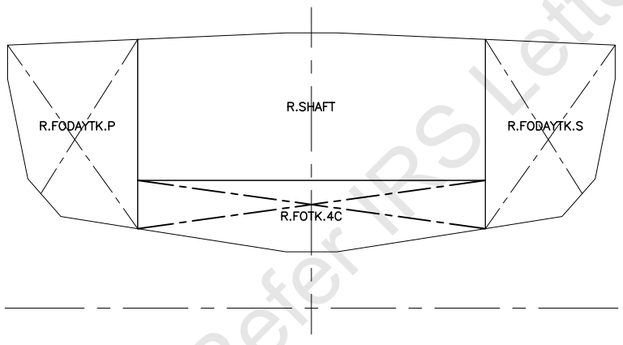
HOLD PLAN

NAME	PURPOSE	DESCRIPITION	NET VOL. (m^3)	CGX (m)	CGY (m)	CGZ (m)	FSM
DIESEL OIL TANKS							
R.FODAYTK.P	DO	Diesel Oil	29.5	8.8	4.5	3.8	4.1
R.FODAYTK.S	DO	Diesel Oil	29.5	8.8	-4.5	3.8	4.1
R.FOTK.1S	DO	Diesel Oil	19.0	23.1	-3.7	2.3	5.7
R.FOTK.1P	DO	Diesel Oil	19.0	23.1	3.7	2.3	5.7
R.FOTK.2P	DO	Diesel Oil	23.0	14.2	1.0	1.0	5.2
R.FOTK.2S	DO	Diesel Oil	23.0	14.2	-1.0	1.0	5.2
R.FOTK.3P	DO	Diesel Oil	6.8	17.4	4.8	1.4	0.9
R.FOTK.3S	DO	Diesel Oil	6.8	17.4	-4.8	1.4	0.9
R.FOTK.4C	DO	Diesel Oil	26.6	8.7	0.0	1.9	76.6
Total :			**183.3**	m^3			
FRESH WATER TANKS							
R.FWTK.P	FW	Fresh Water	16.9	27.6	1.9	2.6	16.6
R.FWTK.S	FW	Fresh Water	17.1	27.6	-1.7	2.5	19.9
Total :			**34.0**	m^3			
MISC. TANKS							
R.LOTK.P	LO	Lubricating Oil	2.3	11.0	5.4	4.1	0.1
R.LOTK.S	LO	Lubricating Oil	2.3	11.0	-5.4	4.1	0.1
R.DISPERSANTTK	DISPERSANT	Oil Spill Dispersant	8.1	18.7	0.0	0.8	9.7
R.FOAMTK	FOAM	Fire fighting Foam	9.4	22.7	0.0	1.0	1.6
R.SLUDGETK	SLU	Sludge	4.0	20.8	-3.8	1.3	5.5
R.OILTK	SLU	Oily Water	4.0	20.7	-1.0	0.8	3.0
R.FOOVERTK	SLU	Fuel Oil Over Flow	3.6	20.8	3.9	1.4	3.7
R.SEWAGETK	GWT	Grey Water	3.7	20.8	1.0	0.8	1.5

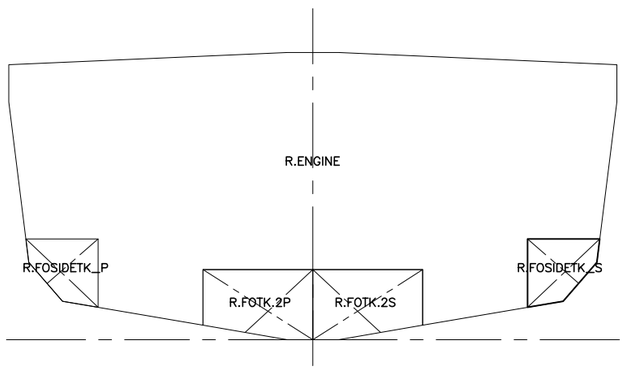
MAIN PARTICULARS

LENGTH O.A.....	abt 33.0 [m]
LENGTH B.P.....	abt 31.3 [m]
BREADTH (MLD).....	abt 11.9 [m]
DEPTH (MLD).....	abt 5.4 [m]
DRAFT (HULL).....	abt 4.2 [m]
COMPLEMENT.....	14 PERSONS
BOLLARD PULL	70 T @100% MCR
INSTALLED POWER	abt 4100 [kW]
CLASS NOTATION.....	IRS – SWASTIKA SUL,TUG SWASTIKA IY,AGNI 1 (2400m^3/hr)

#15



#30



Rev. I	15 Sep 2021	For Publishing on IPA Website	VKM	ABK	HUR
No:	Date	Description	Drawn	Checked	Approved

ASTDS	70T BP TUG			
	TITLE **TANK PLAN**			
DESIGN NO : CT3370				
COCHIN SHIPYARD LIMITED P.O. Bag 1653, COCHIN-682015, INDIA	1:120	A3	CT3370	CT3370-101-007
	Scale	Format	Project No.	Dwg. no.

This design was developed by Cochin Shipyard Ltd. for Indian Ports Association as a part of ASTDS Package. CSL does not make any representation or warranties, express or implied as to the completeness, accuracy, suitability of the design and it shall be the responsibility of the respective builder/end-user to make its own assessment/evaluation of any such completeness, accuracy, suitability of the design prior to construction and any consequence thereof.

Refer IRS Letter E-126287-191890 dated, September 2021

9 HYDROSTATIC DATA

MAIN CHARACTERISTICS OF THE VESSEL:

Length between perpendiculars	31.33	m
Breadth (moulded)	11.78	m
Design draught (moulded)	4.20	m
X-coordinate of aft perpendicular	0.40	m
X-coordinate of reference point (XREF)	16.07	m
X-coordinate of midship section (XMID)	16.52	m
Thickness of keelplate	0.012	m
Mean thickness of shell plating	0.010	m
Seawater density	1.025	ton/m3

Calculations are based on STABHULL date 2021-08-25 time 10:57

Shell thickness used in the calculation	10.0	mm
X-coord. of aft end of DWL	0.37	m
X-coord. of fore end of DWL	31.74	m
Calc. sections	63	
Plate thickness	10.0	mm

EXPLANATION OF SYMBOLS:

T	Draught (moulded)	m
TK	Draught below keel	m
DISP	Total displacement	t
LCB	longitudinal centre of buoyancy	m
VCB	Vertical center of buoyancy	m
LCF	Longitudinal centre of flotation	m
KMT	Transverse metacentric height	m
MCT	Moment to change trim	tm/cm
TPC	change of displacement/change of draught	t/cm

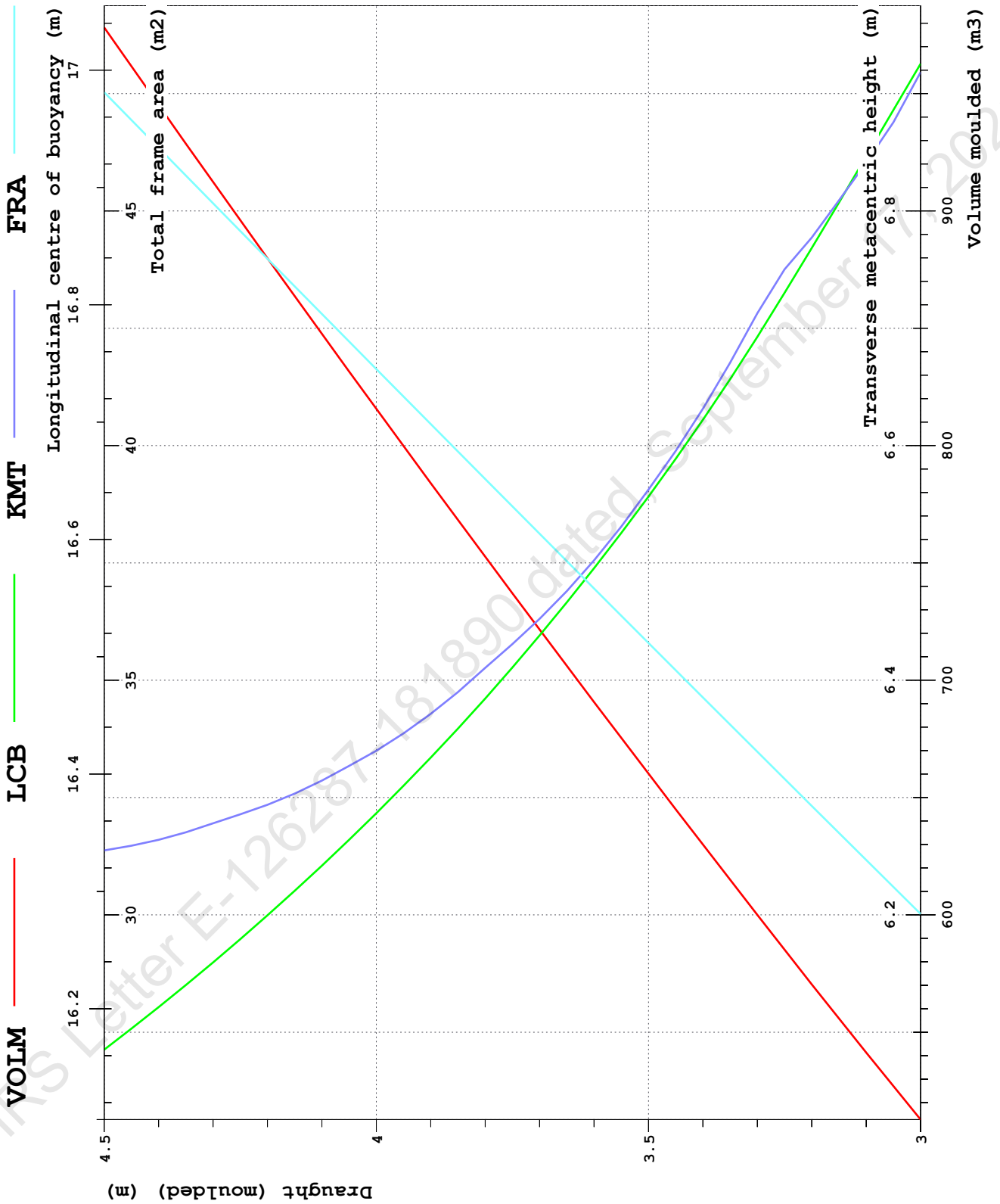
Trim by BOW : +ve
X = 0 at TRANSOM

Refer IRS Letter E-126217-181890 dated, September 17, 2021

Trim: 0 m

T m	TK m	DISP t	LCB m	VCB m	LCF m	KMT m	MCT tm/cm	TPC t/cm
3.000	3.012	529.5	17.005	1.849	15.563	6.918	5.2	2.9
3.050	3.062	544.1	16.966	1.880	15.497	6.876	5.3	2.9
3.100	3.112	558.8	16.926	1.912	15.436	6.841	5.5	3.0
3.150	3.162	573.7	16.887	1.943	15.382	6.809	5.6	3.0
3.200	3.212	588.8	16.848	1.975	15.338	6.777	5.7	3.0
3.250	3.262	603.9	16.810	2.006	15.295	6.750	5.8	3.0
3.300	3.312	619.2	16.773	2.037	15.276	6.713	5.9	3.1
3.350	3.362	634.5	16.737	2.068	15.268	6.671	6.0	3.1
3.400	3.412	649.9	16.702	2.099	15.261	6.631	6.1	3.1
3.450	3.462	665.4	16.669	2.130	15.254	6.595	6.1	3.1
3.500	3.512	681.0	16.637	2.161	15.247	6.563	6.2	3.1
3.550	3.562	696.7	16.606	2.192	15.248	6.531	6.3	3.1
3.600	3.612	712.4	16.575	2.222	15.242	6.502	6.3	3.2
3.650	3.662	728.2	16.546	2.253	15.236	6.476	6.4	3.2
3.700	3.712	744.0	16.518	2.283	15.229	6.452	6.5	3.2
3.750	3.762	760.0	16.491	2.313	15.221	6.431	6.5	3.2
3.800	3.812	776.0	16.464	2.343	15.214	6.411	6.6	3.2
3.850	3.862	792.1	16.439	2.373	15.208	6.390	6.7	3.2
3.900	3.912	808.2	16.414	2.403	15.202	6.371	6.8	3.2
3.950	3.962	824.4	16.390	2.433	15.193	6.355	6.8	3.3
4.000	4.012	840.7	16.367	2.463	15.185	6.340	6.9	3.3
4.050	4.062	857.1	16.344	2.493	15.177	6.327	7.0	3.3
4.100	4.112	873.6	16.322	2.523	15.170	6.314	7.0	3.3
4.150	4.162	890.1	16.301	2.553	15.163	6.303	7.1	3.3
4.200	4.212	906.7	16.280	2.582	15.155	6.294	7.2	3.3
4.250	4.262	923.3	16.259	2.612	15.147	6.286	7.2	3.3
4.300	4.312	940.1	16.239	2.642	15.140	6.278	7.3	3.4
4.350	4.362	956.9	16.220	2.671	15.135	6.270	7.4	3.4
4.400	4.412	973.8	16.201	2.701	15.130	6.264	7.4	3.4
4.450	4.462	990.7	16.183	2.730	15.124	6.259	7.5	3.4
4.500	4.512	1007.7	16.165	2.760	15.118	6.255	7.6	3.4

Refer IRS Letter E-126287-181890 dated September 17, 2021

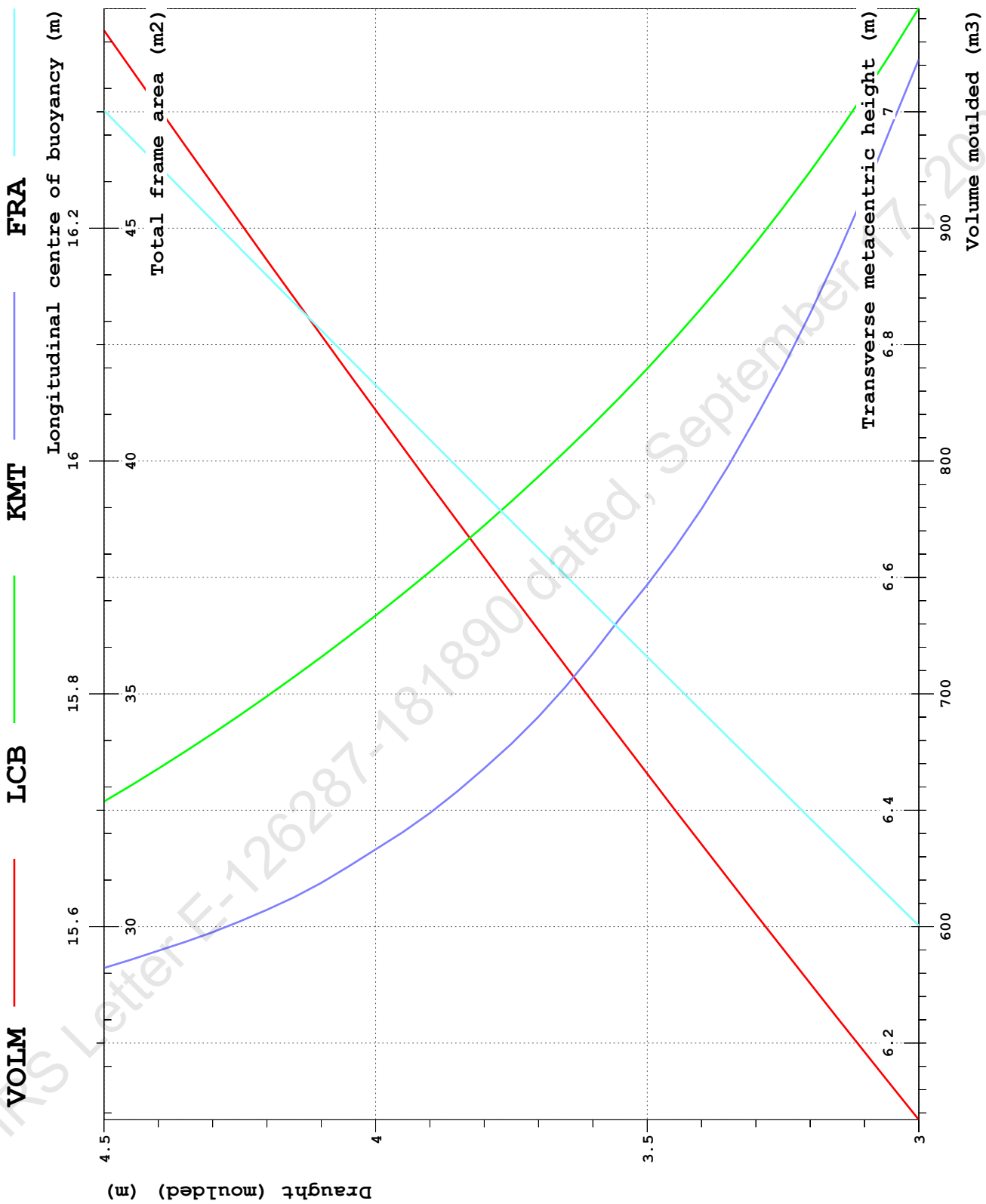


Refer IRS Letter E-126287/181890 dated September 17, 2021

Trim: -0.6 m

T m	TK m	DISP t	LCB m	VCB m	LCF m	KMT m	MCT tm/cm	TPC t/cm
3.000	3.012	534.0	16.389	1.864	15.004	7.045	5.5	3.0
3.050	3.062	548.9	16.351	1.896	14.996	6.988	5.6	3.0
3.100	3.112	563.8	16.316	1.928	15.002	6.930	5.7	3.0
3.150	3.162	578.9	16.281	1.960	15.001	6.877	5.7	3.0
3.200	3.212	594.1	16.249	1.991	14.999	6.827	5.8	3.0
3.250	3.262	609.3	16.218	2.023	14.996	6.780	5.9	3.1
3.300	3.312	624.6	16.188	2.054	14.992	6.737	5.9	3.1
3.350	3.362	640.0	16.159	2.085	14.990	6.696	6.0	3.1
3.400	3.412	655.5	16.131	2.116	14.987	6.659	6.1	3.1
3.450	3.462	671.0	16.105	2.147	14.984	6.625	6.2	3.1
3.500	3.512	686.7	16.079	2.177	14.982	6.594	6.2	3.1
3.550	3.562	702.4	16.055	2.208	14.977	6.565	6.3	3.1
3.600	3.612	718.1	16.031	2.238	14.969	6.535	6.4	3.2
3.650	3.662	734.0	16.009	2.269	14.962	6.506	6.5	3.2
3.700	3.712	749.9	15.987	2.299	14.956	6.480	6.5	3.2
3.750	3.762	766.0	15.965	2.329	14.949	6.457	6.6	3.2
3.800	3.812	782.0	15.945	2.360	14.943	6.436	6.7	3.2
3.850	3.862	798.2	15.924	2.390	14.944	6.416	6.7	3.2
3.900	3.912	814.4	15.905	2.420	14.939	6.398	6.8	3.3
3.950	3.962	830.7	15.886	2.450	14.934	6.381	6.9	3.3
4.000	4.012	847.1	15.867	2.480	14.927	6.366	7.0	3.3
4.050	4.062	863.5	15.849	2.509	14.921	6.352	7.0	3.3
4.100	4.112	880.1	15.832	2.539	14.917	6.338	7.1	3.3
4.150	4.162	896.6	15.815	2.569	14.912	6.325	7.2	3.3
4.200	4.212	913.3	15.798	2.599	14.907	6.314	7.2	3.3
4.250	4.262	930.0	15.782	2.628	14.901	6.304	7.3	3.4
4.300	4.312	946.8	15.766	2.658	14.896	6.295	7.4	3.4
4.350	4.362	963.7	15.751	2.688	14.892	6.287	7.4	3.4
4.400	4.412	980.6	15.736	2.717	14.888	6.279	7.5	3.4
4.450	4.462	997.6	15.721	2.747	14.892	6.272	7.6	3.4
4.500	4.512	1014.7	15.707	2.776	14.902	6.265	7.6	3.4

Refer IRS Letter E-126287-181890 dated September 17, 2021

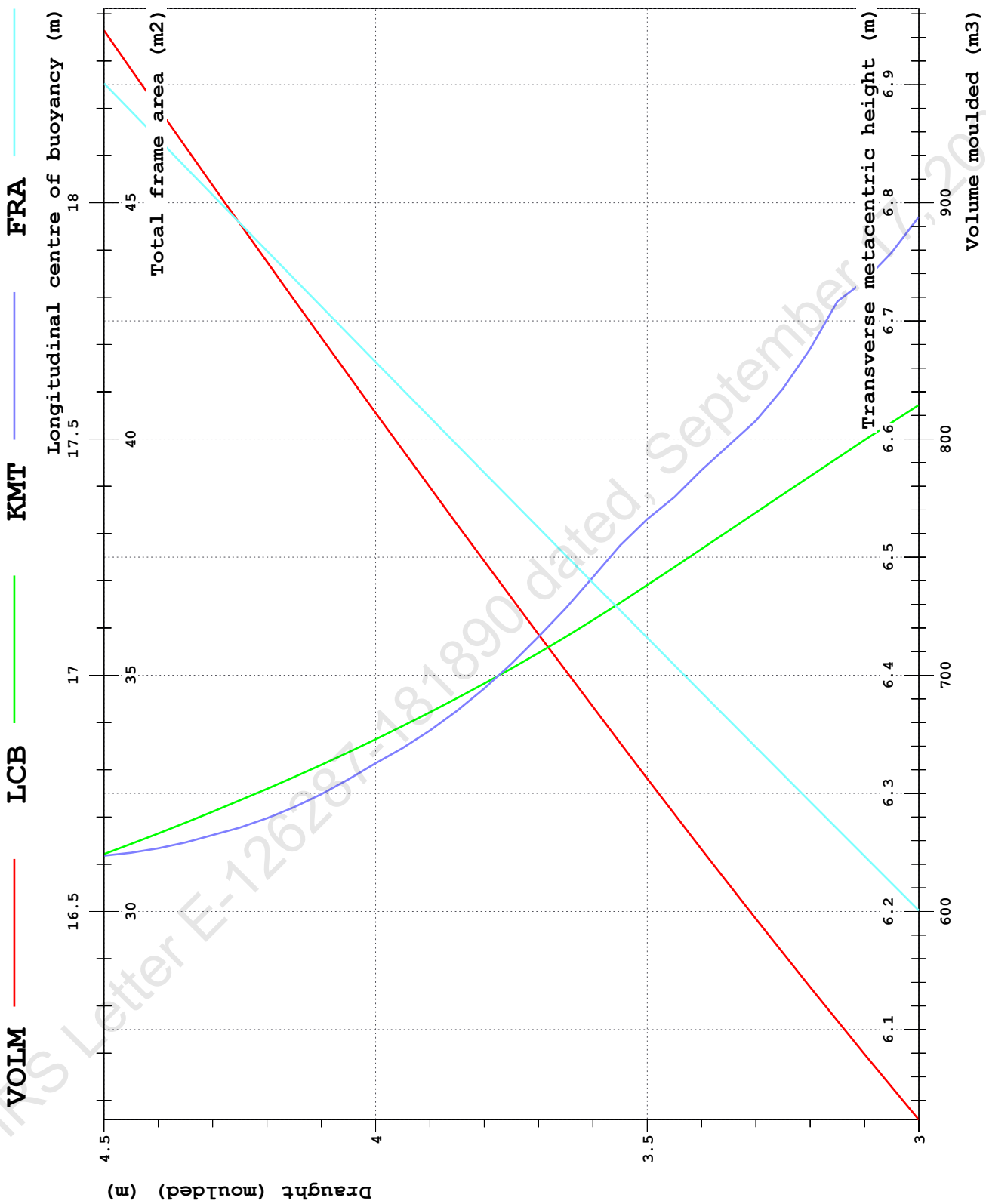


Refer IRS Letter E-126287-181890 dated, September 17, 2021

Trim: 0.6 m

T m	TK m	DISP t	LCB m	VCB m	LCF m	KMT m	MCT tm/cm	TPC t/cm
3.000	3.012	528.5	17.572	1.852	16.168	6.788	4.8	2.8
3.050	3.062	542.6	17.535	1.882	16.099	6.758	4.9	2.9
3.100	3.112	557.0	17.498	1.913	16.021	6.734	5.1	2.9
3.150	3.162	571.5	17.460	1.944	15.941	6.716	5.2	2.9
3.200	3.212	586.2	17.421	1.975	15.884	6.676	5.3	2.9
3.250	3.262	601.0	17.383	2.005	15.829	6.643	5.5	3.0
3.300	3.312	615.9	17.345	2.036	15.760	6.616	5.6	3.0
3.350	3.362	631.0	17.306	2.067	15.695	6.595	5.7	3.0
3.400	3.412	646.2	17.267	2.097	15.640	6.574	5.9	3.1
3.450	3.462	661.5	17.229	2.128	15.592	6.551	6.0	3.1
3.500	3.512	677.0	17.191	2.158	15.546	6.532	6.1	3.1
3.550	3.562	692.5	17.153	2.189	15.515	6.510	6.2	3.1
3.600	3.612	708.2	17.117	2.219	15.501	6.483	6.3	3.1
3.650	3.662	723.9	17.081	2.250	15.495	6.457	6.4	3.2
3.700	3.712	739.7	17.047	2.280	15.486	6.433	6.4	3.2
3.750	3.762	755.6	17.014	2.310	15.478	6.410	6.5	3.2
3.800	3.812	771.5	16.982	2.340	15.470	6.389	6.6	3.2
3.850	3.862	787.5	16.952	2.370	15.461	6.370	6.6	3.2
3.900	3.912	803.6	16.922	2.400	15.453	6.353	6.7	3.2
3.950	3.962	819.8	16.893	2.430	15.444	6.338	6.8	3.2
4.000	4.012	836.0	16.864	2.459	15.435	6.326	6.8	3.3
4.050	4.062	852.4	16.837	2.489	15.429	6.312	6.9	3.3
4.100	4.112	868.7	16.810	2.519	15.423	6.299	7.0	3.3
4.150	4.162	885.2	16.784	2.548	15.416	6.288	7.0	3.3
4.200	4.212	901.7	16.759	2.578	15.408	6.279	7.1	3.3
4.250	4.262	918.3	16.735	2.608	15.399	6.271	7.2	3.3
4.300	4.312	935.0	16.711	2.637	15.391	6.265	7.2	3.3
4.350	4.362	951.7	16.688	2.667	15.384	6.258	7.3	3.4
4.400	4.412	968.5	16.665	2.696	15.378	6.253	7.4	3.4
4.450	4.462	985.4	16.643	2.725	15.370	6.250	7.4	3.4
4.500	4.512	1002.3	16.621	2.755	15.363	6.247	7.5	3.4

