

Longitudinal Strength Members & Small Hatch Securing System

IMO - MSC 105(73)
Longitudinal Strength



Area reduction

Valid for oil tankers with length of 130 meters and more, age more than 10 years (calculated from delivery date).

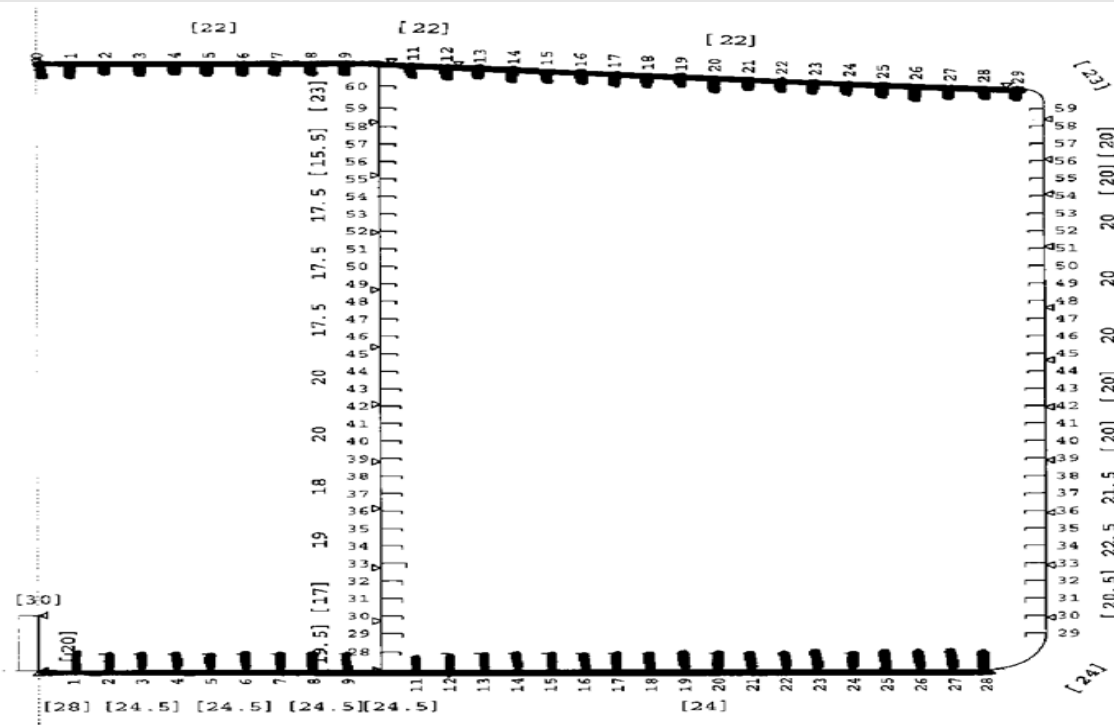
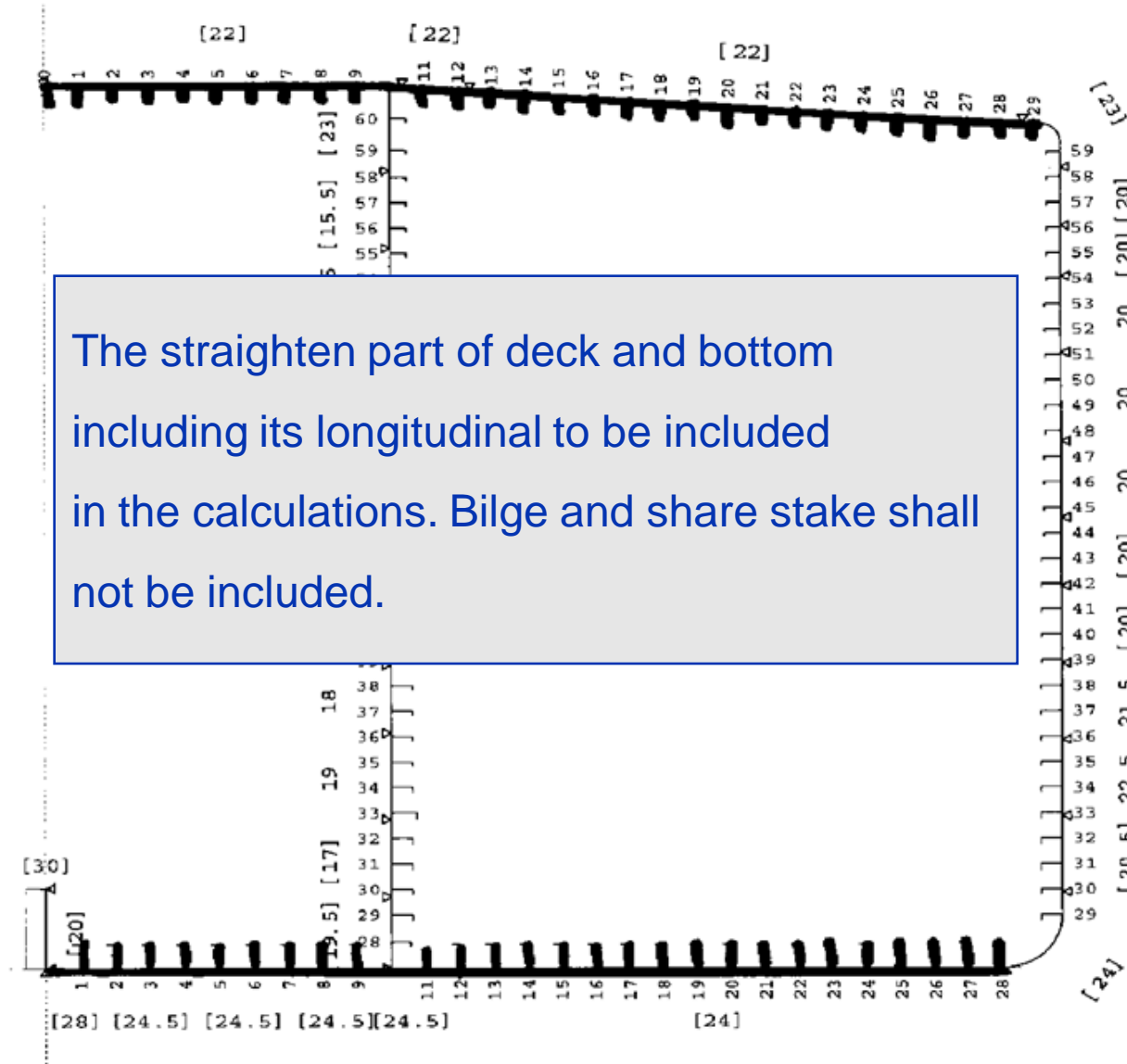


Fig. Showing a ships half breadth – total area reductions in deck and bottom to be calculated.

Area reduction



The straighten part of deck and bottom including its longitudinal to be included in the calculations. Bilge and share stake shall not be included.

If the vessel has a double bottom, tank top shall not be included in the reduction calcul.

■ Thickness Measurement Report

Transverse sectional area of hull girder flange				
Total deck and bottom cross section area (plates + long.)		Measured	As-built	Diminution
		Cm ²	Cm ²	%
Transverse Section 1	Deck			
	Bottom			
Transverse Section 2	Deck			
	Bottom			
Transverse Section 3	Deck			
	Bottom			

If the ship's age is more than 10 years according to date of delivery at the time of the commencement of thickness measurements for the 2nd renewal survey, evaluation of longitudinal strength according to IMO Res. A.744(18) as amended shall be carried out for two (2) transverse sections.

If the ship's age is more than 15 years according to date of delivery at the time of the commencement of thickness measurements for the 3rd renewal survey, evaluation of longitudinal strength according to the above ref. shall be carried out for three (3) transverse sections.

■ How to use the excel sheets

Insert values using the unit mm

Calculated areas are given with the unit cm²

Basis for the t-min list is 5% or 1 Deck: 5 % 10 %
(delete as found necessary) Bottom: 5 % 10 %

Plates:

Deck, Port

Deck, Stbd

Plate No	As built			As measured			Diminution Area red. %	Plate No	As built			As measured			Diminution Area red. %
	Breath B _b	Thickness t _b	Area = B _b *t _b	Thickness t _m	Area = B _b *t _m	Area red. %			Breath B _b	Thickness t _b	Area = B _b *t _b	Thickness t _m	Area = B _b *t _m	Area red. %	
1*	1215,0	10,5	127,6		0,0	100,0	1*	1215,0	10,5	127,6		0,0	100,0		
2*	2430,0	11,5	279,5		0,0	100,0	2*	2430,0	11,5	279,5		0,0	100,0		
3*	2430,0	11,5	279,5		0,0	100,0	3*	2430,0	11,5	279,5		0,0	100,0		
4*	2430,0	11,5	279,5		0,0	100,0	4*	2430,0	11,5	279,5		0,0	100,0		
5	3100,0	20,0	620,0		0,0	100,0	5	3100,0	20,0	620,0		0,0	100,0		
6	3155,0	20,0	631,0		0,0	100,0	6	3155,0	20,0	631,0		0,0	100,0		
Sum B _b	14760,0						Sum B _b	14760,0							
Total			2216,9	Total		0,0	Total			2216,9	Total		0,0		

Bottom, Port

Bottom, St

Plate No	As built			As measured			Diminution Area red. %	Plate No	As built			As measured			Diminution Area red. %
	Breath B _b	Thickness t _b	Area = B _b *t _b	Thickness t _m	Area = B _b *t _m	Area red. %			Breath B _b	Thickness t _b	Area = B _b *t _b	Thickness t _m	Area = B _b *t _m	Area red. %	
Keel plate	1150,0	18,0	207,0		0,0	100,0	Keel plate	1150,0	18,0	207,0		0,0	100,0		
2	2500,0	13,0	325,0		0,0	100,0	2	2500,0	13,0	325,0		0,0	100,0		
3	2500,0	13,0	325,0		0,0	100,0	3	2500,0	13,0	325,0		0,0	100,0		
4	2500,0	13,0	325,0		0,0	100,0	4	2500,0	13,0	325,0		0,0	100,0		
5	2500,0	13,0	325,0		0,0	100,0	5	2500,0	13,0	325,0		0,0	100,0		
6	2500,0	13,0	325,0		0,0	100,0	6	2500,0	13,0	325,0		0,0	100,0		
Sum B _b	13650,0						Sum B _b	13650,0							
Total			1832,0	Total		0,0	Total			1832,0	Total		0,0		

- When filling in measured thicknesses, all thicknesses shall be given in mm.
- If plate thicknesses in the Fr. No. measured are different from thicknesses given in the excel sheet (normally taken from vessel's midship drawing), thicknesses in column **Thickness t_b** is to be corrected.
- New **Area** = $B_b * t_b$ will automatically be calculated.
- Average thickness measured for a plate to be added into column:
Thickness t_m

Area reduction - Plates



All thicknesses and measurements in mm

Average thickness measured for a plate to be added into column **Thickness t_m**

Plate No	As built			Area = $B_b * t_b$	As measured	Area = $B_b * t_m$	Diminution	
	Breath B_b	Thickness t_b	Thickness t_m				Area red.	%
1	1215,0	10,5	127,6		0,0	100,0		
2	2430,0	11,5	279,5		0,0	100,0		
3	2430,0	11,5	279,5		0,0	100,0		
	7080,0	11,5	279,5		0,0	100,0		
Total				2216,9	Total		0,0	

If plate thicknesses measured are different from thicknesses given in the excel sheet (normally taken from vessel's midship drawing), thicknesses in column **Thickness t_b** is to be corrected.