Refer IRS Letter E-126287-181890 dated September 17, 2021



Refer IRS Letter E-126287-181890 dated, September 14, 2021

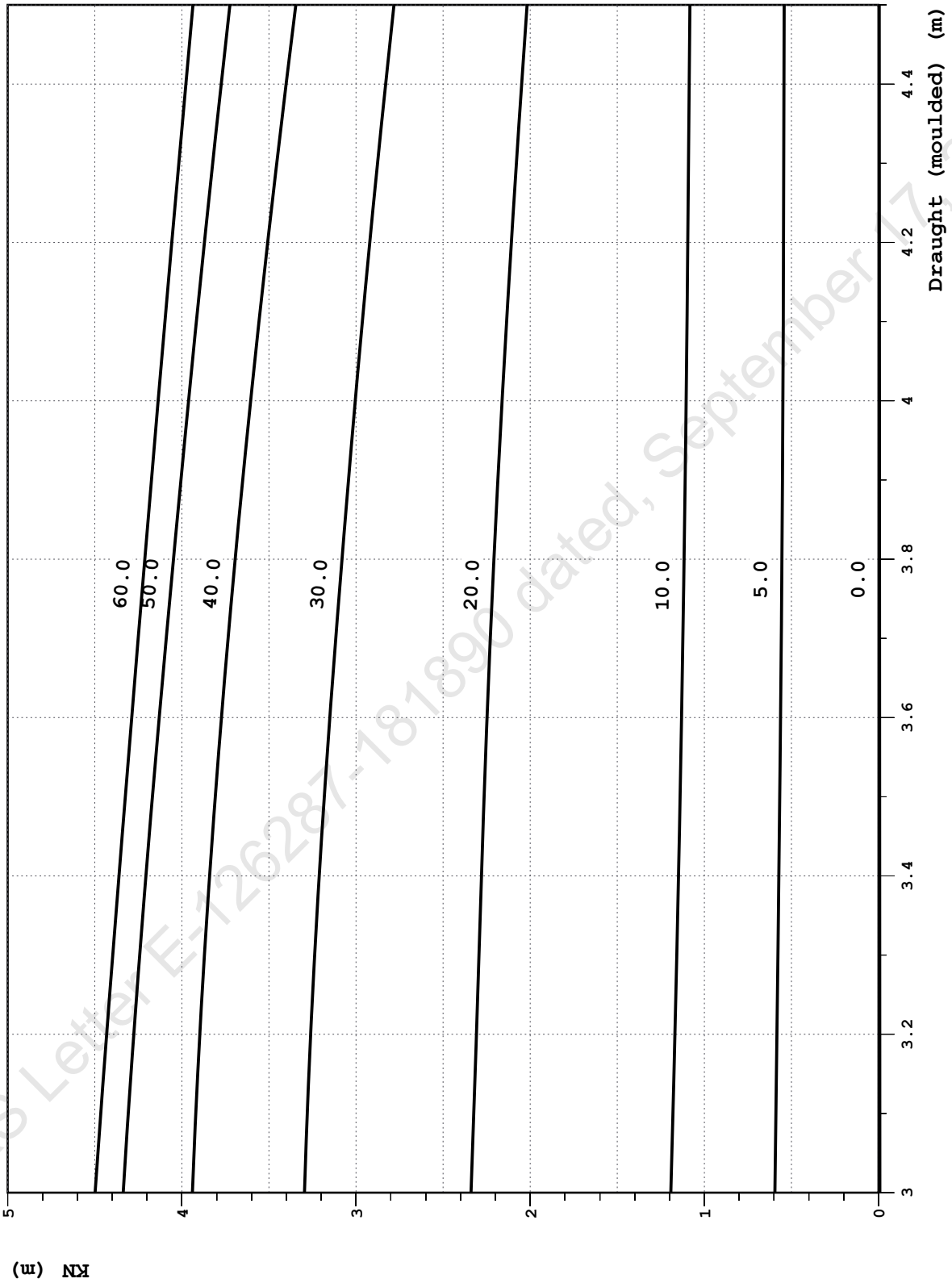
10 CROSS CURVES

Trim: 0 m

	KN (For Diff Heel Angles)							
draught	0.0	5.0	10.0	20.0	30.0	40.0	50.0	60.0
3.000	-0.008	0.595	1.193	2.340	3.296	3.940	4.337	4.498
3.050	-0.008	0.592	1.186	2.332	3.288	3.930	4.323	4.482
3.100	-0.007	0.589	1.180	2.324	3.280	3.920	4.308	4.466
3.150	-0.007	0.586	1.174	2.316	3.271	3.909	4.292	4.449
3.200	-0.007	0.583	1.169	2.308	3.261	3.897	4.276	4.432
3.250	-0.007	0.580	1.163	2.301	3.250	3.884	4.260	4.415
3.300	-0.007	0.578	1.158	2.294	3.238	3.871	4.242	4.397
3.350	-0.006	0.575	1.153	2.287	3.225	3.856	4.225	4.379
3.400	-0.006	0.572	1.148	2.279	3.211	3.841	4.207	4.361
3.450	-0.006	0.570	1.144	2.272	3.197	3.825	4.188	4.343
3.500	-0.006	0.567	1.139	2.265	3.182	3.808	4.169	4.325
3.550	-0.006	0.565	1.135	2.256	3.167	3.791	4.150	4.307
3.600	-0.006	0.562	1.131	2.248	3.151	3.773	4.130	4.288
3.650	-0.006	0.560	1.127	2.239	3.134	3.754	4.110	4.269
3.700	-0.006	0.558	1.123	2.229	3.116	3.735	4.090	4.251
3.750	-0.005	0.556	1.120	2.219	3.099	3.715	4.069	4.232
3.800	-0.005	0.554	1.116	2.208	3.080	3.694	4.048	4.213
3.850	-0.005	0.553	1.113	2.197	3.062	3.673	4.027	4.194
3.900	-0.005	0.551	1.110	2.186	3.043	3.651	4.006	4.175
3.950	-0.005	0.550	1.107	2.174	3.024	3.628	3.984	4.156
4.000	-0.005	0.549	1.104	2.161	3.005	3.605	3.962	4.136
4.050	-0.005	0.548	1.102	2.149	2.984	3.581	3.939	4.117
4.100	-0.005	0.547	1.099	2.136	2.964	3.557	3.917	4.097
4.150	-0.005	0.546	1.097	2.122	2.943	3.532	3.894	4.078
4.200	-0.005	0.545	1.095	2.108	2.921	3.507	3.871	4.058
4.250	-0.004	0.544	1.093	2.094	2.899	3.481	3.847	4.038
4.300	-0.004	0.544	1.091	2.079	2.877	3.455	3.823	4.018
4.350	-0.004	0.543	1.089	2.064	2.854	3.429	3.799	3.998
4.400	-0.004	0.543	1.087	2.049	2.830	3.401	3.774	3.977
4.450	-0.004	0.542	1.085	2.034	2.806	3.374	3.749	3.957
4.500	-0.004	0.542	1.083	2.018	2.782	3.346	3.724	3.936

Refer IRS Letter E-126287-181850 dated, September 17, 2021

Trim: 0 m



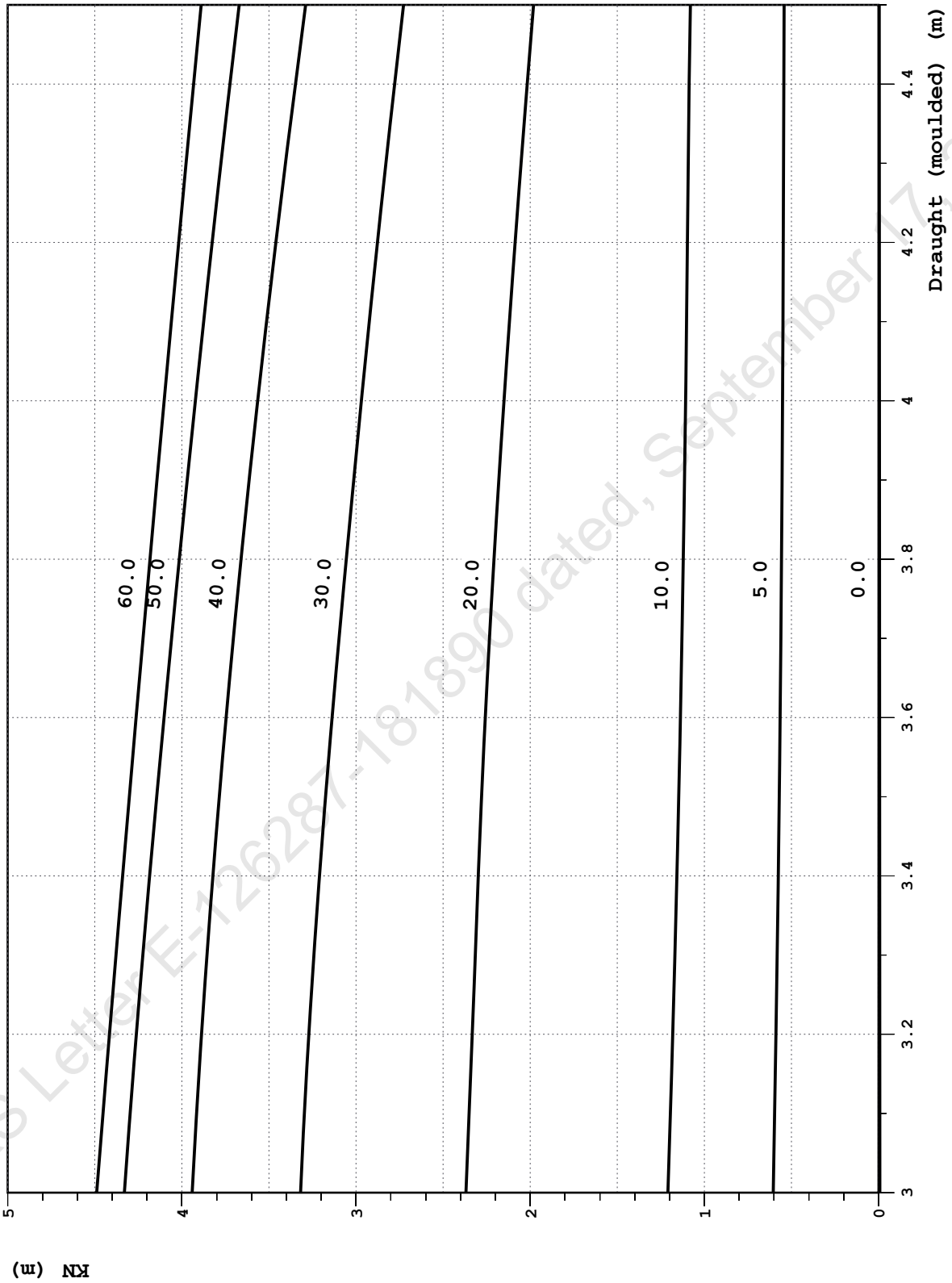
Refer IRS Letter E-126287-181890 dated, September 17, 2021

Trim: -0.6 m

draught	KN (For Diff Heel Angles) 0.0	5.0	10.0	20.0	30.0	40.0	50.0	60.0
3.000	-0.008	0.604	1.209	2.369	3.319	3.941	4.330	4.489
3.050	-0.007	0.600	1.202	2.359	3.308	3.928	4.314	4.471
3.100	-0.007	0.596	1.195	2.350	3.297	3.915	4.297	4.453
3.150	-0.007	0.593	1.188	2.341	3.284	3.902	4.279	4.434
3.200	-0.007	0.589	1.181	2.332	3.271	3.887	4.262	4.416
3.250	-0.007	0.585	1.175	2.324	3.257	3.872	4.243	4.397
3.300	-0.007	0.582	1.169	2.315	3.242	3.856	4.224	4.378
3.350	-0.006	0.579	1.163	2.307	3.226	3.839	4.205	4.359
3.400	-0.006	0.575	1.158	2.298	3.210	3.822	4.185	4.340
3.450	-0.006	0.572	1.152	2.289	3.193	3.804	4.165	4.321
3.500	-0.006	0.570	1.147	2.279	3.175	3.785	4.144	4.302
3.550	-0.006	0.567	1.142	2.269	3.157	3.766	4.124	4.282
3.600	-0.006	0.565	1.137	2.258	3.138	3.746	4.102	4.263
3.650	-0.006	0.563	1.133	2.246	3.118	3.726	4.081	4.243
3.700	-0.005	0.560	1.129	2.234	3.098	3.704	4.059	4.223
3.750	-0.005	0.559	1.125	2.221	3.077	3.683	4.037	4.203
3.800	-0.005	0.557	1.121	2.208	3.056	3.660	4.015	4.183
3.850	-0.005	0.555	1.117	2.194	3.035	3.637	3.992	4.163
3.900	-0.005	0.554	1.114	2.180	3.013	3.614	3.969	4.143
3.950	-0.005	0.552	1.111	2.166	2.991	3.590	3.946	4.123
4.000	-0.005	0.551	1.108	2.151	2.969	3.565	3.923	4.102
4.050	-0.005	0.550	1.105	2.135	2.947	3.539	3.899	4.081
4.100	-0.005	0.549	1.102	2.119	2.924	3.514	3.875	4.060
4.150	-0.005	0.548	1.099	2.103	2.901	3.487	3.851	4.040
4.200	-0.004	0.547	1.097	2.087	2.877	3.460	3.826	4.018
4.250	-0.004	0.546	1.095	2.070	2.853	3.433	3.801	3.997
4.300	-0.004	0.545	1.092	2.053	2.829	3.405	3.776	3.976
4.350	-0.004	0.544	1.090	2.035	2.804	3.377	3.750	3.955
4.400	-0.004	0.544	1.088	2.017	2.779	3.348	3.724	3.933
4.450	-0.004	0.543	1.084	1.999	2.753	3.319	3.698	3.911
4.500	-0.004	0.542	1.080	1.981	2.727	3.289	3.671	3.889

Refer IRS Letter E-12528/18/1500 dated, September 17, 2021

Trim: -0.6 m



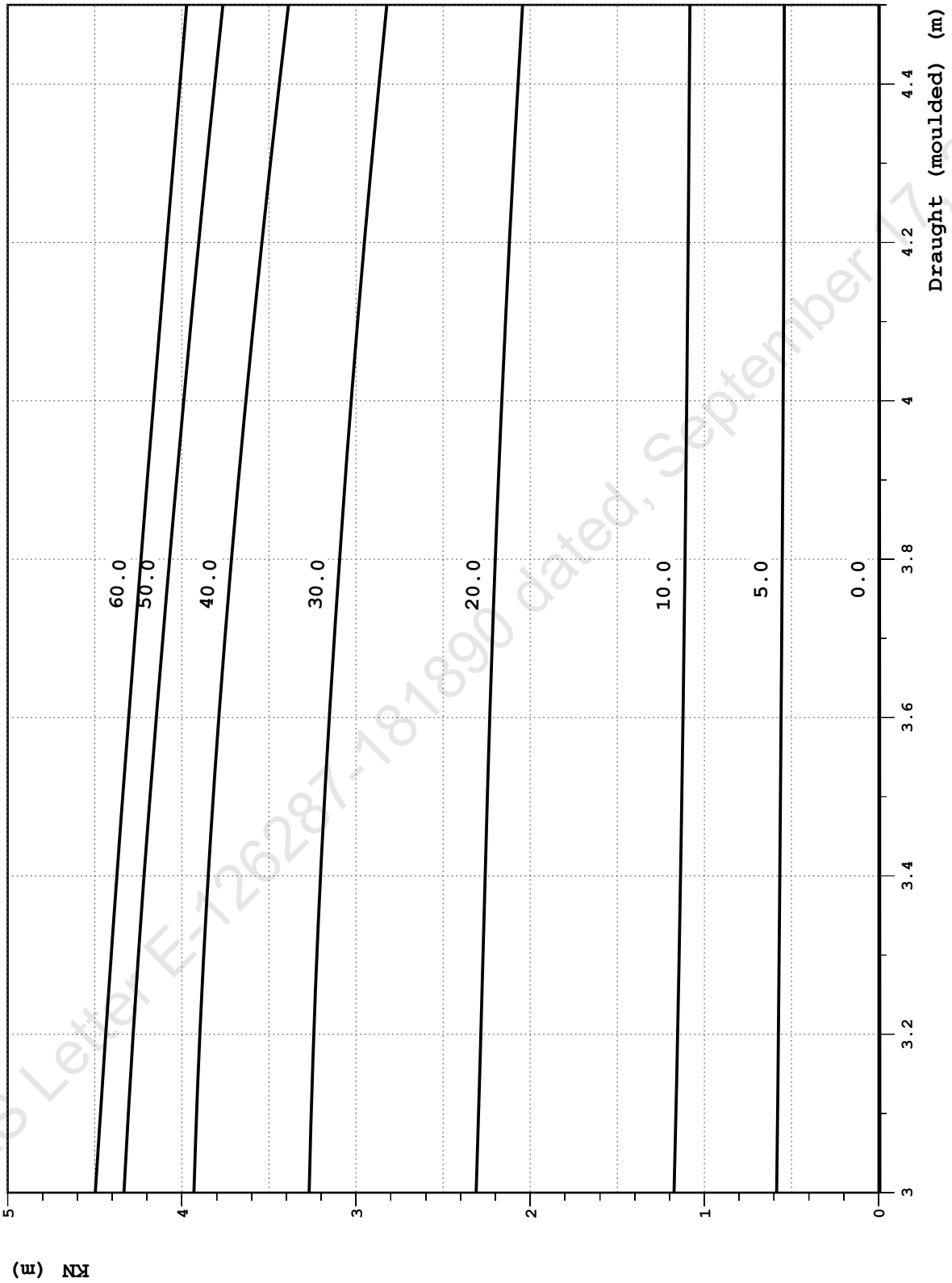
Refer IRS Letter E-126287-181890 dated, September 17, 2021

Trim: 0.6 m

	KN (For Diff Heel Angles)							
draught	0.0	5.0	10.0	20.0	30.0	40.0	50.0	60.0
3.000	-0.008	0.585	1.174	2.310	3.269	3.931	4.333	4.497
3.050	-0.008	0.582	1.168	2.303	3.264	3.924	4.320	4.482
3.100	-0.007	0.579	1.163	2.296	3.257	3.916	4.307	4.467
3.150	-0.007	0.577	1.158	2.290	3.250	3.907	4.294	4.452
3.200	-0.007	0.575	1.153	2.283	3.243	3.897	4.280	4.437
3.250	-0.007	0.572	1.149	2.277	3.234	3.886	4.265	4.421
3.300	-0.007	0.570	1.145	2.271	3.225	3.874	4.250	4.406
3.350	-0.006	0.568	1.141	2.265	3.215	3.862	4.234	4.390
3.400	-0.006	0.567	1.137	2.259	3.204	3.849	4.217	4.373
3.450	-0.006	0.565	1.133	2.252	3.192	3.835	4.200	4.357
3.500	-0.006	0.563	1.129	2.246	3.180	3.820	4.183	4.340
3.550	-0.006	0.561	1.126	2.239	3.167	3.804	4.165	4.323
3.600	-0.006	0.559	1.123	2.232	3.154	3.788	4.147	4.305
3.650	-0.006	0.558	1.119	2.225	3.139	3.771	4.128	4.288
3.700	-0.006	0.556	1.116	2.217	3.125	3.753	4.109	4.270
3.750	-0.005	0.554	1.114	2.209	3.110	3.734	4.090	4.253
3.800	-0.005	0.553	1.111	2.201	3.094	3.715	4.071	4.235
3.850	-0.005	0.551	1.108	2.192	3.079	3.695	4.051	4.217
3.900	-0.005	0.550	1.106	2.183	3.062	3.675	4.031	4.199
3.950	-0.005	0.548	1.103	2.173	3.045	3.654	4.010	4.180
4.000	-0.005	0.547	1.101	2.163	3.028	3.632	3.989	4.162
4.050	-0.005	0.546	1.099	2.153	3.010	3.610	3.968	4.143
4.100	-0.005	0.545	1.097	2.142	2.991	3.587	3.947	4.125
4.150	-0.005	0.545	1.095	2.131	2.972	3.564	3.925	4.106
4.200	-0.005	0.544	1.093	2.120	2.952	3.540	3.903	4.087
4.250	-0.004	0.543	1.091	2.108	2.932	3.516	3.881	4.069
4.300	-0.004	0.543	1.089	2.096	2.911	3.491	3.858	4.050
4.350	-0.004	0.542	1.088	2.083	2.890	3.466	3.835	4.031
4.400	-0.004	0.542	1.086	2.070	2.868	3.440	3.812	4.011
4.450	-0.004	0.541	1.085	2.057	2.846	3.414	3.788	3.992
4.500	-0.004	0.541	1.083	2.044	2.823	3.388	3.764	3.973

Refer IRS Letter E-125287/181/90 dated, September 17, 2021

Trim: 0.6 m



Refer IRS Letter E-126287-181890 dated, September 17, 2021

11. LOADING CONDITIONS

LOADING CONDITIONS SUMMARY TABLE

LOADING CONDITION	T m	TR m	HEEL deg	GM m	DISP t	KG m
LIGHTSHIP - Not sailing condition	3.508	-0.844	0.4	1.799	692.1	4.591
DRY DOCKING - Not sailing condition	3.689	-0.223	0.2	1.901	742.6	4.371
LC01 - DEPARTURE (100% CONSUMABLES)	4.176	-0.283	0.5	2.095	901.8	4.052
LC02 - ARRIVAL (10% CONSUMABLES)	3.674	-0.579	0.1	1.907	741.4	4.388
LC03 - LC01+CRANE LOAD(3T Load)	4.184	-0.310	0.5	2.074	904.8	4.072
LC04 - LC02+CRANE LOAD(3T Load)	3.682	-0.609	0.1	1.883	744.4	4.411

Refer IRS Letter E-126287-181890 dated, September 17, 2021

LIGHTSHIP - Not sailing condition

Floating Position - Intact condition

Draught at AP (moulded)	3.930 m
Draught at FP (moulded)	3.086 m
Mean Draught (moulded)	3.508 m
Trim (+ by Bow)	-0.844 m
Heel (+ PS)	0.4 deg
KM above moulded BL	6.601 m
KG above moulded BL	4.591 m
GM0 (solid)	2.010 m
Free Surface Correction	0.211 m
GM (liquid)	1.799 m
Density of Water	1.025 t/m3

LCB	:	15.849 m Fwd of AP
LCF	:	14.862 m Fwd of AP
MCT	:	6.272 tm/cm
TPC	:	3.141 t/cm

LOAD SUMMARY TABLE

NAME	LOAD	MASS t	LCG m	TCG m	VCG m
Oil Spill Dispersant	DISPERSANT	0.0	0.000	0.000	0.000
Diesel Oil	DO	0.0	0.000	0.000	0.000
Fire fighting Foam	FOAM	0.0	0.000	0.000	0.000
Fresh Water	FW	0.0	0.000	0.000	0.000
Grey Water	GWT	0.0	0.000	0.000	0.000
Lubricating Oil	LO	0.0	0.000	0.000	0.000
Sludge	SLU	0.0	0.000	0.000	0.000
Deadweight		0.0	0.000	0.000	0.000
Lightweight		692.1	15.914	0.008	4.591
Deadweight		0.0	0.000	0.000	0.000
Total weight		692.1	15.914	0.008	4.591

Refer IRS Letter E-126287-181890 dated, September 17, 2021

LOADING COMPONENTS

Diesel Oil (Density 0.860 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.FODAYTK.P	DO	0.0	0.0	0.0	8.811	4.540	3.752	4.08
R.FODAYTK.S	DO	0.0	0.0	0.0	8.811	-4.540	3.752	4.08
R.FOTK.1S	DO	0.0	0.0	0.0	23.089	-3.686	2.307	0.00
R.FOTK.1P	DO	0.0	0.0	0.0	23.089	3.686	2.307	0.00
R.FOTK.2P	DO	0.0	0.0	0.0	14.194	1.037	1.041	0.00
R.FOTK.2S	DO	0.0	0.0	0.0	14.194	-1.037	1.041	0.00
R.FOTK.3P	DO	0.0	0.0	0.0	17.384	4.764	1.434	0.00
R.FOTK.3S	DO	0.0	0.0	0.0	17.384	-4.764	1.434	0.00
R.FOTK.4C	DO	0.0	0.0	0.0	8.705	0.000	1.932	76.61
TOTAL			0.0	0.0				84.76

Fresh Water (Density 1.0 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.FWTK.P	FW	0.0	0.0	0.0	27.551	1.914	2.570	16.56
R.FWTK.S	FW	0.0	0.0	0.0	27.632	-1.659	2.506	19.88
TOTAL			0.0	0.0				36.44

Lub Oil (Density 0.860 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.LOTK.P	LO	0.0	0.0	0.0	11.001	5.423	4.122	0.06
R.LOTK.S	LO	0.0	0.0	0.0	11.001	-5.423	4.122	0.06
TOTAL			0.0	0.0				0.13

FOAM (Density 1.0 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.FOAMTK	FOAM	0.0	0.0	0.0	22.738	0.000	1.044	1.63
TOTAL			0.0	0.0				1.63

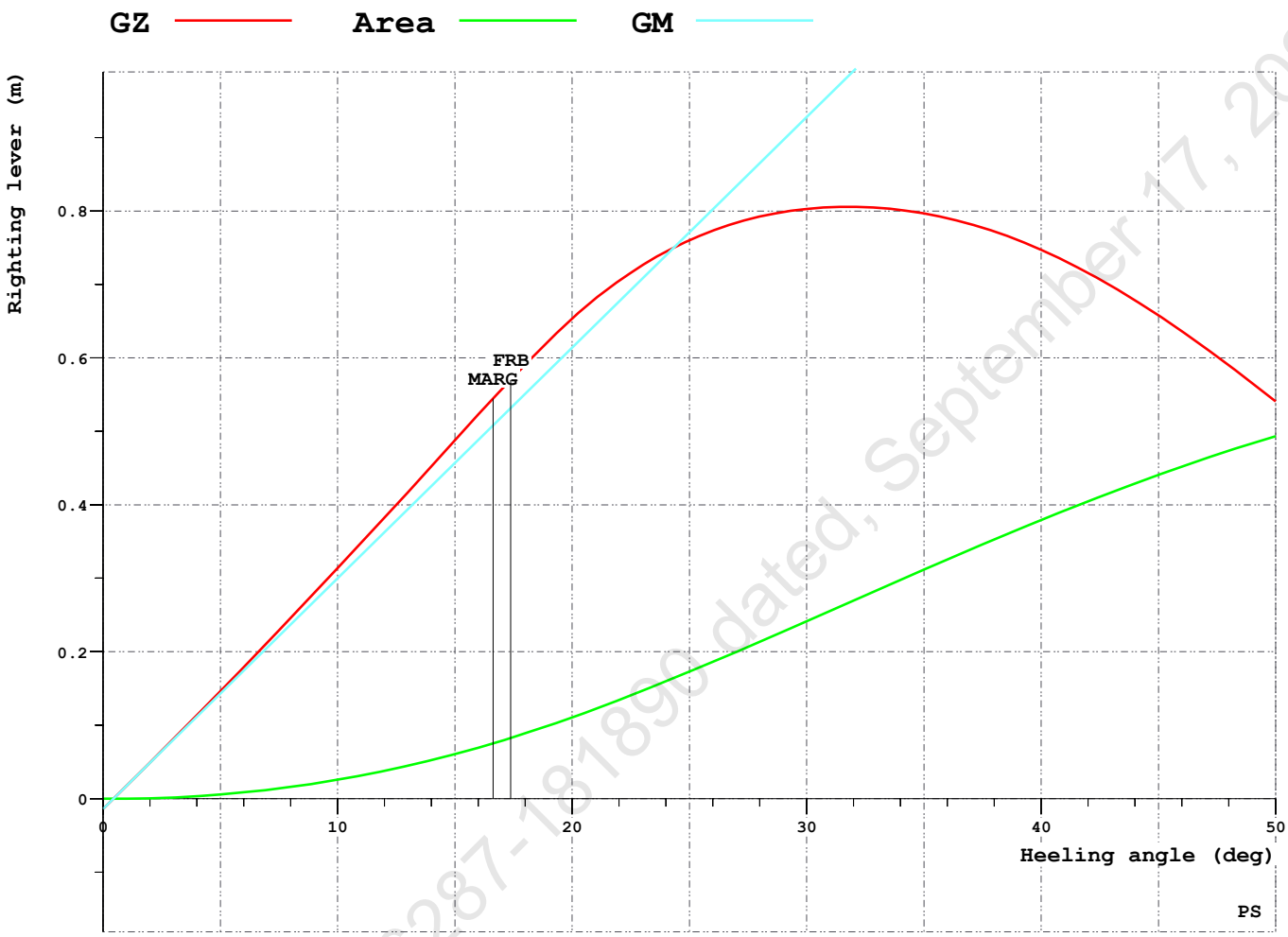
Refer IRS Letter E-126287-18/890 dated, September 17, 2021

DISPERSANT (Density 1.0 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.DISPERSANTTK	DISPERSANT	0.0	0.0	0.0	18.749	0.000	0.752	9.74
TOTAL			0.0	0.0				9.74

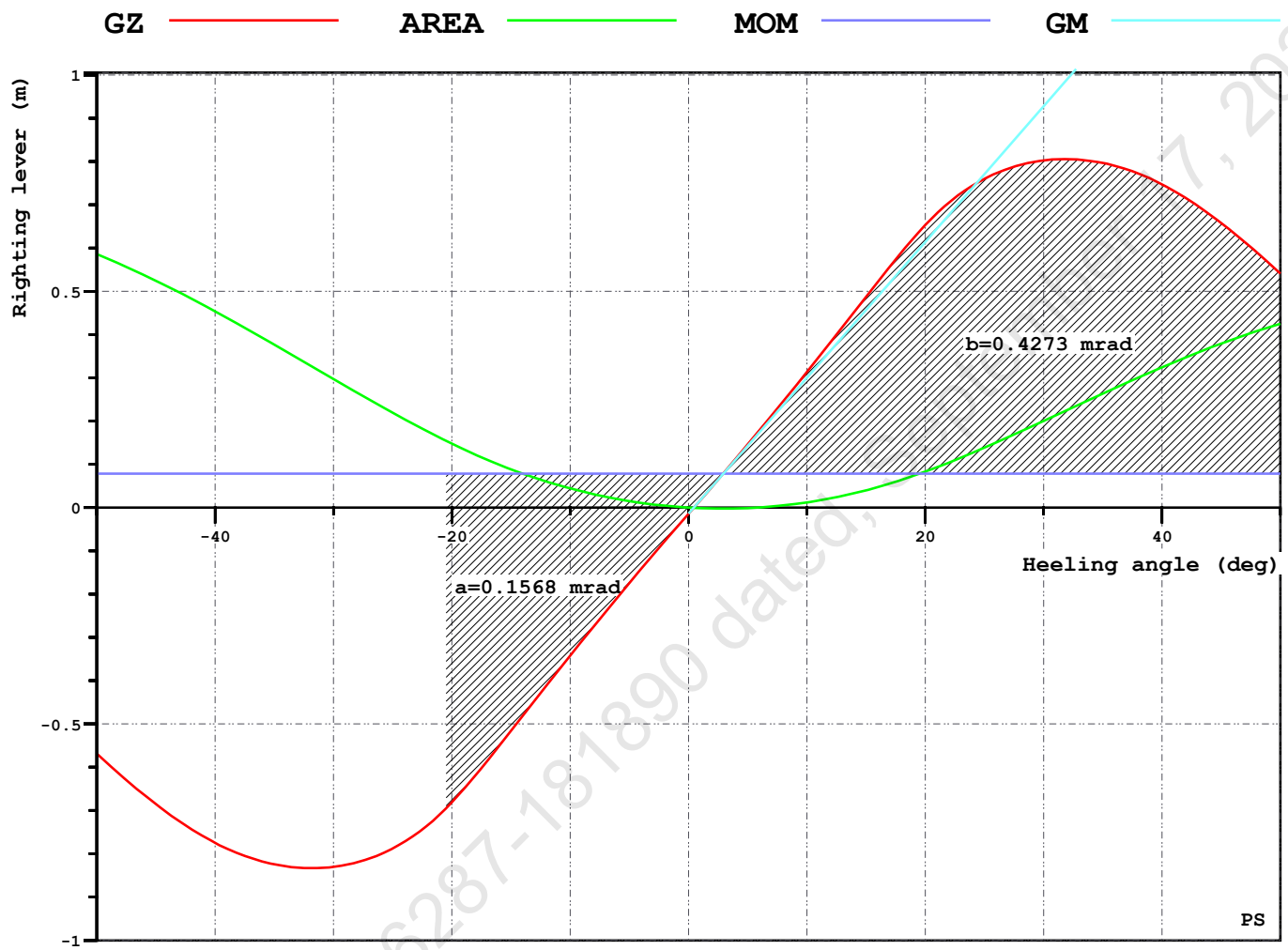
Refer IRS Letter E-126287-181890 dated, September 17, 2021

INTACT STABILITY CHECK PLOT



Refer IRS Letter E-126287-181890 dated, September 17, 2021

IMO WEATHER CRITERIA



Refer IRS Letter E-126287-181890 dated, 17.09.2021

INTACT STABILITY CRITERIA

RCR	TEXT	REQ	ATTV	UNIT	STAT
AREA30	Area under GZ curve up to 30 deg.	0.055	0.242	mrad	OK
AREA40	Area under GZ curve up to 40 deg.	0.090	0.379	mrad	OK
AREA3040	Area under GZ curve btw. 30-40 deg.	0.030	0.138	mrad	OK
GZ0.2	Max GZ > 0.2	0.200	0.806	m	OK
MAXGZ25	Max. GZ at an angle > 25 deg.	25.000	31.806	deg	OK
GM0.15	GM > 0.15 m	0.150	1.799	m	OK
V.IMOWEATHER	IMO weather criterion	1.000	2.726		OK
IMO.WIND_HEEL	Wind Heel <16 or <=80% of dk imm.	13.904	2.101	deg	OK
2020IS-B2.9.7.1.2	Eq. angle less than 10 deg. or dk. imm.	17.380	2.497	deg	OK
2020IS-B2.9.7.1.1	Resid. righting area > 0.08 mrad	0.080	0.234	mrad	OK

Refer IRS Letter E-126287-181890 dated, September 17, 2021

GZ CURVE DATA

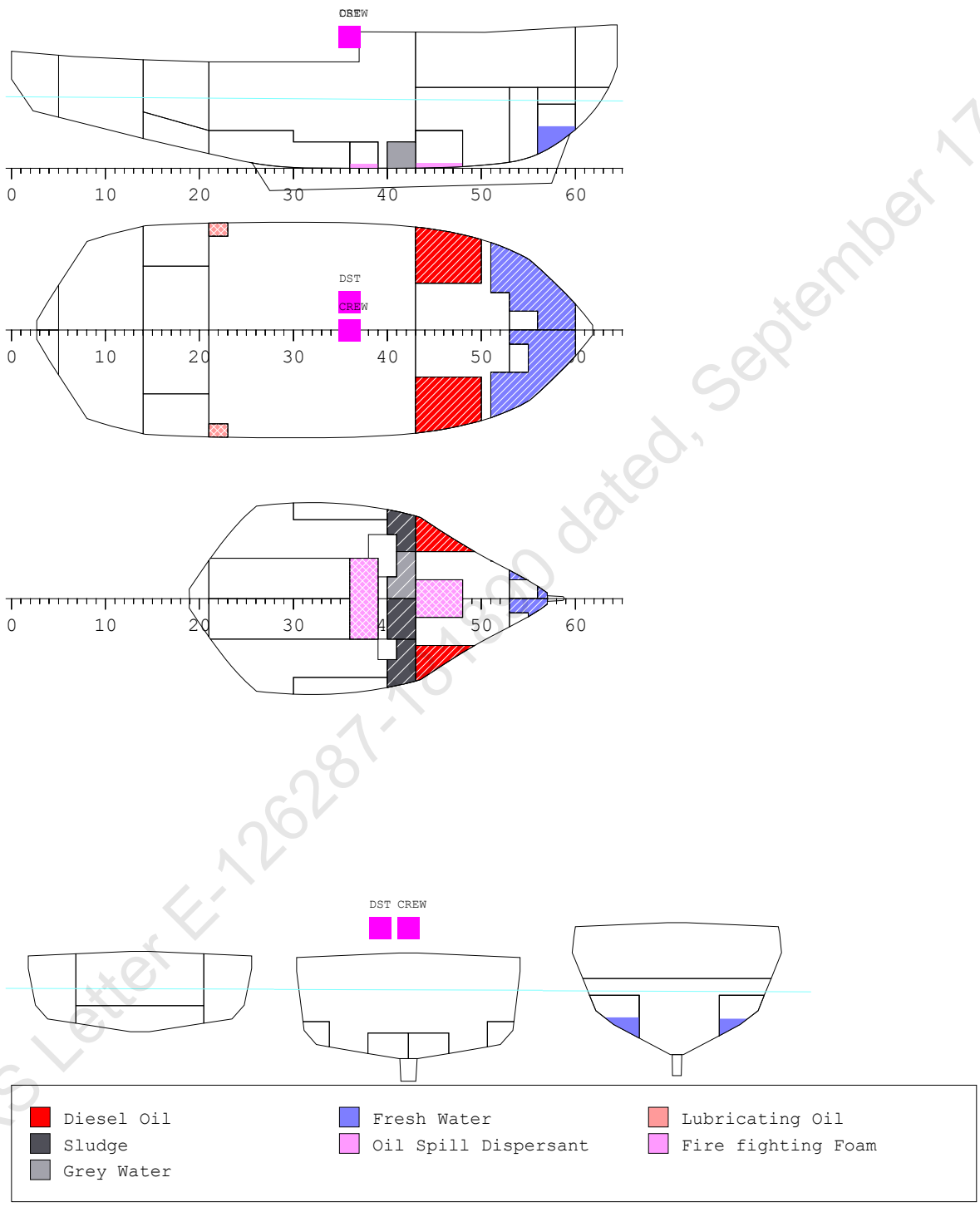
HEEL deg	T m	TR m	GZ m	AREA mrad
0.0	3.508	-0.844	-0.014	0.000
0.4	3.508	-0.844	0.000	0.000
5.0	3.489	-0.834	0.146	0.006
10.0	3.431	-0.802	0.314	0.026
15.0	3.331	-0.742	0.488	0.061
20.0	3.192	-0.662	0.654	0.111
30.0	2.841	-0.642	0.803	0.242
40.0	2.373	-0.853	0.747	0.379
50.0	1.832	-1.137	0.541	0.493

RELEVANT OPENINGS

NAME	TEXT	WT	X m	Y m	Z m	IMMA deg	IMMR m
ER_V_P	ER_INLET_P	UNPROTECTED	13.373	2.300	6.300	-	2.700
ER_V_S	ER_INLET_S	UNPROTECTED	13.373	-2.300	6.300	-	2.736
ER_O_P	ER_OUT_P	UNPROTECTED	14.000	1.500	8.400	-	4.822
ER_O_S	ER_OUT_S	UNPROTECTED	14.000	-1.500	8.400	-	4.846

Refer IRS Letter E-126287-181890 dated, September 17, 2021

DRY DOCKING - Not sailing condition



Refer IRS Letter E-126287-181.00 dated, September 17, 2021

DRY DOCKING - Not sailing condition

Floating Position - Intact condition

Draught at AP (moulded)	3.800 m
Draught at FP (moulded)	3.578 m
Mean Draught (moulded)	3.689 m
Trim (+ by Bow)	-0.223 m
Heel (+ PS)	0.2 deg
KM above moulded BL	6.469 m
KG above moulded BL	4.371 m
GM0 (solid)	2.098 m
Free Surface Correction	0.197 m
GM (liquid)	1.901 m
Density of Water	1.025 t/m3

LCB	:	16.327 m Fwd of AP
LCF	:	15.135 m Fwd of AP
MCT	:	6.472 tm/cm
TPC	:	3.182 t/cm

LOAD SUMMARY TABLE

NAME	LOAD	MASS t	LCG m	TCG m	VCG m
Crew	CREW	1.0	18.000	0.000	7.000
Oil Spill Dispersant	DISPERSANT	0.8	18.743	0.000	0.141
Diesel Oil	DO	7.9	22.871	0.000	1.355
Deck Store	DST	0.2	18.000	1.500	7.000
Fire fighting Foam	FOAM	0.9	22.635	0.000	0.175
Fresh Water	FW	9.4	27.461	0.254	1.716
Grey Water	GWT	3.5	20.842	1.034	0.741
Lubricating Oil	LO	0.4	11.003	0.000	2.781
Sludge	SLU	26.3	20.768	-0.434	1.102
Deadweight		50.5	22.203	-0.100	1.352
Lightweight		692.1	15.914	0.008	4.591
Deadweight		50.5	22.203	-0.100	1.352
Total weight		742.6	16.342	0.001	4.371

Refer IRS Letter E-126287-181890 dated, September 17, 2021

LOADING COMPONENTS

Diesel Oil (Density 0.860 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.FODAYTK.P	DO	0.0	0.0	0.0	8.811	4.540	3.752	4.08
R.FODAYTK.S	DO	0.0	0.0	0.0	8.811	-4.540	3.752	4.08
R.FOTK.1S	DO	24.1	3.9	4.6	23.089	-3.686	2.307	0.00
R.FOTK.1P	DO	24.1	3.9	4.6	23.089	3.686	2.307	0.00
R.FOTK.2P	DO	0.0	0.0	0.0	14.194	1.037	1.041	0.00
R.FOTK.2S	DO	0.0	0.0	0.0	14.194	-1.037	1.041	0.00
R.FOTK.3P	DO	0.0	0.0	0.0	17.384	4.764	1.434	0.00
R.FOTK.3S	DO	0.0	0.0	0.0	17.384	-4.764	1.434	0.00
R.FOTK.4C	DO	0.0	0.0	0.0	8.705	0.000	1.932	76.61
TOTAL			7.9	9.2				84.76

Fresh Water (Density 1.0 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.FWTK.P	FW	27.8	4.7	4.7	27.551	1.914	2.570	16.56
R.FWTK.S	FW	27.4	4.7	4.7	27.632	-1.659	2.506	19.88
TOTAL			9.4	9.4				36.44

Lub Oil (Density 0.860 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.LOTK.P	LO	10.0	0.2	0.2	11.001	5.423	4.122	0.06
R.LOTK.S	LO	10.0	0.2	0.2	11.001	-5.423	4.122	0.06
TOTAL			0.4	0.5				0.13

FOAM (Density 1.0 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.FOAMTK	FOAM	10.0	0.9	0.9	22.738	0.000	1.044	1.63
TOTAL			0.9	0.9				1.63

Refer IRS Letter E-126287-181890 dated, September 17, 2021

DISPERSANT (Density 1.0 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.DISPERSANTTK	DISPERSANT	10.0	0.8	0.8	18.749	0.000	0.752	9.74
TOTAL			0.8	0.8				9.74

STORES

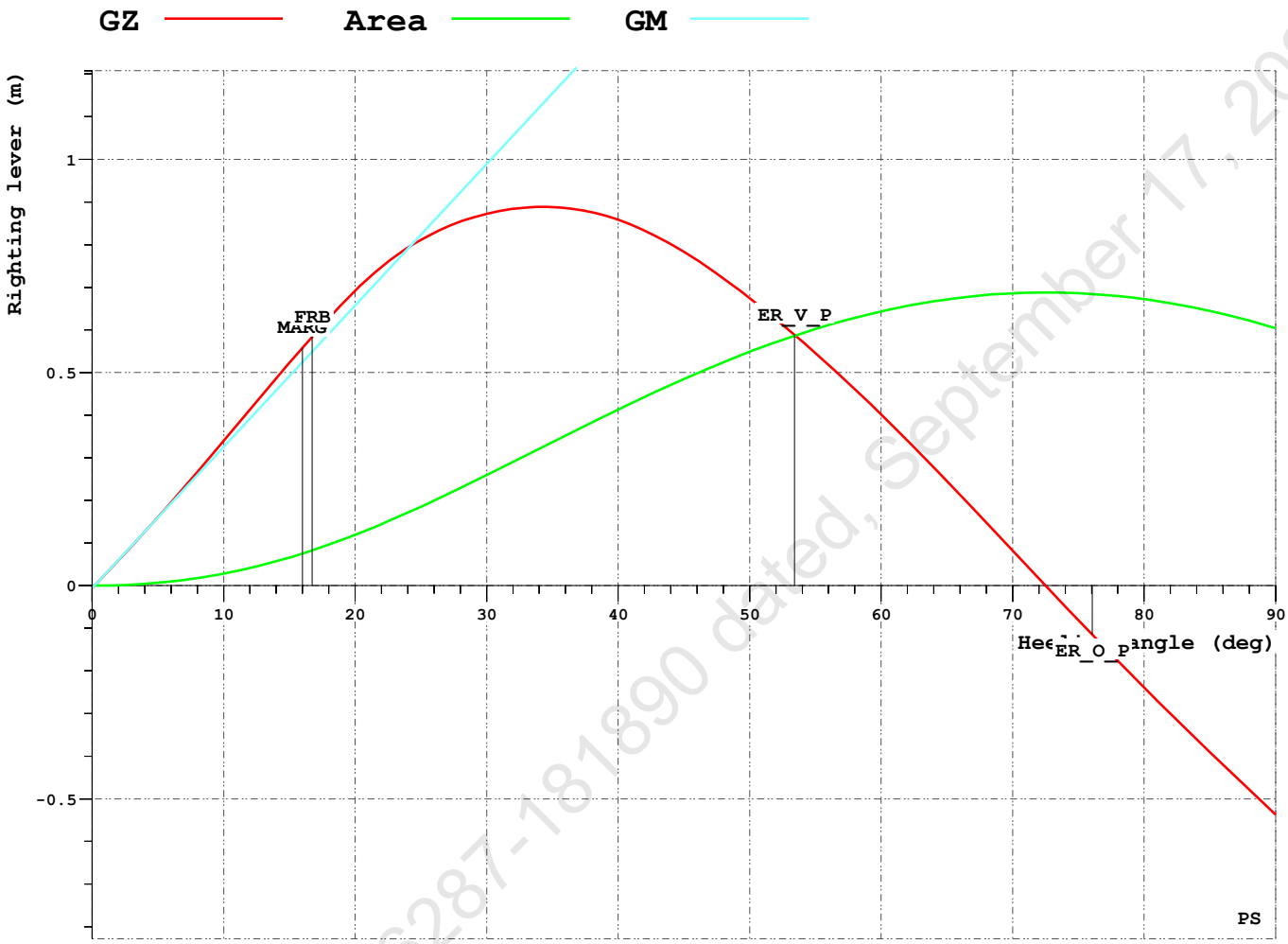
NAME	PURP	MASS t	LCG m	TCG m	VCG m
STORES	MASS	0.2	18.000	1.500	7.000
TOTAL		0.2	18.000	1.500	7.000