New **Area = $B_b * t_b$** will automatically be calculated.

Area reduction

Plates:

Plate No	As built			As measured		Diminution
	Breath B_b	Thickness t_b	Area = $B_b * t_b$	Thickness t_m	Area = $B_b * t_m$	Area red. %
1	1215,0	11,5	139,7		0,0	100,0
2	2430,0	12,5	303,8		0,0	100,0
3	2430,0	11,5	279,5		0,0	100,0
3	2430,0	11,5	279,5		0,0	100,0
5	3100,0	21,0	651,0		0,0	100,0
6	3155,0	21,0	651,0		0,0	100,0
Sum B_b	14760,0					
Total			2216,9	Total		0,0

Area reduction



Average thickness measured for a Plate to be added into column

Thickness t_m

Plates:

Plate No	As built			As measured		Diminution	
	Breath B_b	Thickness t_b	Area = $B_b * t_b$	Thickness t_m	Area = $B_b * t_m$	Area red.	%
1	1215,0	10,5	127,6	10,1	122,7		3,8
2	2430,0	11,5	279,5	11,0	267,3		4,3
3	2430,0	11,5	279,5	11,3	274,6		1,7
3	2430,0	11,5	279,5	11,3	274,6		1,7
5	3100,0	20,0	620,0	18,9	585,9		5,5
6	3155,0	20,0			593,1		6,0
Sum B_b	14760,0						
Total			2216,9	Total		2118,2	

Areas in cm²
Calculated by this sheet

- Longitudinals

- In case of corrections, this has to be carried out as for plating.

- When bulb's please remember that the total area is:

$$\text{Area} = hw * tw + b$$

Area is taken from a recognized international standard.

- Please also remember that the area b (column **Bulb area b**) is:

$$b = \text{Area} - hw * tw$$

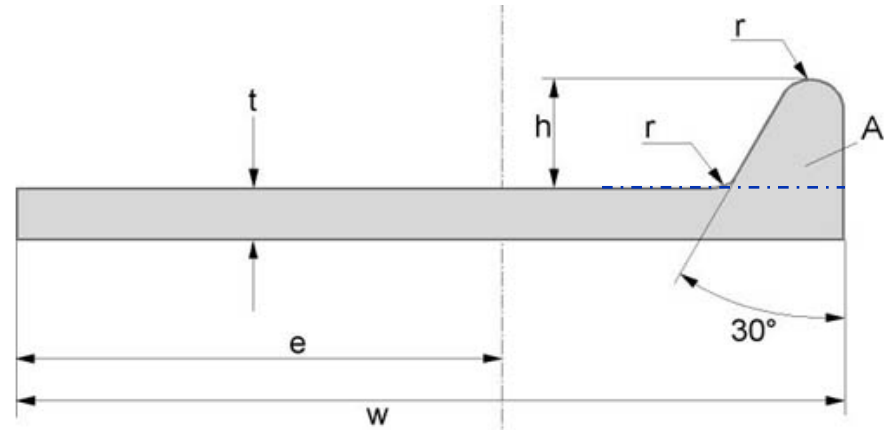
- Bulb 400,0*16,0 have according German DIN standard a total area of:

89.4 cm².

$$b = 89.4 - 40 * 1.6 = 25.4 \text{ cm}^2$$

How to calculate – area of a bulb profile

- Find area from bulb profile table
- Web area: $w \times t$
- Bulb area: tot area-web area



Example 20HP bulb:

- Tot area from table: $3,51\text{cm}^2$
- Web area: $1,4 \times 0,8 = 1,12\text{cm}^2$
- Bulb area: $3,51 - 1.12 = 2,39\text{cm}^2$