CREW

NAME	PURP	MASS t	LCG m	TCG m	VCG m
CREW	MASS	1.0	18.000	0.000	7.000
TOTAL		1.0	18.000	0.000	7.000

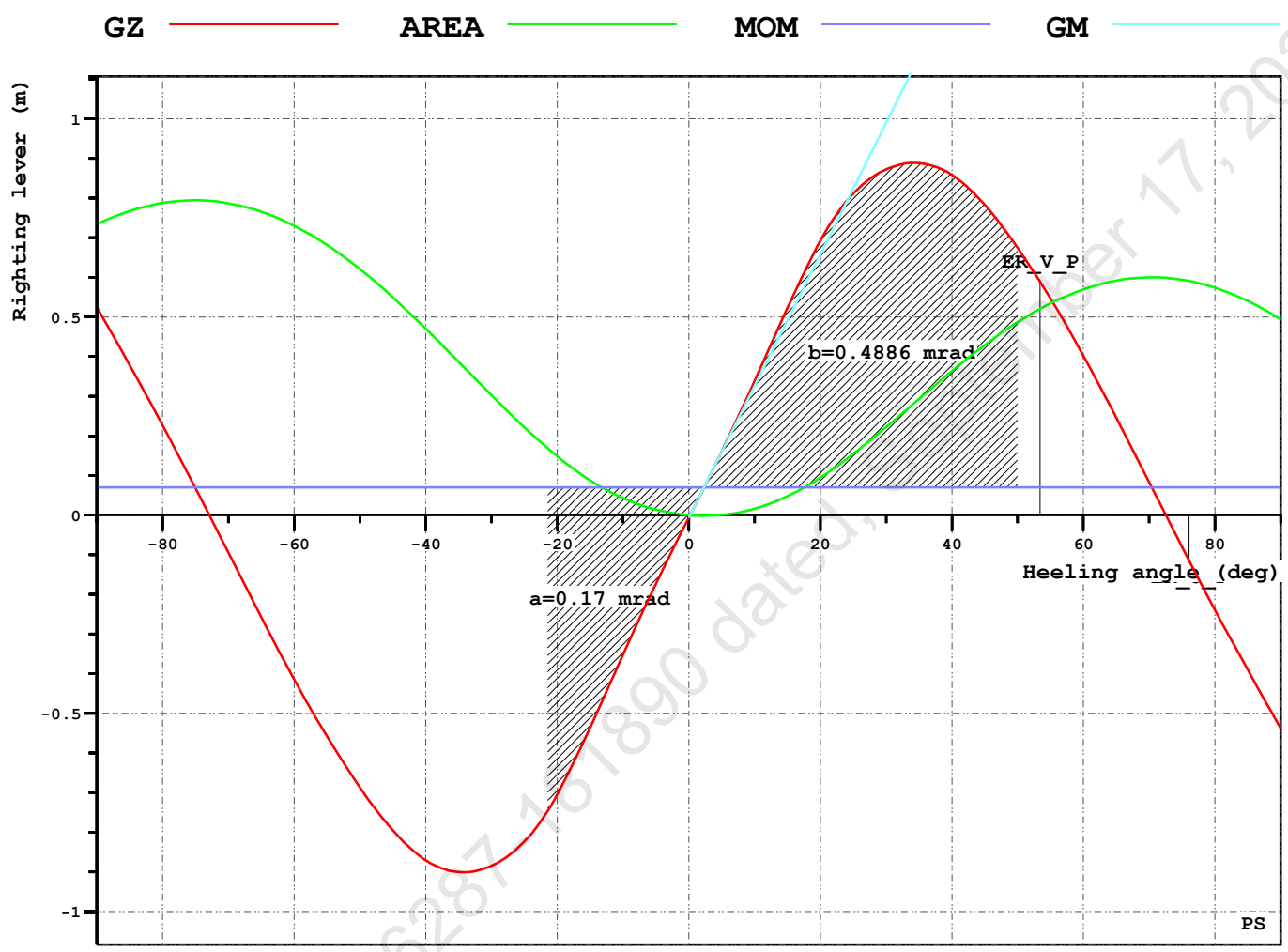
Refer IRS Letter E-126287-181800 dated, September 17, 2021

INTACT STABILITY CHECK PLOT



Refer IRS Letter E-126287-181890 dated, September 17, 2021

IMO WEATHER CRITERIA



Refer IRS Letter E-126287-161890 dated, October 17, 2021

INTACT STABILITY CRITERIA

RCR	TEXT	REQ	ATTV	UNIT	STAT
AREA30	Area under GZ curve up to 30 deg.	0.055	0.259	mrad	OK
AREA40	Area under GZ curve up to 40 deg.	0.090	0.413	mrad	OK
AREA3040	Area under GZ curve btw. 30-40 deg.	0.030	0.154	mrad	OK
GZ0.2	Max GZ > 0.2	0.200	0.888	m	OK
MAXGZ25	Max. GZ at an angle > 25 deg.	25.000	34.286	deg	OK
GM0.15	GM > 0.15 m	0.150	1.901	m	OK
V.IMOWEATHER	IMO weather criterion	1.000	2.875		OK
IMO.WIND_HEEL	Wind Heel <16 or <=80% of dk imm.	13.389	1.628	deg	OK

Refer IRS Letter E-126287-181890 dated, September 17, 2021

GZ CURVE DATA

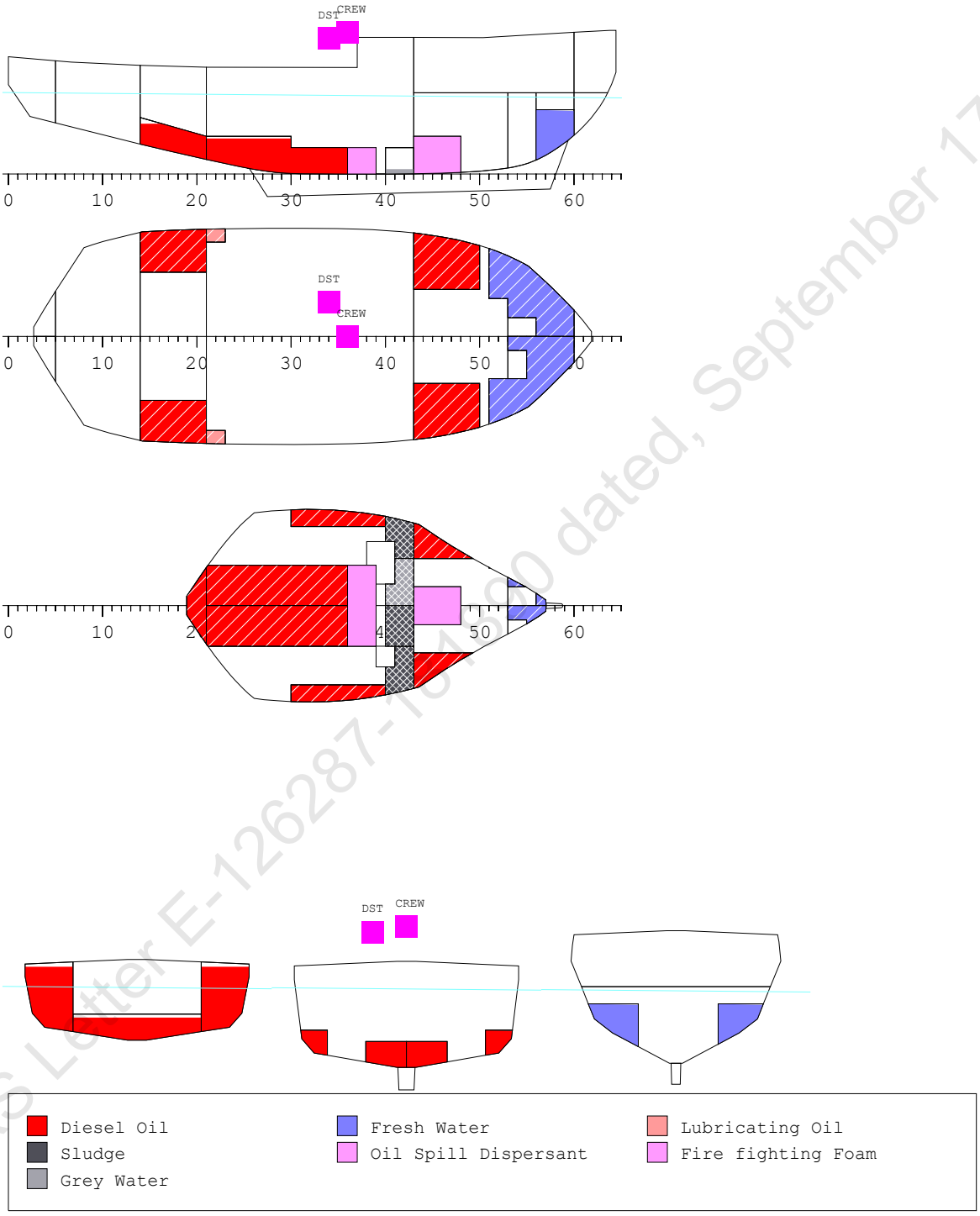
HEEL deg	T m	TR m	GZ m	AREA mrad
0.0	3.689	-0.223	-0.006	0.000
0.2	3.689	-0.223	0.000	0.000
10.0	3.609	-0.187	0.339	0.028
20.0	3.367	-0.061	0.692	0.119
30.0	3.021	-0.057	0.872	0.259
40.0	2.571	-0.254	0.858	0.413
50.0	2.049	-0.499	0.675	0.548
60.0	1.479	-0.732	0.402	0.643
70.0	0.873	-0.943	0.082	0.686
80.0	0.264	-1.053	-0.239	0.672
90.0	-0.327	-1.171	-0.537	0.604

RELEVANT OPENINGS

NAME	TEXT	WT	X m	Y m	Z m	IMMA deg	IMMR m
ER_V_P	ER_INLET_P	UNPROTECTED	13.373	2.300	6.300	53.4	2.584
ER_V_S	ER_INLET_S	UNPROTECTED	13.373	-2.300	6.300	-	2.599
ER_O_P	ER_OUT_P	UNPROTECTED	14.000	1.500	8.400	76.1	4.691
ER_O_S	ER_OUT_S	UNPROTECTED	14.000	-1.500	8.400	-	4.701

Refer IRS Letter E-126287-181890 dated, September 17, 2021

LC01 - DEPARTURE (100% CONSUMABLES)



Refer IRS Letter E-126287-101-20 dated, September 17, 2021

LC01 - DEPARTURE (100% CONSUMABLES)

Floating Position - Intact condition

Draught at AP (moulded)	4.318 m
Draught at FP (moulded)	4.035 m
Mean Draught (moulded)	4.176 m
Trim (+ by Bow)	-0.283 m
Heel (+ PS)	0.5 deg
KM above moulded BL	6.309 m
KG above moulded BL	4.052 m
GM0 (solid)	2.257 m
Free Surface Correction	0.162 m
GM (liquid)	2.095 m
Density of Water	1.025 t/m3

LCB	:	16.061 m Fwd of AP
LCF	:	15.040 m Fwd of AP
MCT	:	7.165 tm/cm
TPC	:	3.326 t/cm

LOAD SUMMARY TABLE

NAME	LOAD	MASS t	LCG m	TCG m	VCG m
Crew	CREW	1.0	18.000	0.000	7.500
Oil Spill Dispersant	DISPERSANT	8.1	18.749	0.000	0.752
Diesel Oil	DO	149.7	13.781	0.000	2.274
Deck Store	DST	2.0	17.000	1.800	7.200
Fire fighting Foam	FOAM	9.4	22.738	0.000	1.044
Fresh Water	FW	32.3	27.584	0.119	2.494
Grey Water	GWT	0.4	20.745	0.546	0.148
Lubricating Oil	LO	4.0	11.001	0.000	4.055
Sludge	SLU	2.8	20.800	-0.202	0.501
Deadweight		209.7	16.605	0.034	2.272
Lightweight		692.1	15.914	0.008	4.591
Deadweight		209.7	16.605	0.034	2.272
Total weight		901.8	16.075	0.014	4.052

Refer IRS Letter No-126287-181890 dated, September 17, 2021

LOADING COMPONENTS

Diesel Oil (Density 0.860 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.FODAYTK.P	DO	95.0	24.1	28.0	8.811	4.540	3.752	4.08
R.FODAYTK.S	DO	95.0	24.1	28.0	8.811	-4.540	3.752	4.08
R.FOTK.1S	DO	95.0	15.5	18.1	23.089	-3.686	2.307	0.00
R.FOTK.1P	DO	95.0	15.5	18.1	23.089	3.686	2.307	0.00
R.FOTK.2P	DO	95.0	18.8	21.9	14.194	1.037	1.041	0.00
R.FOTK.2S	DO	95.0	18.8	21.9	14.194	-1.037	1.041	0.00
R.FOTK.3P	DO	95.0	5.6	6.5	17.384	4.764	1.434	0.00
R.FOTK.3S	DO	95.0	5.6	6.5	17.384	-4.764	1.434	0.00
R.FOTK.4C	DO	95.0	21.7	25.3	8.705	0.000	1.932	76.61
TOTAL			149.7	174.1				84.76

Fresh Water (Density 1.0 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.FWTK.P	FW	95.0	16.1	16.1	27.551	1.914	2.570	16.56
R.FWTK.S	FW	95.0	16.3	16.3	27.632	-1.659	2.506	19.88
TOTAL			32.3	32.3				36.44

Lub Oil (Density 0.860 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.LOTK.P	LO	95.0	2.0	2.2	11.001	5.423	4.122	0.06
R.LOTK.S	LO	95.0	2.0	2.2	11.001	-5.423	4.122	0.06
TOTAL			4.0	4.4				0.13

FOAM (Density 1.0 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.FOAMTK	FOAM	100.0	9.4	9.4	22.738	0.000	1.044	1.63
TOTAL			9.4	9.4				1.63

Refer IRS Letter E-126287-18/890 dated, September 17, 2021

DISPERSANT (Density 1.0 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.DISPERSANTTK	DISPERSANT	100.0	8.1	8.1	18.749	0.000	0.752	9.74
TOTAL			8.1	8.1				9.74

STORES

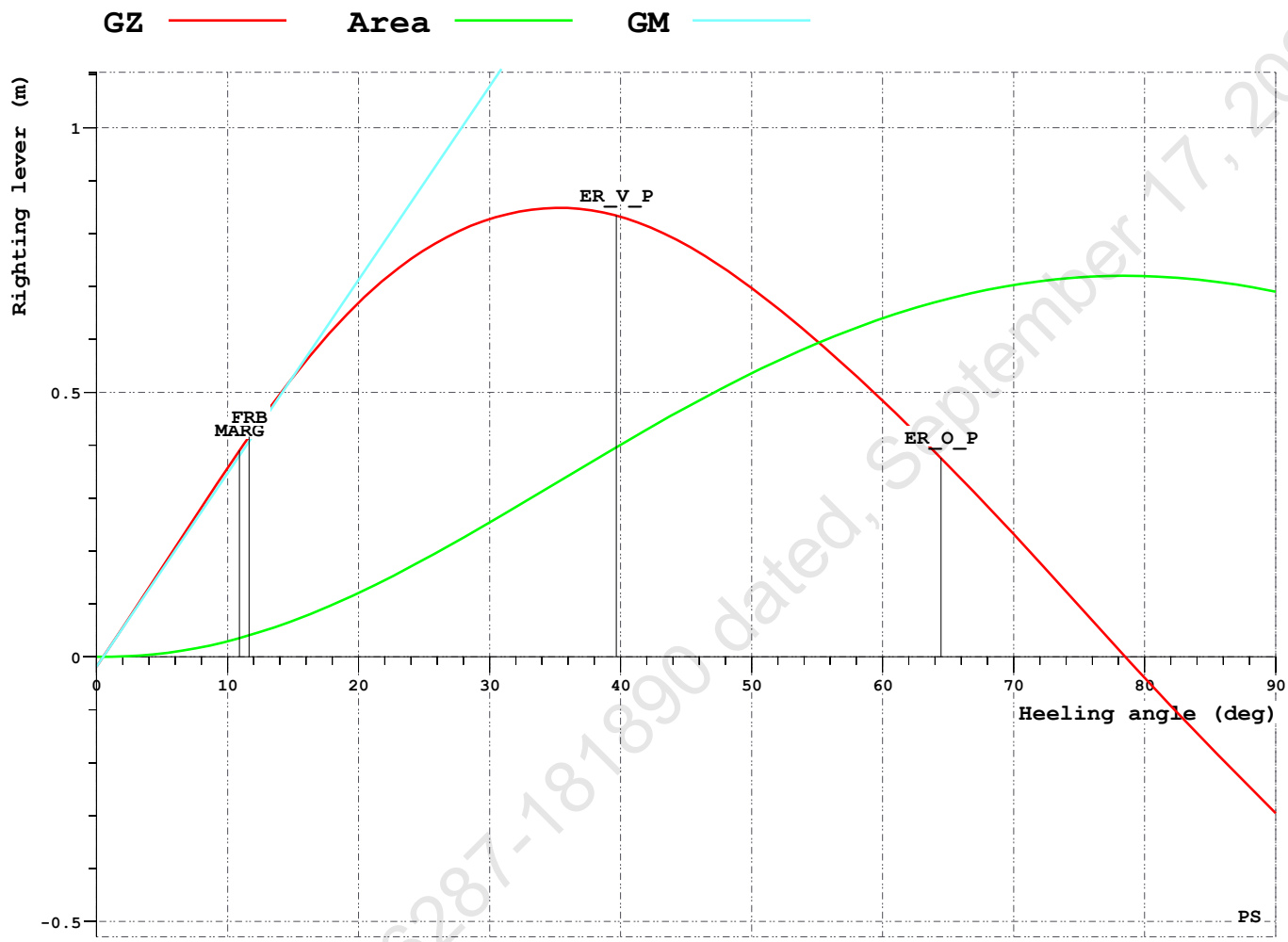
NAME	PURP	MASS t	LCG m	TCG m	VCG m
STORES	MASS	2.0	17.000	1.800	7.200
TOTAL		2.0	17.000	1.800	7.200

CREW

NAME	PURP	MASS t	LCG m	TCG m	VCG m
CREW	MASS	1.0	18.000	0.000	7.500
TOTAL		1.0	18.000	0.000	7.500

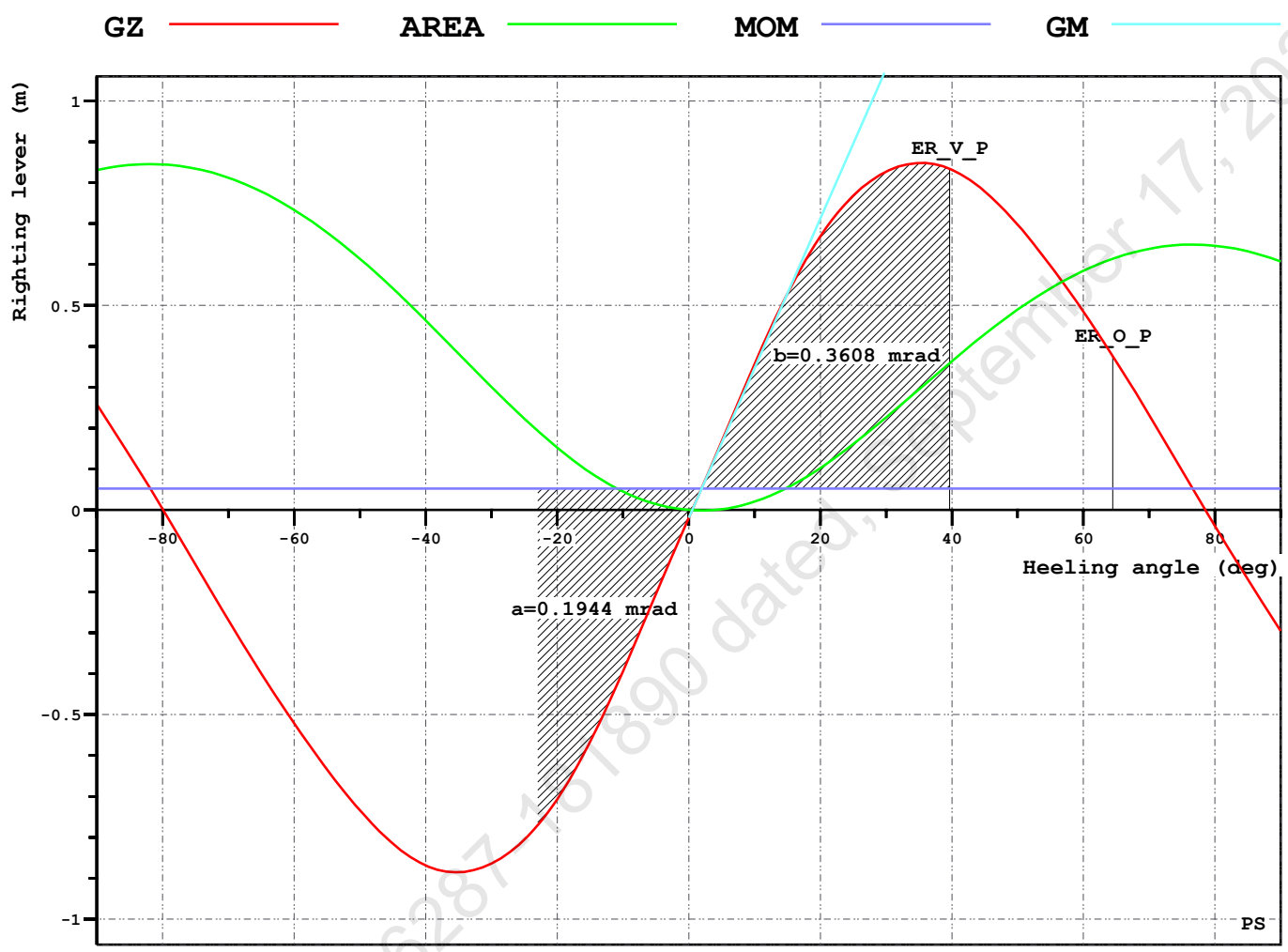
Refer IRS Letter E-126287-181800 dated, September 17, 2021