ProfEdit - C:\Program Files\DNV\Nauticus\Nauticus Hull\Data\Bulb.tab

File Edit Help

20 HPBulb

Profile view

Profile scantlings

No	h	t	c	r1	r2	r3	r4	Angle
1	60	4	12,5	3,5	3,5	0	0	30
2	60	5	12,5	3,5	3,5	0	0	30
3	60	6	12,5	3,5	3,5	0	0	30
4	80	5	14	4	4	0	0	30
5	80	6	14	4	4	0	0	30
6	80	7	14	4	4	0	0	30
7	100	6	15,5	4,5	4,5	0	0	30
8	100	7	15,5	4,5	4,5	0	0	30
9	100	8	15,5	4,5	4,5	0	0	30
10	120	6	17	5	5	0	0	30
11	120	7	17	5	5	0	0	30
12	120	8	17	5	5	0	0	30
13	140	7	19	5,5	5,5	0	0	30
14	140	8	19	5,5	5,5	0	0	30
15	140	9	19	5,5	5,5	0	0	30
16	160	7	22	6	6	0	0	30
17	160	8	22	6	6	0	0	30
18	160	9	22	6	6	0	0	30
19	180	8	25	7	7	0	0	30
20	180	9	25	7	7	0	0	30
21	180	10	25	7	7	0	0	30
22	200	9	28	8	8	0	0	30
23	200	10	28	8	8	0	0	30
24	200	11,5	28	8	8	0	0	30
25	200	12	28	8	8	0	0	30
26	220	10	31	9	9	0	0	30

Profile properties

Main	Z	Equiv.
Type No	20	
Short Id	HPbulb	
Long Id	HPBulb	
Profile alone		
Area (cm ²)	3,51	
Weight (kg/m)	2,76	
Surface (m ² /m)	0,141	
Xcg/Ycg (mm)	2,3 / 37,9	
Ixx/Iyy (cm ⁴)	12 / 1	
Including plate		
Plate b (mm)	600	
Plate t (mm)	10,0	
Ycg (mm)	-2,6	
I (cm ⁴)	78	
Z (cm ³)	13	

Area reduction



Thicknesses measured for a longitudinal to be added into column Thickness twm and Thickness tfm

Longitudinals:

Stiffener No, off CL	Stiffener type	As built						Measured				Diminution
		Web height h_w	Thickness t_w	Flange width h h_f	Thickness t_f	Bulb area b	Area = $h_w * t_w + h_f * t_f + b$	Thickness t_{wm}	Thickness t_{fm}	Bulb area* b_m	Area = $h_w * t_{wm} + h_f * t_{fm} + b_m$	Area reduction %
1	T bar	300,0	15,0	250,0	30,0		120,0				0,0	100,0
2	Bulb	180,0	9,0			4,5	20,7			0,0	0,0	100,0
3	Bulb	400,0					89,4			0,0	0,0	100,0
4	Bulb									0,0	0,0	100,0
5	Bulb									0,0	0,0	100,0
6	Bulb	400,0					89,4			0,0	0,0	100,0
7	Bulb	400,0	16,0			25,4	89,4			0,0	0,0	100,0
8	Bulb	400,0	16,0			25,4	89,4			0,0	0,0	100,0
9	Bulb	400,0				25,4	89,4			0,0	0,0	100,0
10	Bulb					25,4	89,4			0,0	0,0	100,0
11	Bulb	400,0				25,4	89,4			0,0	0,0	100,0
12	Bulb	400,0	16,0			25,4	89,4			0,0	0,0	100,0
Total "as built", Port							1034,7	Total "measured", Port			0	

All thicknesses given in mm

Areas in cm2
Calculated by this sheet

Area reduction



Longitudinals:

		As built						Measured				Diminution
Stiffener No, off CL	Stiffener type	Web height h_w	Thickness t_w	Flange width h_f	Thickness t_f	Bulb area b	Area = $h_w * t_w + h_f * t_f + b$	Thickness t_{wm}	Thickness t_{fm}	Bulb area* b_m	Area = $h_w * t_{wm} + h_f * t_{fm} + b_m$	Area reduction %
1	T bar	300,0	15,0	250,0	30,0		120,0	14,1	29,0		114,8	4,3
2	Bulb	180,0	9,0			4,5	20,7	8,3		4,2	19,1	7,8
3	Bulb	400,0	16,0							23,8	83,8	6,3
4	Bulb	400,0	16,0							24,0	84,4	5,6
5	Bulb	400,0	16,0							24,1	84,9	5,0
6	Bulb	400,0	16,0							23,8	83,8	6,3
7	Bulb	400,0	16,0			25,4	89,4	14,9		23,7	83,3	6,9
8	Bulb	400,0	16,0			25,4	89,4	14,9		23,7	83,3	6,9
9	Bulb	400,0	16,0			25,4	89,4	14,8		23,7	82,7	7,5
10	Bulb	400,0	16,0			25,4	89,4					6,3
11	Bulb	400,0	16,0			25,4	89,4					5,0
12	Bulb	400,0	16,0			25,4	89,4	15,1			84,4	5,6
		Total "as built", Port						1034,7	Total "measured", Port		973,2	

Measured thicknesses to be given in mm

Areas in cm2
Calculated by this sheet

Area reduction

Total:

	As built	Measured	Area reduction, %
Total plate area, deck	6947,16	6568,224	5,5
	As built	Measured	Area reduction, %
Total plate area, bottom	7331,2	7213,14	1,6
	As built	Measured	Area reduction, %
Total stiffener area, deck	2910,6	2709,46	6,9
	As built	Measured	Area reduction, %
Total stiffener area, bottom	2242	2194,75	2,1

As built area, Measured area and Area reduction calculated.

Area reduction

For reporting:

	As built	Measured	Area reduction, %	
Total deck area (plates+stiffeners)	9858,0	9277,7	5,9	% Acceptable area reduction
	As built	Measured	Area reduction, %	
Total bottom area (plates+stiffeners)	9573,2	9407,9	1,7	% Acceptable area reduction

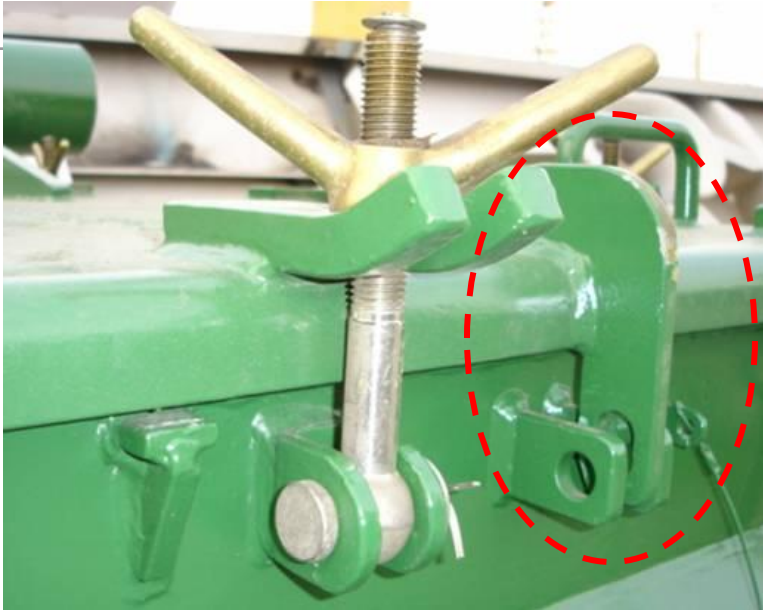
Areas, as built and measured including area reduction % to be reported in the survey report (form 40.9a).