INTACT STABILITY CHECK PLOT



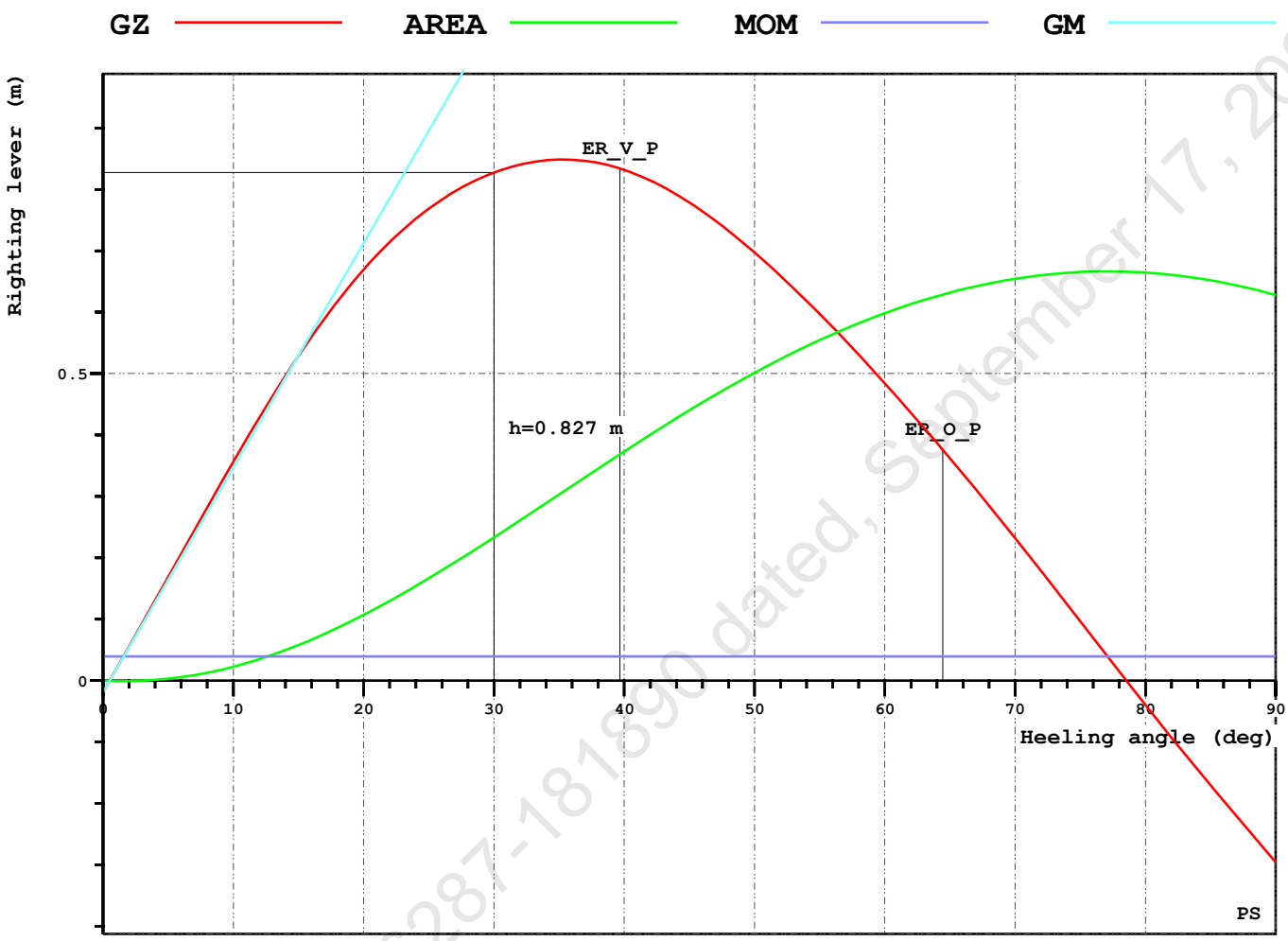
Refer IRS Letter E-126287-181890 dated, September 17, 2021

IMO WEATHER CRITERIA



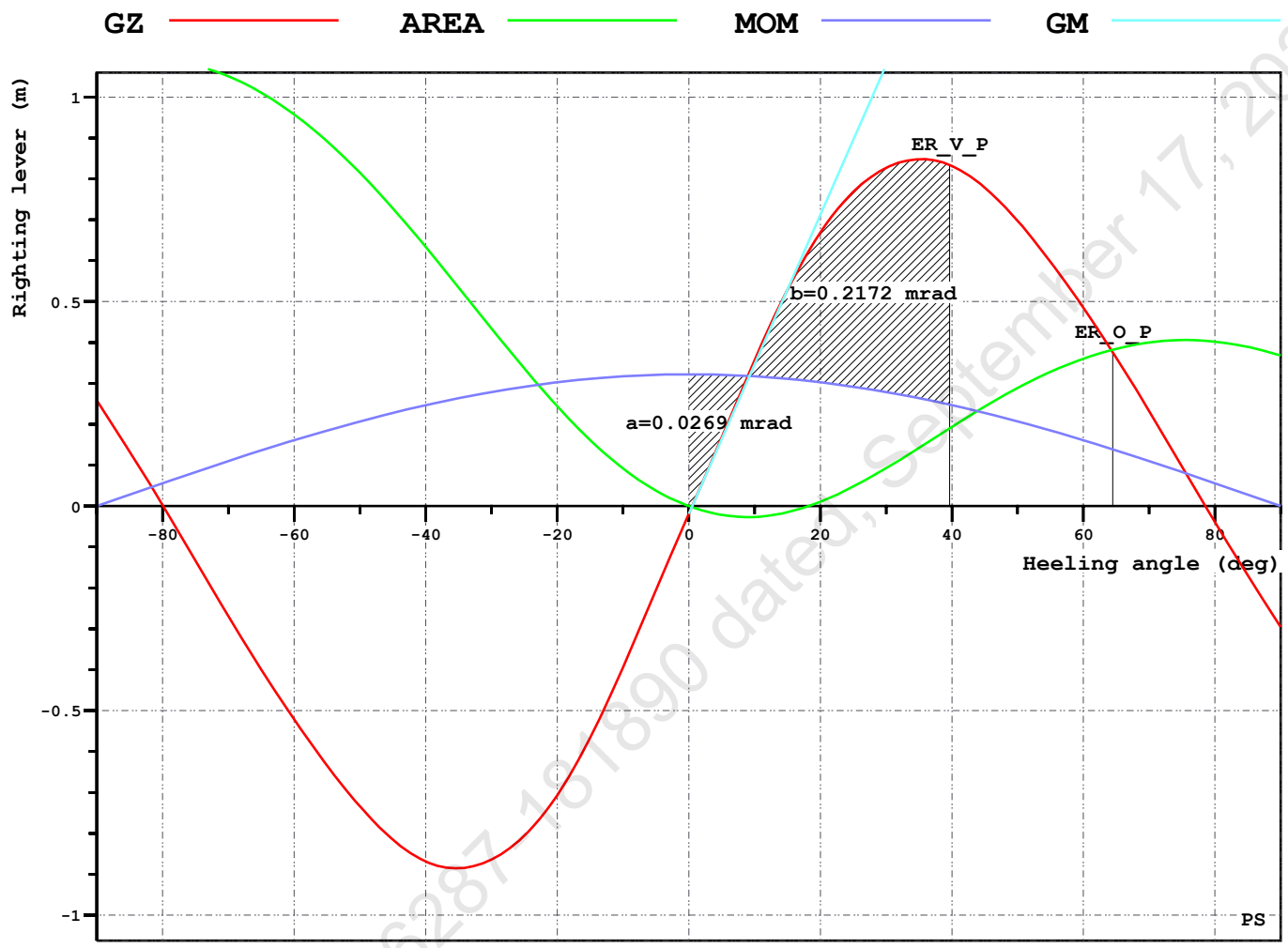
Refer IRS Letter E-126287 / 161890 dated, September 17, 2021

EXTERNAL FI-FI



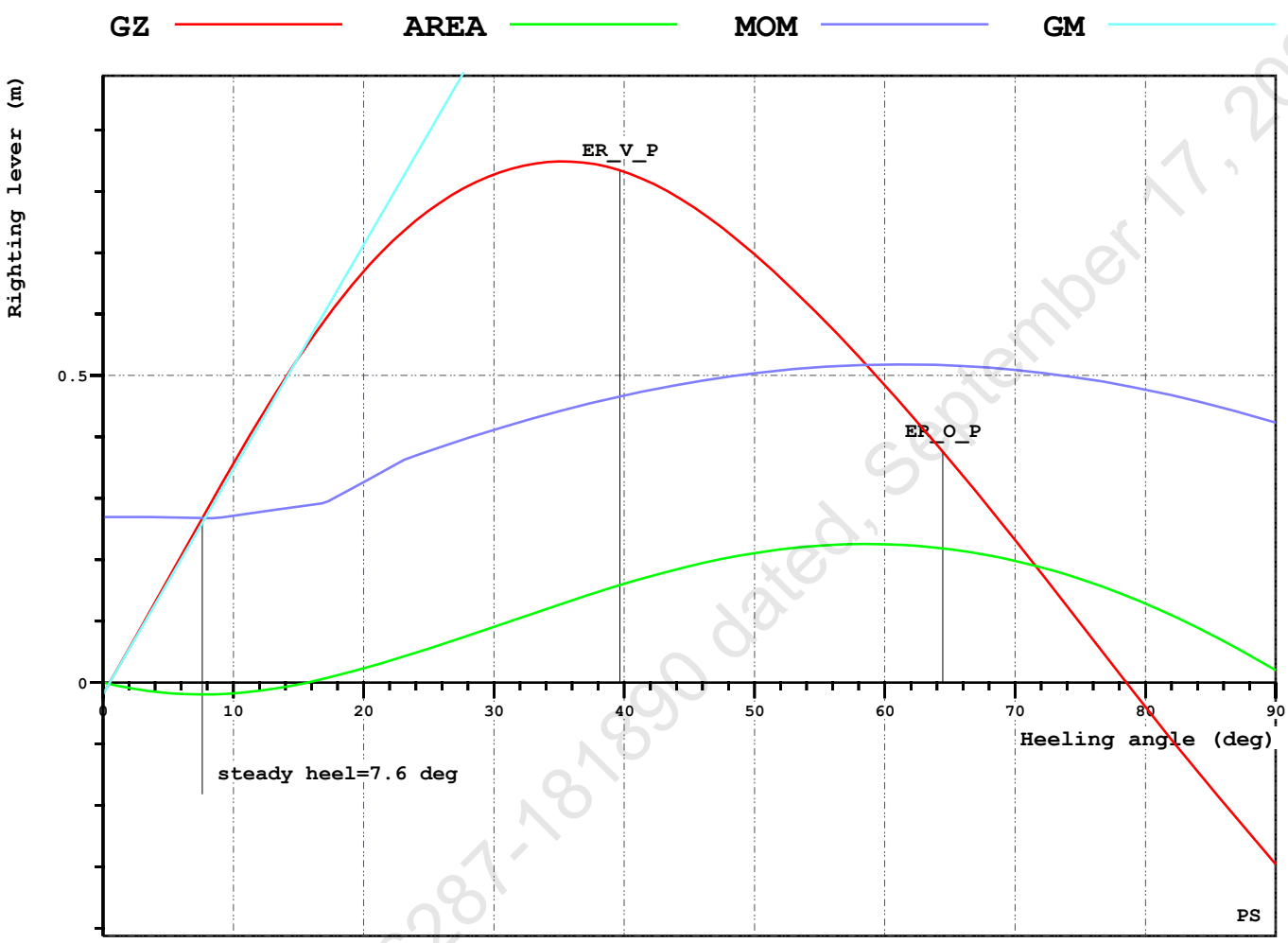
Refer IRS Letter E-126287-181890 dated, September 17, 2021

IS CODE TOWING - Self Tripping



Refer IRS Letter E-126287-191890 dated, September 17, 2021

IS CODE TOWING - Tow Tripping



Refer IRS Letter E-126287-181890 dated, September 17, 2021

INTACT STABILITY CRITERIA

RCR	TEXT	REQ	ATTV	UNIT	STAT
AREA30	Area under GZ curve up to 30 deg.	0.055	0.254	mrad	OK
AREA40	Area under GZ curve up to 40 deg.	0.090	0.396	mrad	OK
AREA3040	Area under GZ curve btw. 30-40 deg.	0.030	0.142	mrad	OK
GZ0.2	Max GZ > 0.2	0.200	0.848	m	OK
MAXGZ25	Max. GZ at an angle > 25 deg.	25.000	35.325	deg	OK
GM0.15	GM > 0.15 m	0.150	2.095	m	OK
V.IMOWEATHER	IMO weather criterion	1.000	1.856		OK
IMO.WIND_HEEL	Wind Heel <16 or <=80% of dk imm.	9.316	1.458	deg	OK
FIFI_GZ	Min. GZ for Fire fighter Ships	0.079	0.827	m	OK
2020IS-B2.8.4.2	AreaA>=AreaB	1.000	8.089		OK
2020IS-B2.8.4.3	Max. heel, tow-tr.	39.672	7.624	deg	OK

Refer IRS Letter E-126287-181890 dated, September 17, 2021

GZ CURVE DATA

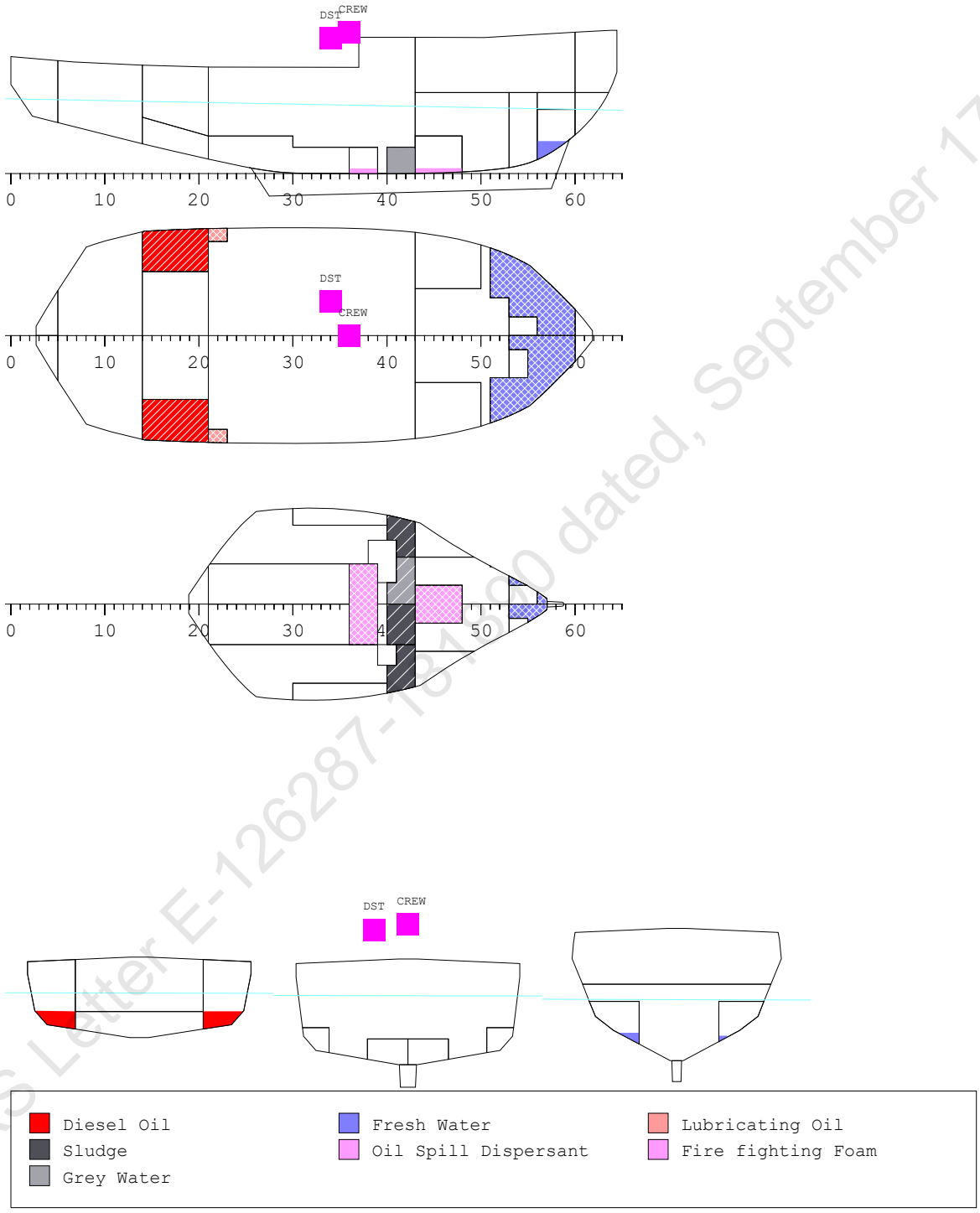
HEEL deg	T m	TR m	GZ m	AREA mrad
0.0	4.176	-0.283	-0.019	0.000
0.5	4.176	-0.283	0.000	0.000
10.0	4.091	-0.260	0.357	0.029
20.0	3.884	-0.297	0.670	0.121
30.0	3.617	-0.608	0.827	0.254
40.0	3.279	-1.054	0.832	0.401
50.0	2.861	-1.505	0.697	0.536
60.0	2.370	-1.921	0.485	0.640
70.0	1.820	-2.274	0.232	0.703
80.0	1.225	-2.533	-0.040	0.719
90.0	0.617	-2.619	-0.296	0.690

RELEVANT OPENINGS

NAME	TEXT	WT	X m	Y m	Z m	IMMA deg	IMMR m
ER_V_P	ER_INLET_P	UNPROTECTED	13.373	2.300	6.300	39.7	2.079
ER_V_S	ER_INLET_S	UNPROTECTED	13.373	-2.300	6.300	-	2.120
ER_O_P	ER_OUT_P	UNPROTECTED	14.000	1.500	8.400	64.5	4.191
ER_O_S	ER_OUT_S	UNPROTECTED	14.000	-1.500	8.400	-	4.218

Refer IRS Letter E-126287-181890 dated, September 17, 2021

LC02 - ARRIVAL (10% CONSUMABLES)



Refer IRS Letter E-126287-181300 dated, September 17, 2021

LC02 - ARRIVAL (10% CONSUMABLES)

Floating Position - Intact condition

Draught at AP (moulded)	3.963 m
Draught at FP (moulded)	3.385 m
Mean Draught (moulded)	3.674 m
Trim (+ by Bow)	-0.578 m
Heel (+ PS)	0.1 deg
KM above moulded BL	6.493 m
KG above moulded BL	4.388 m
GM0 (solid)	2.105 m
Free Surface Correction	0.197 m
GM (liquid)	1.907 m
Density of Water	1.025 t/m3

LCB	:	16.017 m Fwd of AP
LCF	:	14.968 m Fwd of AP
MCT	:	6.484 tm/cm
TPC	:	3.185 t/cm

LOAD SUMMARY TABLE

NAME	LOAD	MASS t	LCG m	TCG m	VCG m
Crew	CREW	1.0	18.000	0.000	7.500
Oil Spill Dispersant	DISPERSANT	0.8	18.743	0.000	0.141
Diesel Oil	DO	12.7	9.002	0.000	2.311
Deck Store	DST	0.2	17.000	1.800	7.200
Fire fighting Foam	FOAM	0.9	22.635	0.000	0.175
Fresh Water	FW	3.4	27.405	0.359	1.306
Grey Water	GWT	3.5	20.842	1.034	0.741
Lubricating Oil	LO	0.4	11.003	0.000	2.781
Sludge	SLU	26.3	20.768	-0.434	1.102
Deadweight		49.3	18.053	-0.125	1.537
Lightweight		692.1	15.914	0.008	4.591
Deadweight		49.3	18.053	-0.125	1.537
Total weight		741.4	16.056	-0.001	4.388

Refer IRS Letter E-126287-181890 dated, September 17, 2021

LOADING COMPONENTS

Diesel Oil (Density 0.860 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.FODAYTK.P	DO	25.0	6.3	7.4	8.811	4.540	3.752	4.08
R.FODAYTK.S	DO	25.0	6.3	7.4	8.811	-4.540	3.752	4.08
R.FOTK.1S	DO	0.0	0.0	0.0	23.089	-3.686	2.307	0.00
R.FOTK.1P	DO	0.0	0.0	0.0	23.089	3.686	2.307	0.00
R.FOTK.2P	DO	0.0	0.0	0.0	14.194	1.037	1.041	0.00
R.FOTK.2S	DO	0.0	0.0	0.0	14.194	-1.037	1.041	0.00
R.FOTK.3P	DO	0.0	0.0	0.0	17.384	4.764	1.434	0.00
R.FOTK.3S	DO	0.0	0.0	0.0	17.384	-4.764	1.434	0.00
R.FOTK.4C	DO	0.0	0.0	0.0	8.705	0.000	1.932	76.61
TOTAL			12.7	14.7				84.76

Fresh Water (Density 1.0 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.FWTK.P	FW	10.0	1.7	1.7	27.551	1.914	2.570	16.56
R.FWTK.S	FW	10.0	1.7	1.7	27.632	-1.659	2.506	19.88
TOTAL			3.4	3.4				36.44

Lub Oil (Density 0.860 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.LOTK.P	LO	10.0	0.2	0.2	11.001	5.423	4.122	0.06
R.LOTK.S	LO	10.0	0.2	0.2	11.001	-5.423	4.122	0.06
TOTAL			0.4	0.5				0.13

FOAM (Density 1.0 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.FOAMTK	FOAM	10.0	0.9	0.9	22.738	0.000	1.044	1.63
TOTAL			0.9	0.9				1.63

Refer IRS Letter E-126287-181890 dated, September 17, 2021

DISPERSANT (Density 1.0 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.DISPERSANTTK	DISPERSANT	10.0	0.8	0.8	18.749	0.000	0.752	9.74
TOTAL			0.8	0.8				9.74

STORES

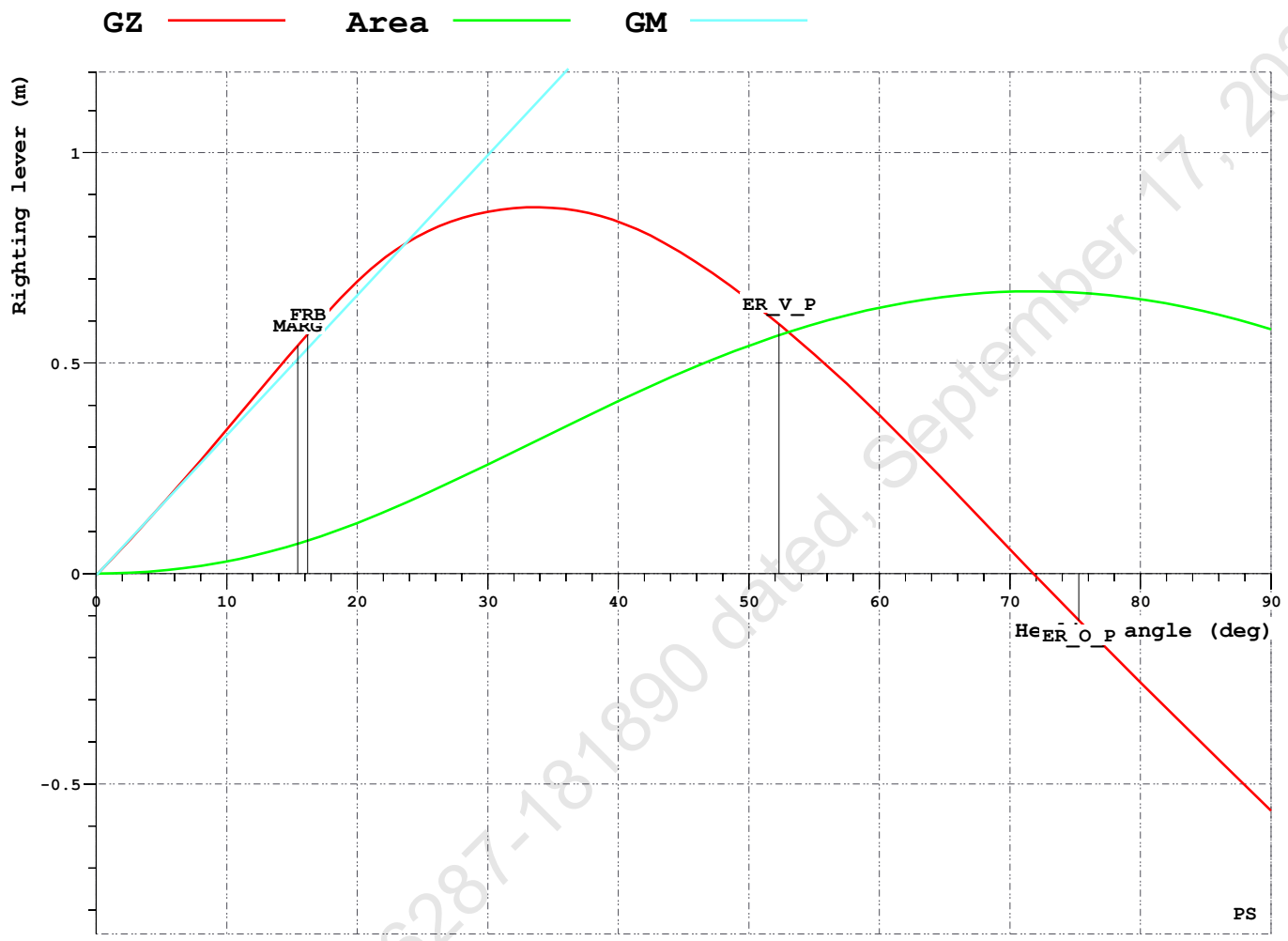
NAME	PURP	MASS t	LCG m	TCG m	VCG m
STORES	MASS	0.2	17.000	1.800	7.200
TOTAL		0.2	17.000	1.800	7.200

CREW

NAME	PURP	MASS t	LCG m	TCG m	VCG m
CREW	MASS	1.0	18.000	0.000	7.500
TOTAL		1.0	18.000	0.000	7.500

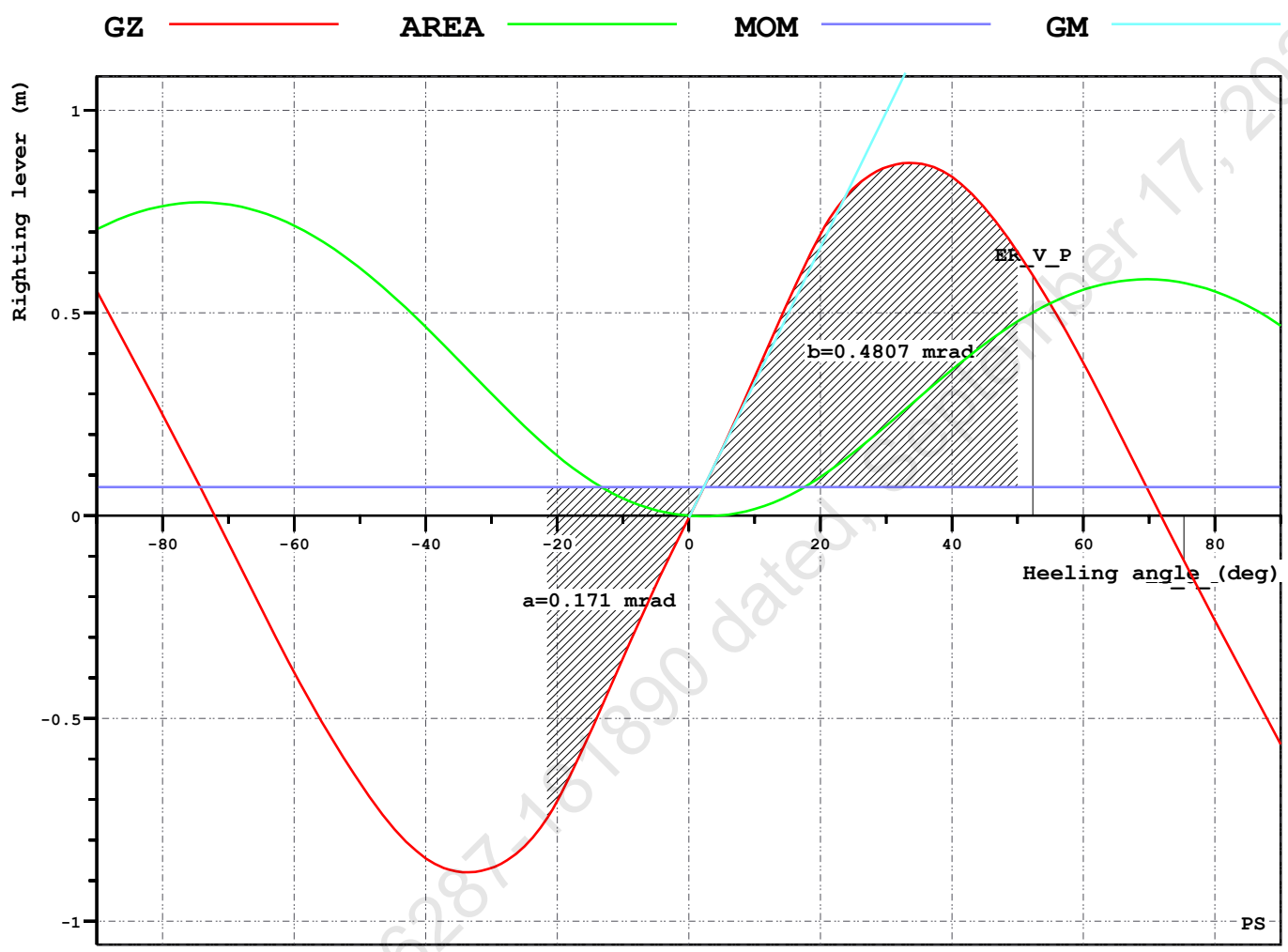
Refer IRS Letter E-126287-181800 dated, September 17, 2021

INTACT STABILITY CHECK PLOT



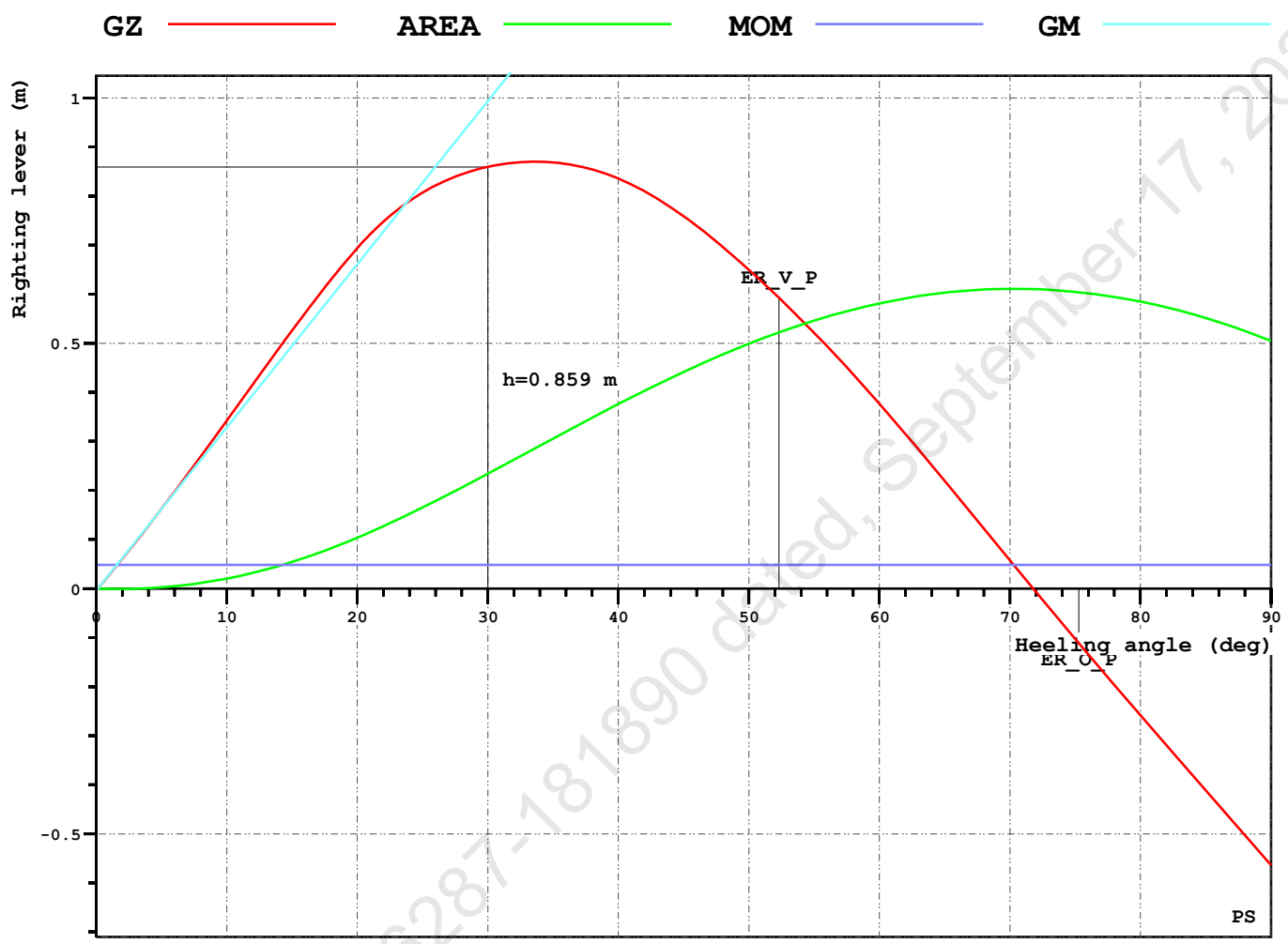
Refer IRS Letter E-126287-181890 dated, September 17, 2021

IMO WEATHER CRITERIA



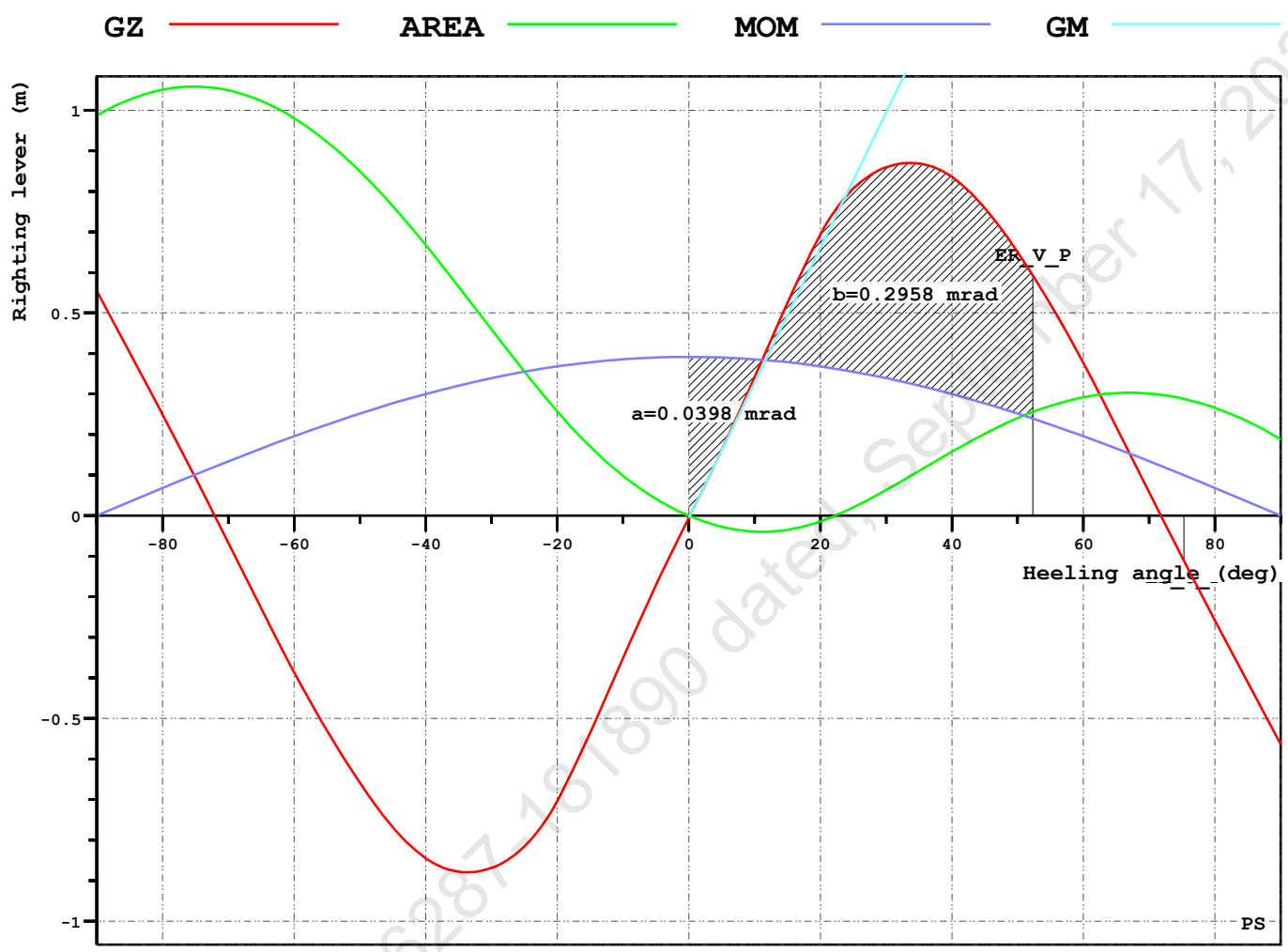
Refer IRS Letter E-126287-161890 dated, October 17, 2021

EXTERNAL FI-FI



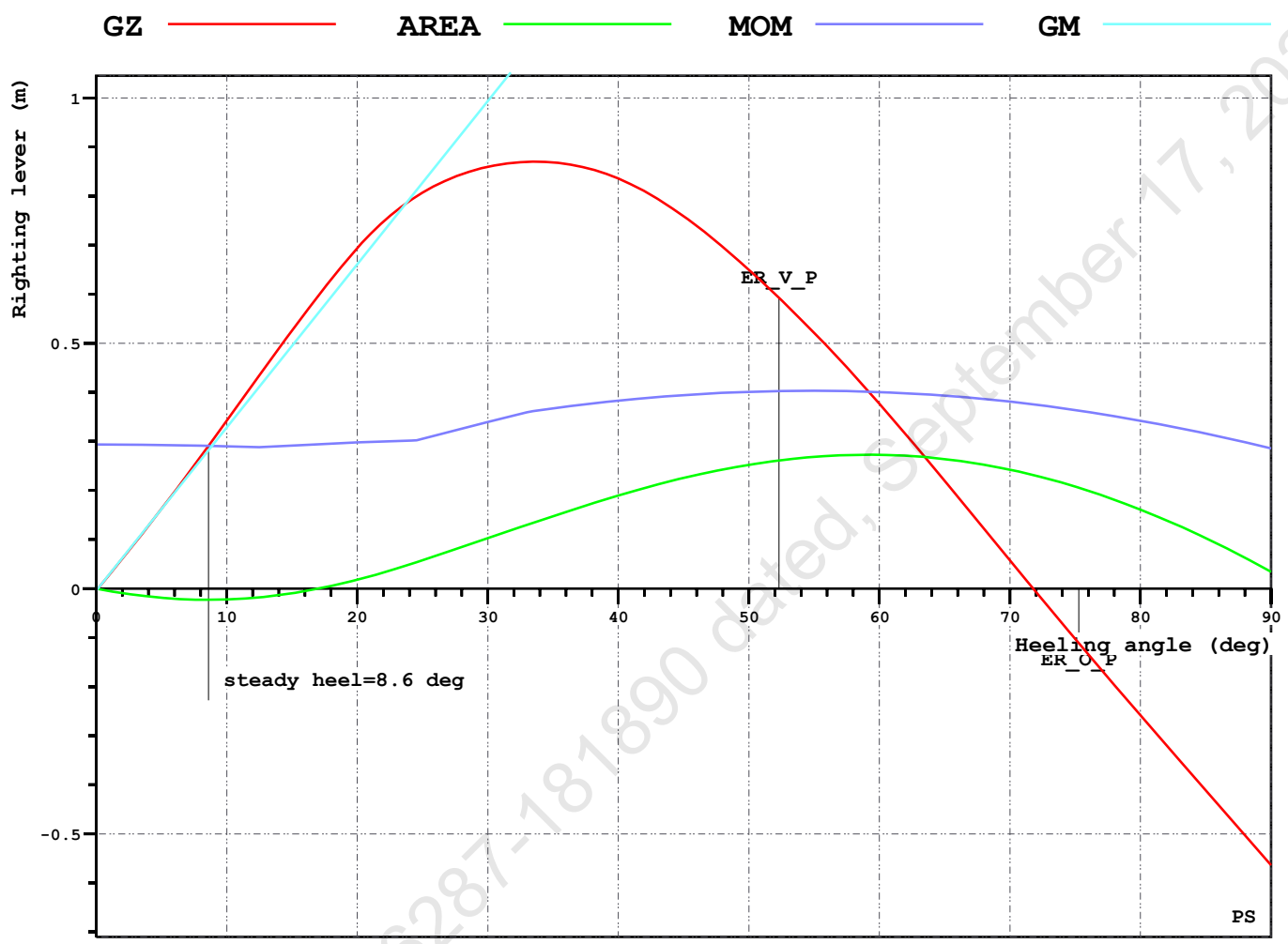
Refer IRS Letter E-126287-181890 dated, September 17, 2021

IS CODE TOWING - Self Tripping



Refer IRS Letter E-126287-181890 dated, September 17, 2021

IS CODE TOWING - Tow Tripping



Refer IRS Letter E-126287-181890 dated, September 17, 2021

INTACT STABILITY CRITERIA

RCR	TEXT	REQ	ATTV	UNIT	STAT
AREA30	Area under GZ curve up to 30 deg.	0.055	0.259	mrad	OK
AREA40	Area under GZ curve up to 40 deg.	0.090	0.409	mrad	OK
AREA3040	Area under GZ curve btw. 30-40 deg.	0.030	0.150	mrad	OK
GZ0.2	Max GZ > 0.2	0.200	0.870	m	OK
MAXGZ25	Max. GZ at an angle > 25 deg.	25.000	33.676	deg	OK
GM0.15	GM > 0.15 m	0.150	1.907	m	OK
V.IMOWEATHER	IMO weather criterion	1.000	2.811		OK
IMO.WIND_HEEL	Wind Heel <16 or <=80% of dk imm.	12.958	1.602	deg	OK
FIFI_GZ	Min. GZ for Fire fighter Ships	0.096	0.859	m	OK
2020IS-B2.8.4.2	AreaA>=AreaB	1.000	7.430		OK
2020IS-B2.8.4.3	Max. heel, tow-tr.	52.307	8.613	deg	OK

Refer IRS Letter E-126287-181890 dated, September 17, 2021

GZ CURVE DATA

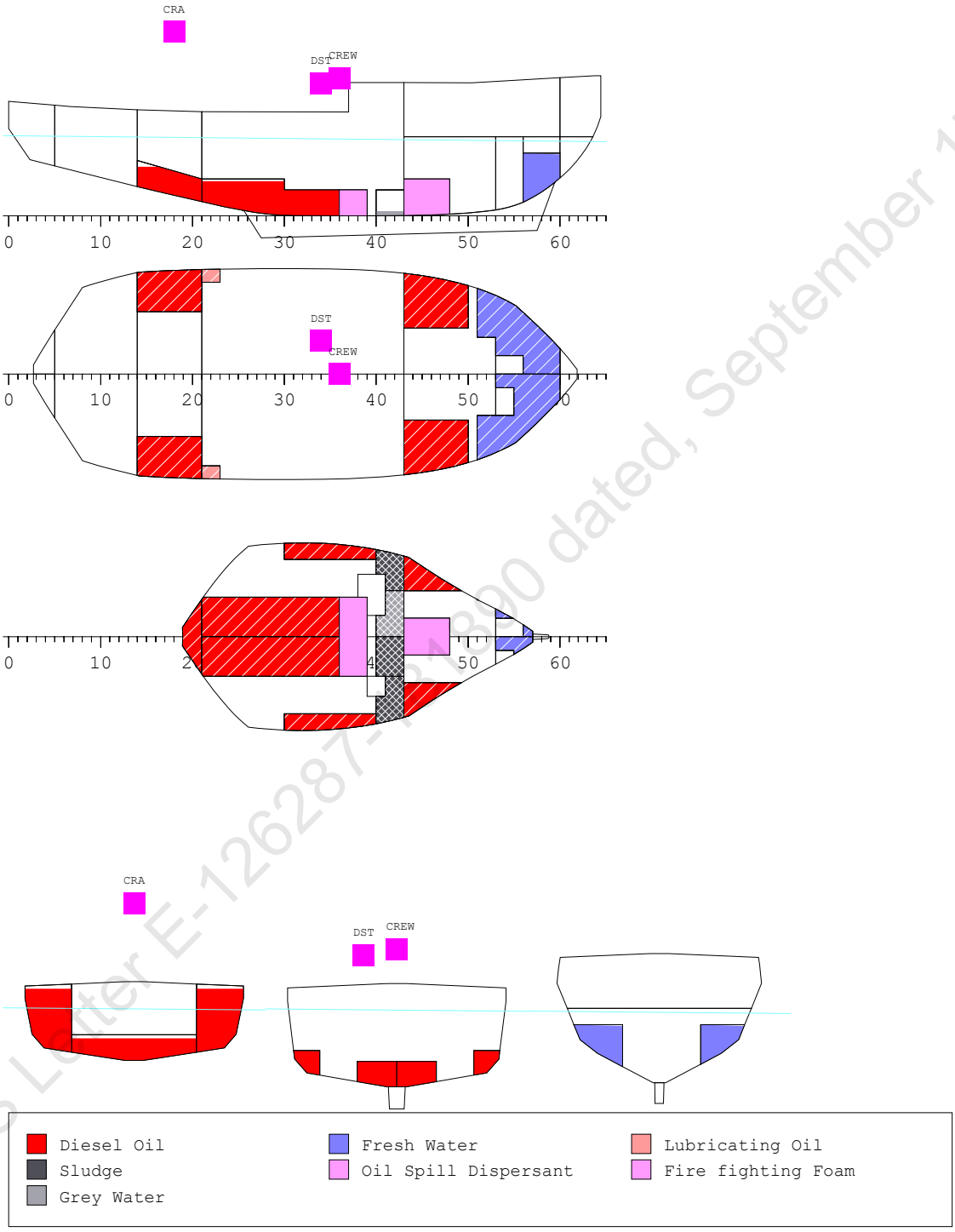
HEEL deg	T m	TR m	GZ m	AREA mrad
0.0	3.674	-0.579	-0.005	0.000
0.1	3.674	-0.579	0.000	0.000
10.0	3.594	-0.541	0.342	0.029
20.0	3.357	-0.430	0.694	0.120
30.0	3.022	-0.471	0.859	0.259
40.0	2.580	-0.725	0.836	0.409
50.0	2.064	-1.030	0.650	0.541
60.0	1.498	-1.319	0.377	0.631
70.0	0.897	-1.555	0.057	0.670
80.0	0.294	-1.671	-0.258	0.652
90.0	-0.304	-1.822	-0.564	0.580

RELEVANT OPENINGS

NAME	TEXT	WT	X m	Y m	Z m	IMMA deg	IMMR m
ER_V_P	ER_INLET_P	UNPROTECTED	13.373	2.300	6.300	52.3	2.570
ER_V_S	ER_INLET_S	UNPROTECTED	13.373	-2.300	6.300	-	2.582
ER_O_P	ER_OUT_P	UNPROTECTED	14.000	1.500	8.400	75.3	4.683
ER_O_S	ER_OUT_S	UNPROTECTED	14.000	-1.500	8.400	-	4.691

Refer IRS Letter E-126287-181890 dated, September 17, 2021

LC03 - LC01+CRANE LOAD(3T Load)



Refer IRS Letter E-126287-R1390 dated, September 17, 2021

LC03 - LC01+CRANE LOAD(3T Load)

Floating Position - Intact condition

Draught at AP (moulded)	4.339 m
Draught at FP (moulded)	4.029 m
Mean Draught (moulded)	4.184 m
Trim (+ by Bow)	-0.310 m
Heel (+ PS)	0.5 deg
KM above moulded BL	6.308 m
KG above moulded BL	4.072 m
GM0 (solid)	2.236 m
Free Surface Correction	0.162 m
GM (liquid)	2.074 m
Density of Water	1.025 t/m3

LCB	:	16.036 m Fwd of AP
LCF	:	15.027 m Fwd of AP
MCT	:	7.18 tm/cm
TPC	:	3.329 t/cm