URS 26 / Small hatch Securing Systems

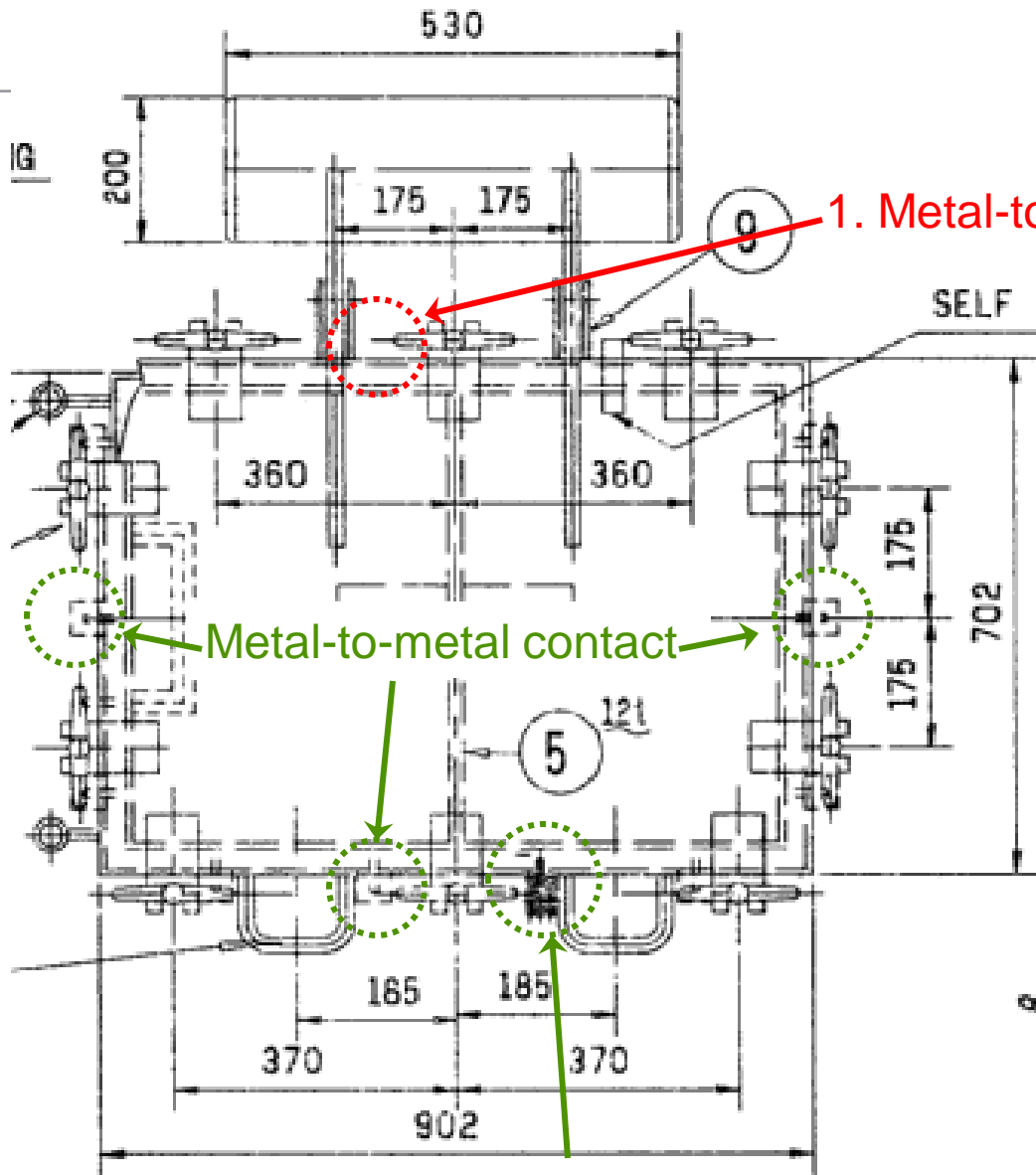


7. Small hatches on the fore deck are to be fitted with an independent secondary securing device



7. It is to be fitted on the side opposite to the hatch cover hinges.





Secondary Securing Device

1. Metal-to-metal contact point to be fitted

2. The scantling of stiffener to be 100x8mm

3. The stiffener to be aligned with metal-to-metal contact points

4. Upper edge of hatch coaming to be reinforced by a horizontal section

5. The hinge is to be placed on the fore edge or outboard edge