LOAD SUMMARY TABLE

NAME	LOAD	MASS t	LCG m	TCG m	VCG m
Crane	CRA	3.0	9.000	0.000	10.000
Crew	CREW	1.0	18.000	0.000	7.500
Oil Spill Dispersant	DISPERSANT	8.1	18.749	0.000	0.752
Diesel Oil	DO	149.7	13.781	0.000	2.274
Deck Store	DST	2.0	17.000	1.800	7.200
Fire fighting Foam	FOAM	9.4	22.738	0.000	1.044
Fresh Water	FW	32.3	27.584	0.119	2.494
Grey Water	GWT	0.4	20.745	0.546	0.148
Lubricating Oil	LO	4.0	11.001	0.000	4.055
Sludge	SLU	2.8	20.800	-0.202	0.501
Deadweight		212.7	16.498	0.033	2.381
Lightweight		692.1	15.914	0.008	4.591
Deadweight		212.7	16.498	0.033	2.381
Total weight		904.8	16.051	0.014	4.072

Refer IRS Letter No:120287-181890 dated, September 17, 2021

LOADING COMPONENTS

Diesel Oil (Density 0.860 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.FODAYTK.P	DO	95.0	24.1	28.0	8.811	4.540	3.752	4.08
R.FODAYTK.S	DO	95.0	24.1	28.0	8.811	-4.540	3.752	4.08
R.FOTK.1S	DO	95.0	15.5	18.1	23.089	-3.686	2.307	0.00
R.FOTK.1P	DO	95.0	15.5	18.1	23.089	3.686	2.307	0.00
R.FOTK.2P	DO	95.0	18.8	21.9	14.194	1.037	1.041	0.00
R.FOTK.2S	DO	95.0	18.8	21.9	14.194	-1.037	1.041	0.00
R.FOTK.3P	DO	95.0	5.6	6.5	17.384	4.764	1.434	0.00
R.FOTK.3S	DO	95.0	5.6	6.5	17.384	-4.764	1.434	0.00
R.FOTK.4C	DO	95.0	21.7	25.3	8.705	0.000	1.932	76.61
TOTAL			149.7	174.1				84.76

Fresh Water (Density 1.0 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.FWTK.P	FW	95.0	16.1	16.1	27.551	1.914	2.570	16.56
R.FWTK.S	FW	95.0	16.3	16.3	27.632	-1.659	2.506	19.88
TOTAL			32.3	32.3				36.44

Lub Oil (Density 0.860 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.LOTK.P	LO	95.0	2.0	2.2	11.001	5.423	4.122	0.06
R.LOTK.S	LO	95.0	2.0	2.2	11.001	-5.423	4.122	0.06
TOTAL			4.0	4.4				0.13

FOAM (Density 1.0 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.FOAMTK	FOAM	100.0	9.4	9.4	22.738	0.000	1.044	1.63
TOTAL			9.4	9.4				1.63

Refer IRS Letter E-126287-18/890 dated, September 17, 2021

DISPERSANT (Density 1.0 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.DISPERSANTTK	DISPERSANT	100.0	8.1	8.1	18.749	0.000	0.752	9.74
TOTAL			8.1	8.1				9.74

STORES

NAME	PURP	MASS t	LCG m	TCG m	VCG m
STORES	MASS	2.0	17.000	1.800	7.200
TOTAL		2.0	17.000	1.800	7.200

CREW

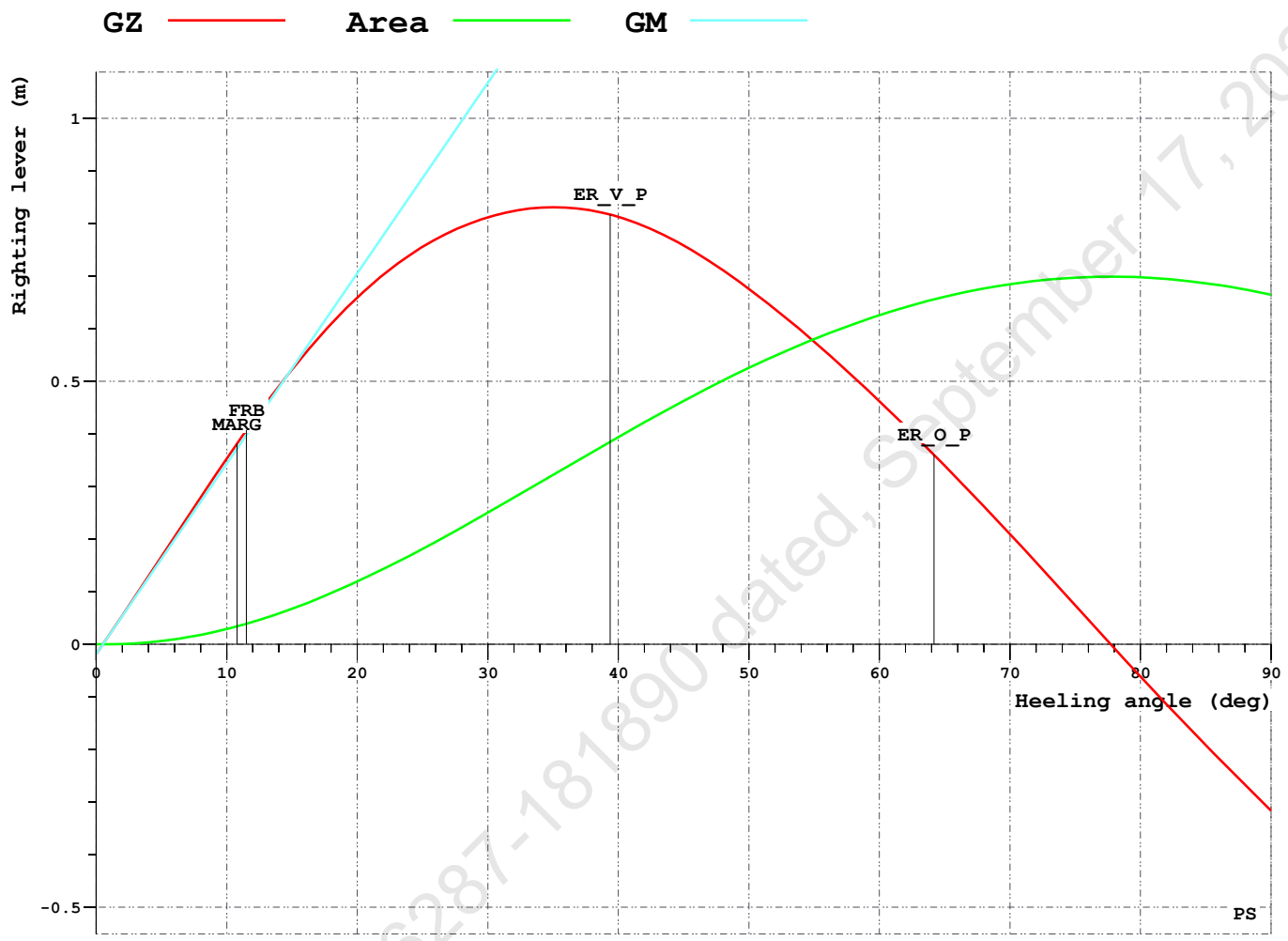
NAME	PURP	MASS t	LCG m	TCG m	VCG m
CREW	MASS	1.0	18.000	0.000	7.500
TOTAL		1.0	18.000	0.000	7.500

CRANE

NAME	PURP	MASS t	LCG m	TCG m	VCG m
CRANE-PAYLO.MASS		3.0	9.000	0.000	10.000
TOTAL		3.0	9.000	0.000	10.000

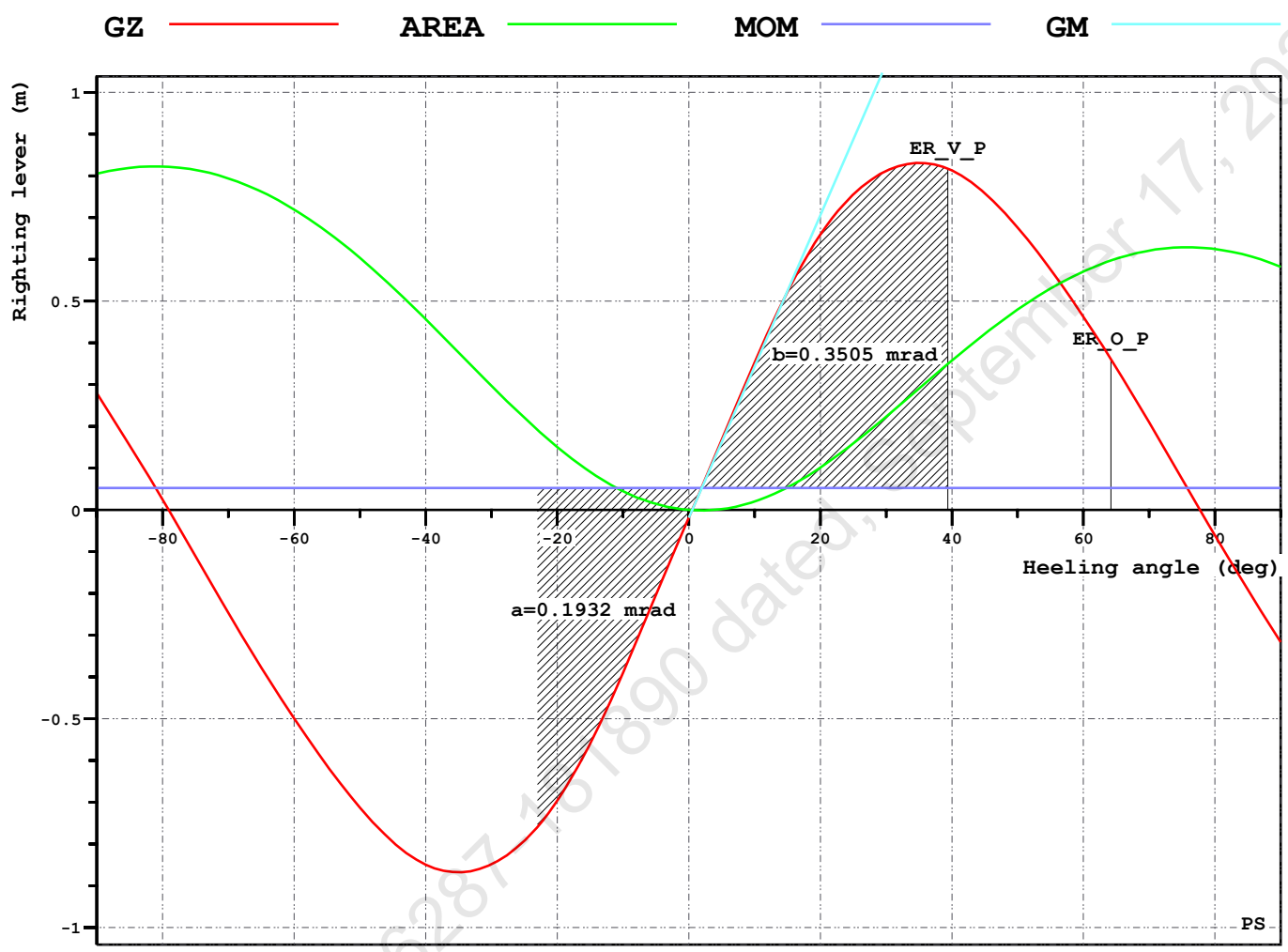
Refer IRS Letter E-126287-181800 dated, September 17, 2021

INTACT STABILITY CHECK PLOT



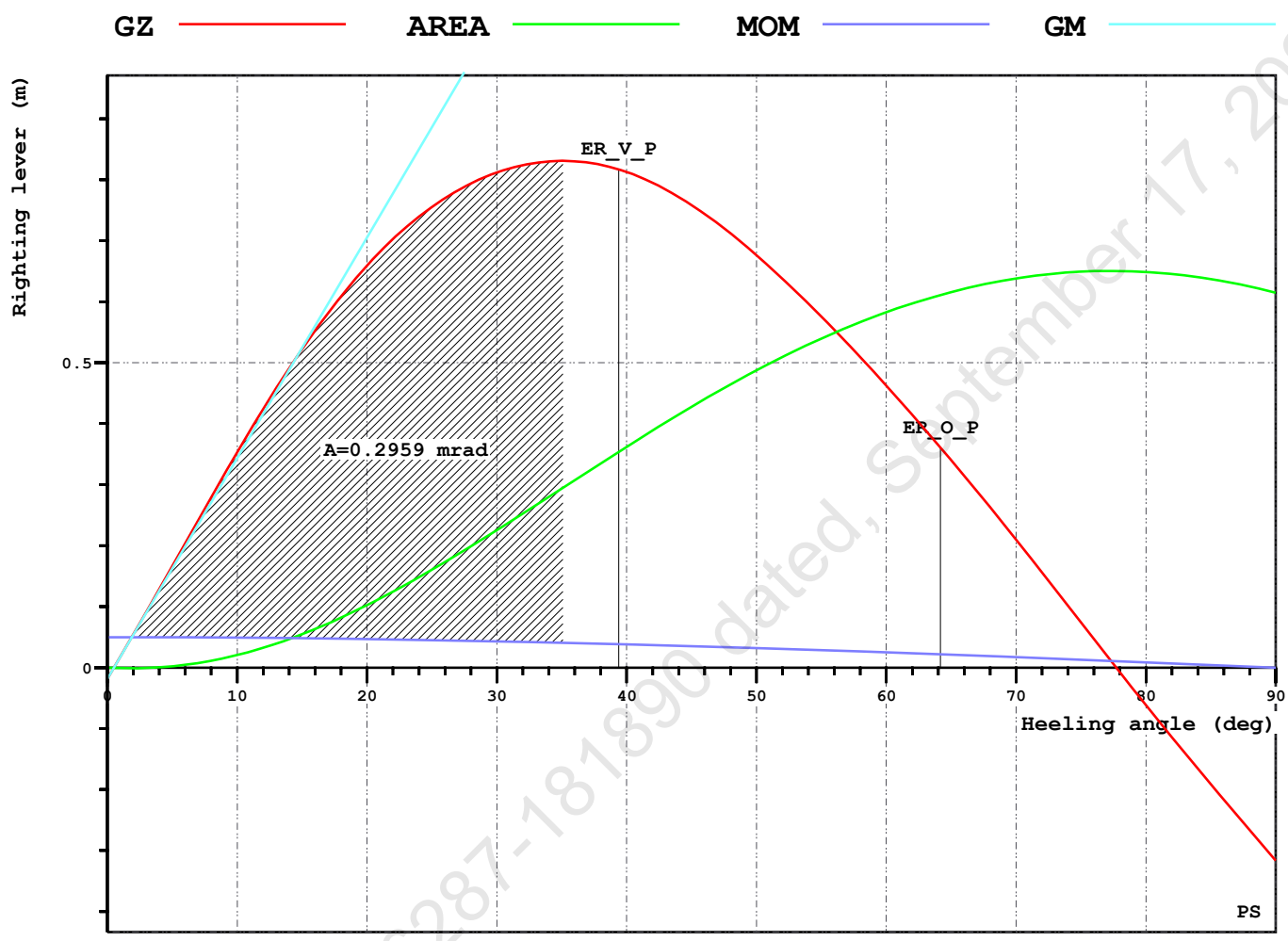
Refer IRS Letter E-126287-181890 dated, September 17, 2021

IMO WEATHER CRITERIA



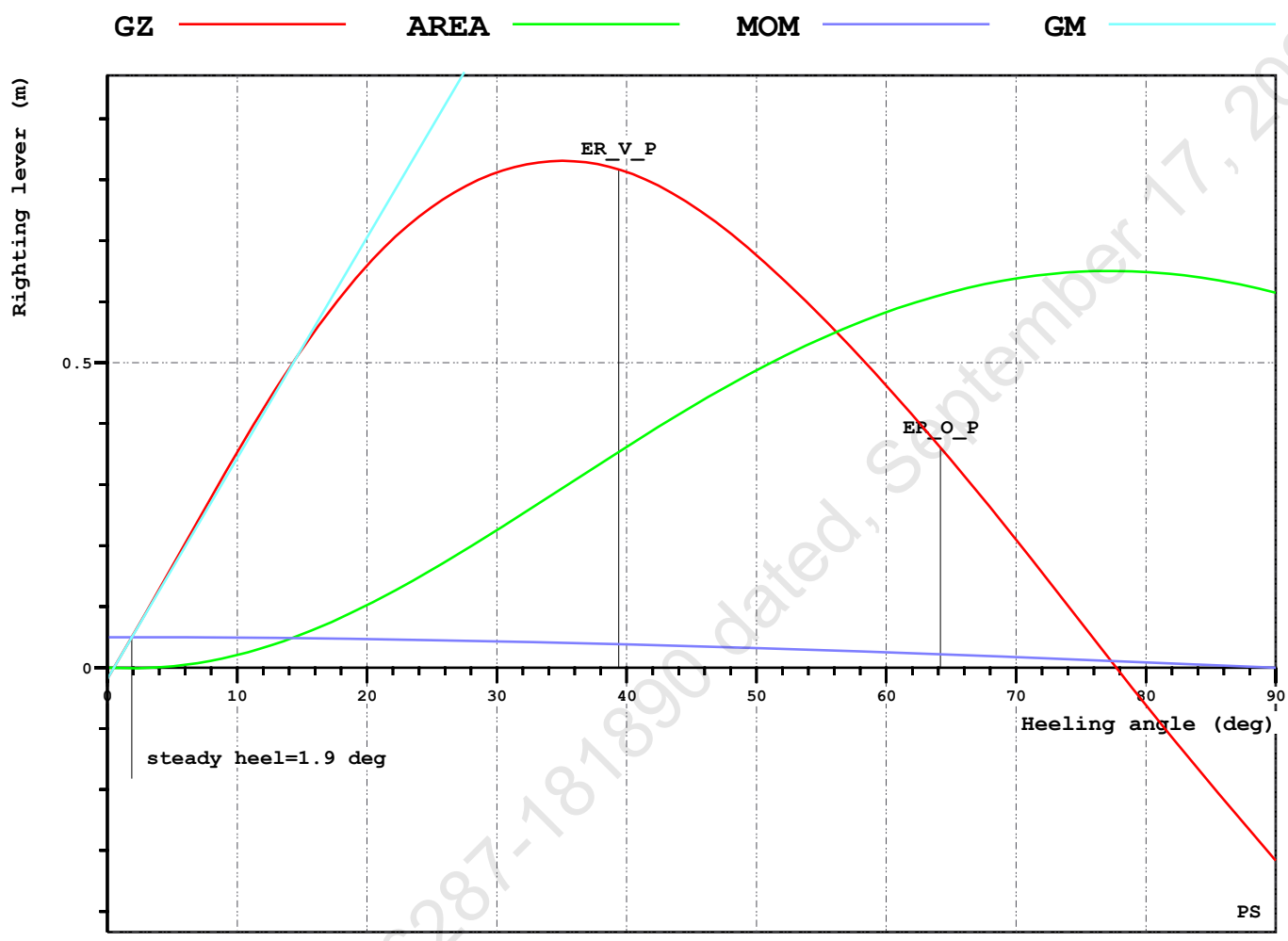
Refer IRS Letter E-126287-161890 dated, September 17, 2021

IS CODE LIFTING - Residual Area



Refer IRS Letter E-126287-181890 dated, September 17, 2021

IS CODE LIFTING - Equilibrium angle



Refer IRS Letter E-126287-181890 dated, September 17, 2021

INTACT STABILITY CRITERIA

RCR	TEXT	REQ	ATTV	UNIT	STAT
AREA30	Area under GZ curve up to 30 deg.	0.055	0.250	mrad	OK
AREA40	Area under GZ curve up to 40 deg.	0.090	0.385	mrad	OK
AREA3040	Area under GZ curve btw. 30-40 deg.	0.030	0.135	mrad	OK
GZ0.2	Max GZ > 0.2	0.200	0.831	m	OK
MAXGZ25	Max. GZ at an angle > 25 deg.	25.000	35.089	deg	OK
GM0.15	GM > 0.15 m	0.150	2.074	m	OK
V.IMOWEATHER	IMO weather criterion	1.000	1.814		OK
IMO.WIND_HEEL	Wind Heel <16 or <=80% of dk imm.	9.213	1.465	deg	OK
2020IS-B2.9.7.1.2	Eq. angle less than 10 deg. or dk. imm.	11.516	1.867	deg	OK
2020IS-B2.9.7.1.1	Resid. righting area > 0.08 mrad	0.080	0.296	mrad	OK

Refer IRS Letter E-126287-181890 dated, September 17, 2021

GZ CURVE DATA

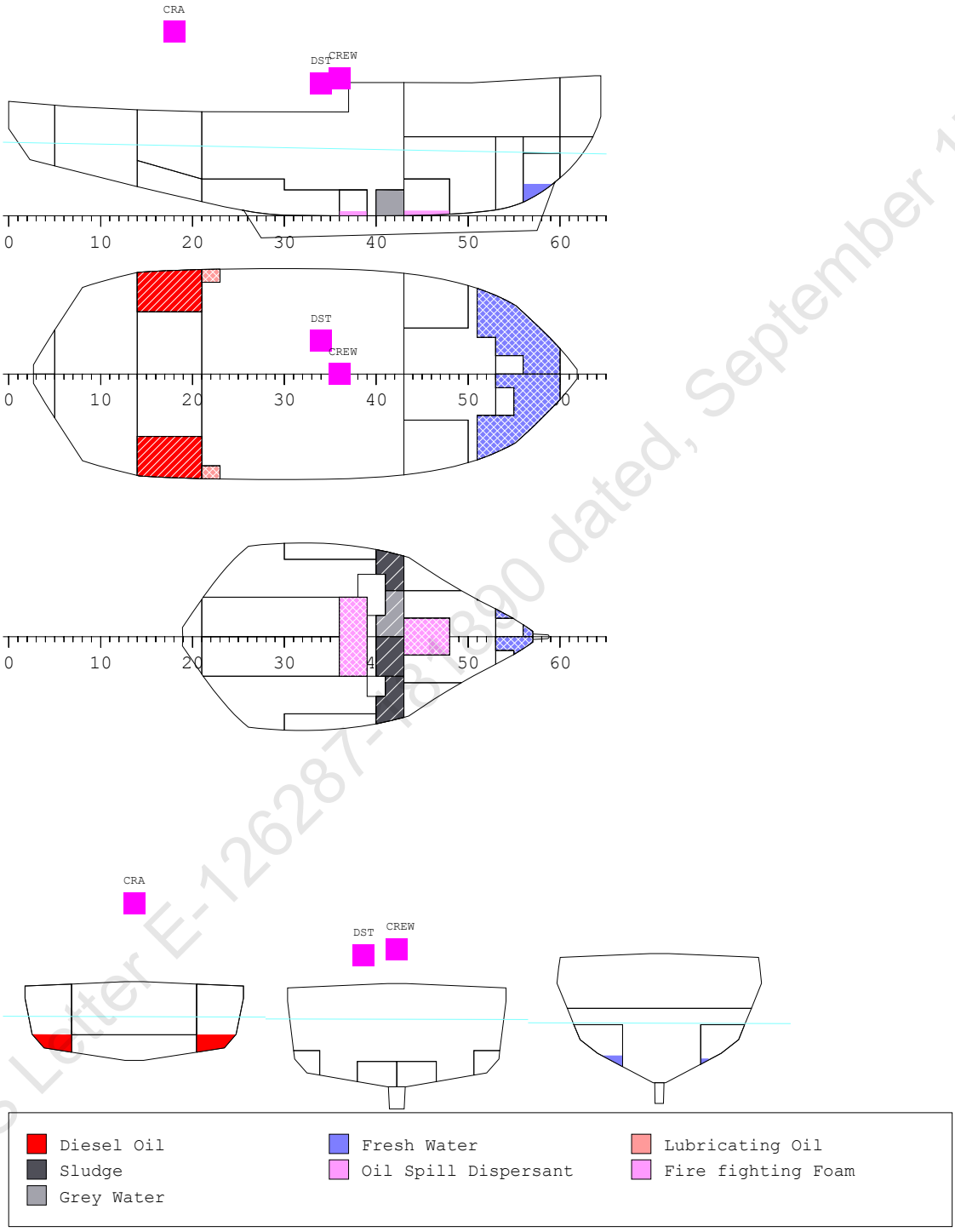
HEEL deg	T m	TR m	GZ m	AREA mrad
0.0	4.185	-0.310	-0.018	0.000
0.5	4.184	-0.310	0.000	0.000
10.0	4.099	-0.287	0.353	0.029
20.0	3.894	-0.330	0.660	0.119
30.0	3.629	-0.653	0.812	0.250
40.0	3.294	-1.109	0.813	0.394
50.0	2.879	-1.570	0.676	0.526
60.0	2.389	-1.994	0.462	0.626
70.0	1.841	-2.353	0.210	0.685
80.0	1.247	-2.615	-0.062	0.698
90.0	0.639	-2.702	-0.317	0.665

RELEVANT OPENINGS

NAME	TEXT	WT	X m	Y m	Z m	IMMA deg	IMMR m
ER_V_P	ER_INLET_P	UNPROTECTED	13.373	2.300	6.300	39.4	2.068
ER_V_S	ER_INLET_S	UNPROTECTED	13.373	-2.300	6.300	-	2.109
ER_O_P	ER_OUT_P	UNPROTECTED	14.000	1.500	8.400	64.2	4.181
ER_O_S	ER_OUT_S	UNPROTECTED	14.000	-1.500	8.400	-	4.208

Refer IRS Letter E-126287-181890 dated, September 17, 2021

LC04 - LC02+CRANE LOAD(3T Load)



Refer IRS Letter E-126287-R1390 dated, September 17, 2021

LC04 - LC02+CRANE LOAD(3T Load)

Floating Position - Intact condition

Draught at AP (moulded)	3.987 m
Draught at FP (moulded)	3.378 m
Mean Draught (moulded)	3.682 m
Trim (+ by Bow)	-0.609 m
Heel (+ PS)	0.1 deg
KM above moulded BL	6.490 m
KG above moulded BL	4.411 m
GM0 (solid)	2.079 m
Free Surface Correction	0.197 m
GM (liquid)	1.883 m
Density of Water	1.025 t/m3

LCB	:	15.987 m Fwd of AP
LCF	:	14.955 m Fwd of AP
MCT	:	6.498 tm/cm
TPC	:	3.188 t/cm

LOAD SUMMARY TABLE

NAME	LOAD	MASS t	LCG m	TCG m	VCG m
Crane	CRA	3.0	9.000	0.000	10.000
Crew	CREW	1.0	18.000	0.000	7.500
Oil Spill Dispersant	DISPERSANT	0.8	18.743	0.000	0.141
Diesel Oil	DO	12.7	9.002	0.000	2.311
Deck Store	DST	0.2	17.000	1.800	7.200
Fire fighting Foam	FOAM	0.9	22.635	0.000	0.175
Fresh Water	FW	3.4	27.405	0.359	1.306
Grey Water	GWT	3.5	20.842	1.034	0.741
Lubricating Oil	LO	0.4	11.003	0.000	2.781
Sludge	SLU	26.3	20.768	-0.434	1.102
Deadweight		52.3	17.534	-0.118	2.022
Lightweight		692.1	15.914	0.008	4.591
Deadweight		52.3	17.534	-0.118	2.022
Total weight		744.4	16.028	-0.001	4.411

Refer IRS Letter No:120287-181890 dated, September 17, 2021

LOADING COMPONENTS

Diesel Oil (Density 0.860 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.FODAYTK.P	DO	25.0	6.3	7.4	8.811	4.540	3.752	4.08
R.FODAYTK.S	DO	25.0	6.3	7.4	8.811	-4.540	3.752	4.08
R.FOTK.1S	DO	0.0	0.0	0.0	23.089	-3.686	2.307	0.00
R.FOTK.1P	DO	0.0	0.0	0.0	23.089	3.686	2.307	0.00
R.FOTK.2P	DO	0.0	0.0	0.0	14.194	1.037	1.041	0.00
R.FOTK.2S	DO	0.0	0.0	0.0	14.194	-1.037	1.041	0.00
R.FOTK.3P	DO	0.0	0.0	0.0	17.384	4.764	1.434	0.00
R.FOTK.3S	DO	0.0	0.0	0.0	17.384	-4.764	1.434	0.00
R.FOTK.4C	DO	0.0	0.0	0.0	8.705	0.000	1.932	76.61
TOTAL			12.7	14.7				84.76

Fresh Water (Density 1.0 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.FWTK.P	FW	10.0	1.7	1.7	27.551	1.914	2.570	16.56
R.FWTK.S	FW	10.0	1.7	1.7	27.632	-1.659	2.506	19.88
TOTAL			3.4	3.4				36.44

Lub Oil (Density 0.860 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.LOTK.P	LO	10.0	0.2	0.2	11.001	5.423	4.122	0.06
R.LOTK.S	LO	10.0	0.2	0.2	11.001	-5.423	4.122	0.06
TOTAL			0.4	0.5				0.13

FOAM (Density 1.0 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.FOAMTK	FOAM	10.0	0.9	0.9	22.738	0.000	1.044	1.63
TOTAL			0.9	0.9				1.63

Refer IRS Letter E-126287-181890 dated, September 17, 2021

DISPERSANT (Density 1.0 t/m3)

NAME	PURP	FILL %	MASS t	VOL m3	LCG m	TCG m	VCG m	FRSM tm
R.DISPERSANTTK	DISPERSANT	10.0	0.8	0.8	18.749	0.000	0.752	9.74
TOTAL			0.8	0.8				9.74

STORES

NAME	PURP	MASS t	LCG m	TCG m	VCG m
STORES	MASS	0.2	17.000	1.800	7.200
TOTAL		0.2	17.000	1.800	7.200

CREW

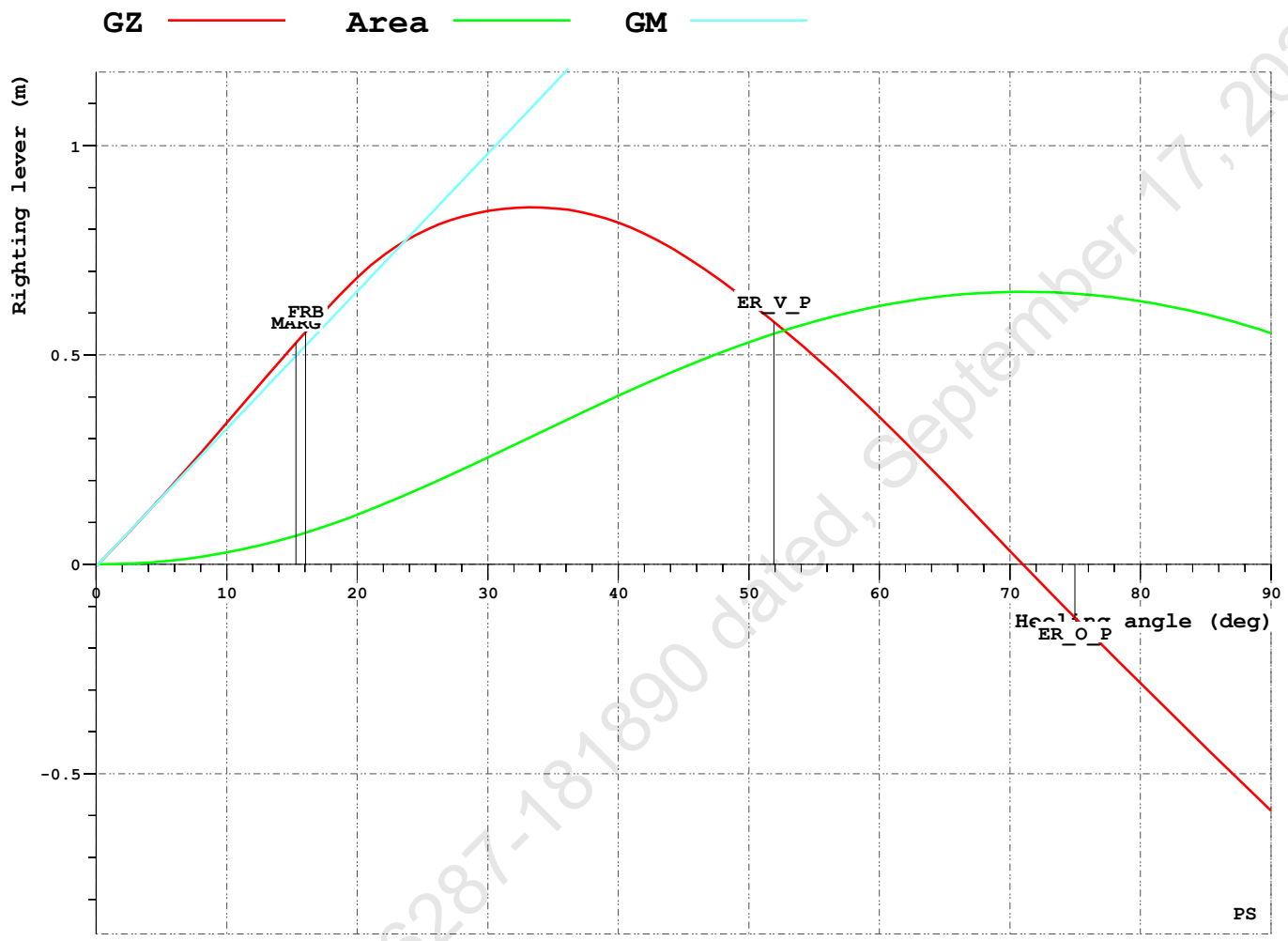
NAME	PURP	MASS t	LCG m	TCG m	VCG m
CREW	MASS	1.0	18.000	0.000	7.500
TOTAL		1.0	18.000	0.000	7.500

CRANE

NAME	PURP	MASS t	LCG m	TCG m	VCG m
CRANE	MASS	3.0	9.000	0.000	10.000
TOTAL		3.0	9.000	0.000	10.000

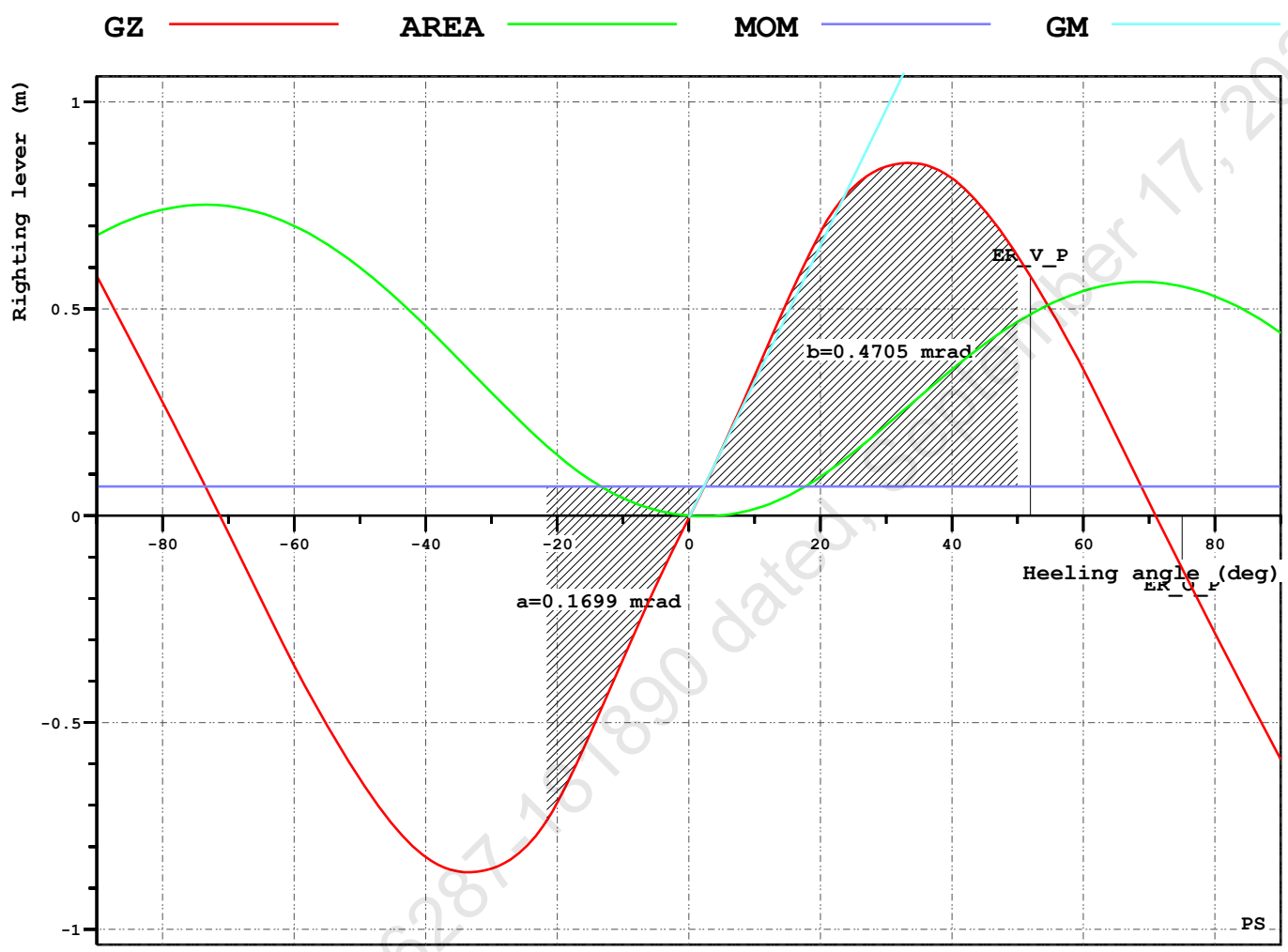
Refer IRS Letter E-126287-181800 dated, September 17, 2021

INTACT STABILITY CHECK PLOT



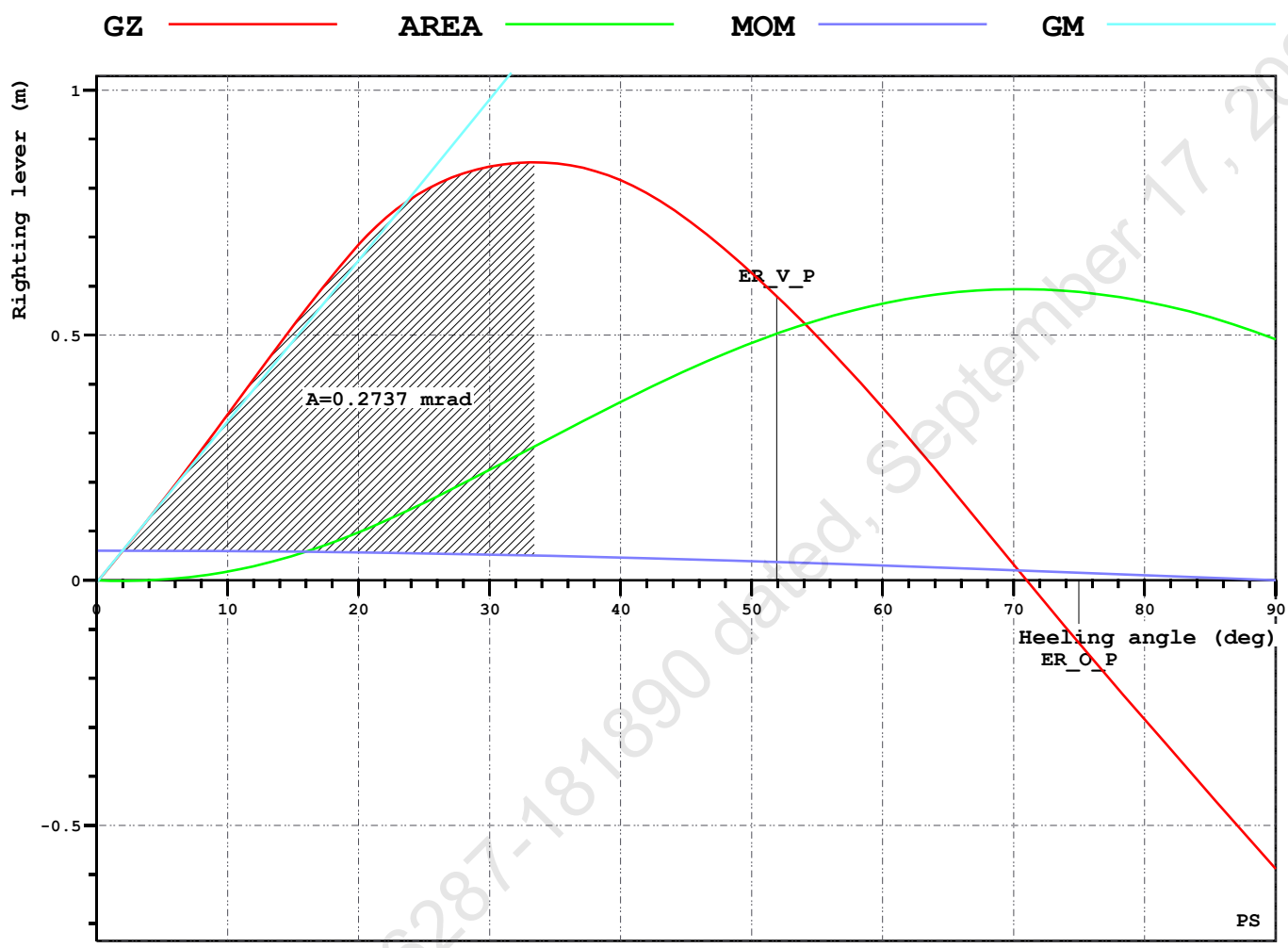
Refer IRS Letter E-126287-181890 dated, September 17, 2021

IMO WEATHER CRITERIA



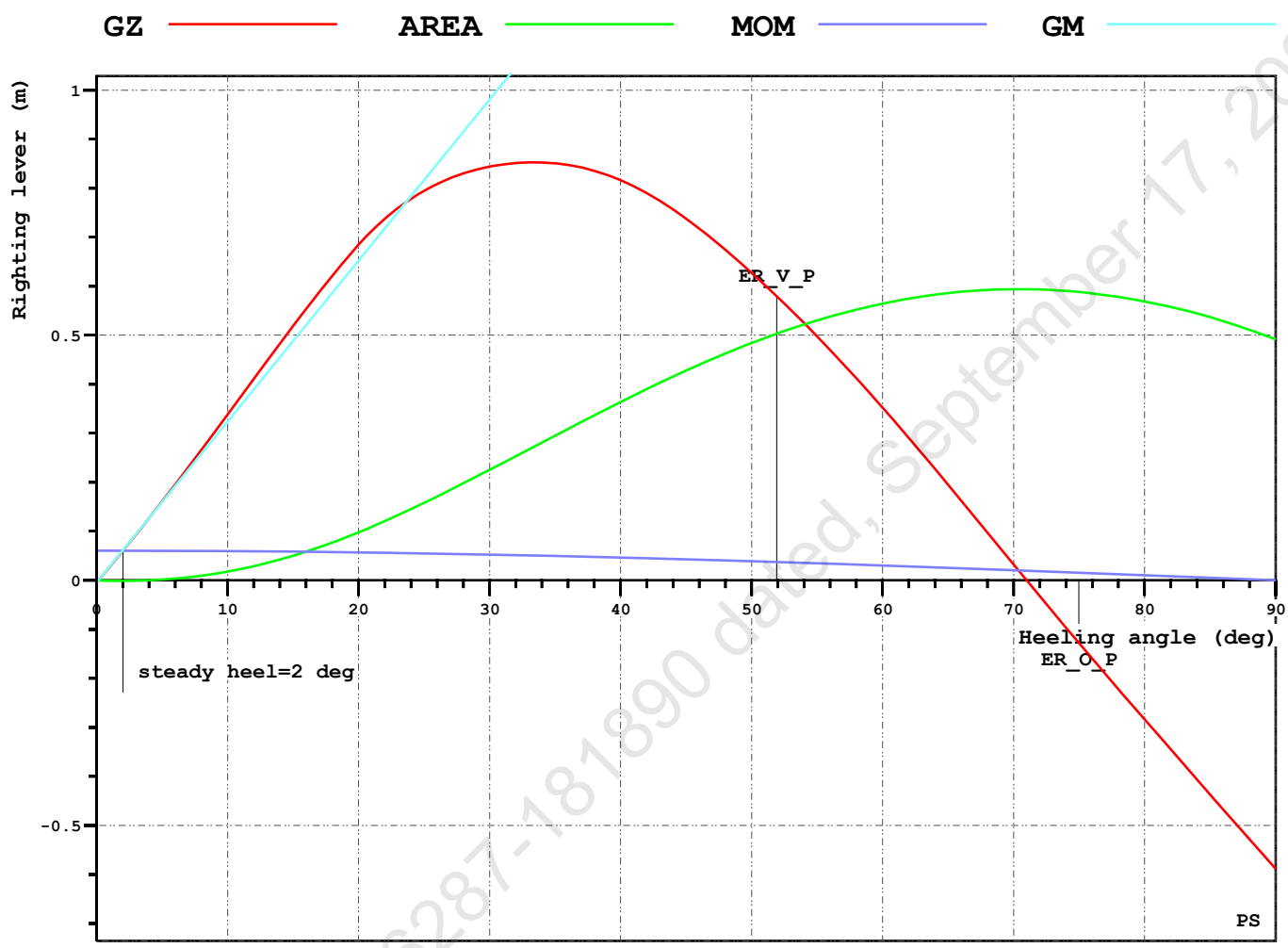
Refer IRS Letter E-126287-161890 dated, October 17, 2021

IS CODE LIFTING - Residual Area



Refer IRS Letter E-126287-181890 dated, September 17, 2021

IS CODE LIFTING - Equilibrium angle



Refer IRS Letter E-126287-181890 dated, September 17, 2021

INTACT STABILITY CRITERIA

RCR	TEXT	REQ	ATTV	UNIT	STAT
AREA30	Area under GZ curve up to 30 deg.	0.055	0.255	mrad	OK
AREA40	Area under GZ curve up to 40 deg.	0.090	0.403	mrad	OK
AREA3040	Area under GZ curve btw. 30-40 deg.	0.030	0.147	mrad	OK
GZ0.2	Max GZ > 0.2	0.200	0.853	m	OK
MAXGZ25	Max. GZ at an angle > 25 deg.	25.000	33.407	deg	OK
GM0.15	GM > 0.15 m	0.150	1.883	m	OK
V.IMOWEATHER	IMO weather criterion	1.000	2.769		OK
IMO.WIND_HEEL	Wind Heel <16 or <=80% of dk imm.	12.841	1.613	deg	OK
2020IS-B2.9.7.1.2	Eq. angle less than 10 deg. or dk. imm.	16.051	2.025	deg	OK
2020IS-B2.9.7.1.1	Resid. righting area > 0.08 mrad	0.080	0.274	mrad	OK

Refer IRS Letter E-126287-181890 dated, September 17, 2021

GZ CURVE DATA

HEEL deg	T m	TR m	GZ m	AREA mrad
0.0	3.682	-0.609	-0.005	0.000
0.1	3.682	-0.609	0.000	0.000
10.0	3.602	-0.571	0.338	0.028
20.0	3.366	-0.464	0.684	0.118
30.0	3.034	-0.515	0.844	0.255
40.0	2.595	-0.780	0.816	0.403
50.0	2.081	-1.094	0.627	0.530
60.0	1.517	-1.392	0.353	0.617
70.0	0.918	-1.632	0.032	0.651
80.0	0.314	-1.751	-0.284	0.628
90.0	-0.283	-1.902	-0.589	0.552

RELEVANT OPENINGS

NAME	TEXT	WT	X m	Y m	Z m	IMMA deg	IMMR m
ER_V_P	ER_INLET_P	UNPROTECTED	13.373	2.300	6.300	51.9	2.559
ER_V_S	ER_INLET_S	UNPROTECTED	13.373	-2.300	6.300	-	2.571
ER_O_P	ER_OUT_P	UNPROTECTED	14.000	1.500	8.400	75.0	4.673
ER_O_S	ER_OUT_S	UNPROTECTED	14.000	-1.500	8.400	-	4.681

Refer IRS Letter E-126287-181890 dated, September 17, 2021