IACS Common Structural Rules for Double Hull Oil Tankers, January 2006

Background Document

APPENDIX D – BUCKLING STRENGTH ASSESSMENT

NOTE:

- This TB is published to improve the transparency of CSRs and increase the understanding of CSRs in the industry.
- The content of the TB is not to be considered as requirements.
- This TB cannot be used to avoid any requirements in CSRs, and in cases where this TB deviates from the Rules, the Rules have precedence.
- This TB provides the background for the first version (January 2006) of the CSRs, and is not subject to maintenance.

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1 ADVANCED BUCKLING ANALYSIS

1.1 General

1.1.1 Scope

1.1.1.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background. However, please see *Section 10* for further information.

1.1.2 Alternative procedures

1.1.2.a Use of alternative buckling procedures to the reference advances buckling analysis methodologies to be documented based on the cases as shown in *Tables D1.1a-D1.1h.* The results presented are loads giving buckling utilization factor 1.0 by use of the reference advanced buckling procedure for a stiffened panel with six stiffener spacings.

1.1.2.b Four stiffener types are considered: flat bars, HP bulb flats, angles and T bars. The following cases are considered:

- Case 1: Uni-axial compression in the direction of the stiffener; σ_x
- Case 2: Uni-axial compression, transverse ; σ_y
- Case 3 : Bi-axial compression with shear; σ_x , σ_y and τ
- Case 4: Bi-axial compression with shear and lateral pressure acting on stiffeners side; σ_x , σ_y , τ and P

1.1.2.c Results for Method 1 (Buckling capacity with allowance for redistribution of load) are shown in *Table D1.1a* (flat bars), *Table D1.1b* (HP bulb flats), *Table D1.1c* (Angles) and *Table D1.1d* (T bars).

1.1.2.d Results for Method 2 (Buckling capacity with no allowance for redistribution of load) are shown in *Table D1.1e* (flat bars), *Table D1.1f* (HP bulb flats), *Table D1.1g* (Angles) and *Table D1.1h* (T bars).

1.1.3 Definitions

1.1.3.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background. However, please see *Section 10* for further information.

Table D1.1a

Flatbar stiffeners – Method 1: Ultimate Strength – Load cases with utilization buckling factor 1.0

Panel geometry					Case 1	Case 2	Case 3 Bi-axial			Case 4 Bi-axial w/pressure			
Length of panel l	Stiffener spacing s	Net Plate thick. t_{net}	Stiff. Height d_w	Web thick. $t_{w\text{-}net}$	Axial stress σ_x	Trans. stress σ_y	Axial stress σ_x	Trans. stress σ_y	Shear stress τ	Axial stress σ_x	Trans. stress σ_y	Shear stress τ	Pressure P
m	mm	mm	mm	mm	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	kN/m²
2.5	850	7	150	7	141	50	93	26	62	92	16	62	15.0
2.5	850	9	150	7	137	58	96	32	66	97	21	68	15.4
2.5	850	12	150	7	132	63	89	34	64	90	22	65	16.0
3.0	850	9	200	9	158	61	119	37	71	108	21	65	23.5
3.0	850	12	200	9	165	73	129	40	77	125	24	75	23.5
3.0	850	15	200	9	168	77	124	38	74	122	24	74	23.5
3.5	850	12	300	14	206	77	174	43	84	155	24	75	56.0
3.5	850	16	300	14	223	105	201	49	97	179	28	86	56.0
3.5	850	20	300	14	235	131	210	51	101	190	30	92	56.0
3.5	850	7	150	7	112	27	68	17	64	70	11	65	8.0
3.5	850	9	150	7	102	32	66	16	61	67	10	62	8.0
3.5	850	12	150	7	91	39	65	16	61	66	10	61	8.0
4.0	850	9	200	9	142	39	103	23	69	101	14	67	13.2
4.0	850	12	200	9	140	48	100	22	67	100	14	66	13.2
4.0	850	15	200	9	133	55	100	22	67	100	14	67	13.2
5.0	850	12	300	14	189	60	153	32	80	144	19	76	27.4
5.0	850	16	300	14	199	73	156	33	82	151	20	80	27.4
5.0	850	20	300	14	201	83	156	33	81	152	20	80	27.4

Table D1.1b

HP-bulb flats – Method 1: Ultimate Strength – Load cases with utilization buckling factor 1.0

Panel geometry					Case 1	Case 2	Case 3 Bi-axial			Case 4 Bi-axial w/pressure			
Length of panel l	Stiffener spacing s	Net Plate thick. t_{net}	Stiff. Height d_w	Web thick. $t_{w\text{-}net}$	Axial stress σ_x	Trans. stress σ_y	Axial stress σ_x	Trans. stress σ_y	Shear stress τ	Axial stress σ_x	Trans. stress σ_y	Shear stress τ	Pressure P
m	mm	mm	mm	mm	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	kN/m²
2.5	850	9	180	9	195	71	140	41	68	141	26	68	50.6
2.5	850	11	180	9	199	83	153	51	73	145	30	69	51.5
2.5	850	13	180	9	205	97	167	63	77	153	36	70	52.3
3.0	850	11	280	11	231	81	178	50	73	174	30	71	118.3
3.0	850	14	280	11	241	101	199	66	78	185	39	73	120.6
3.0	850	17	280	11	252	123	222	86	83	194	47	73	122.5
3.5	850	14	400	16	270	109	226	73	79	209	42	73	253.6
3.5	850	18	400	16	279	137	248	97	84	219	54	74	259.7
3.5	850	22	400	16	288	169	265	124	87	230	67	75	264.7
3.5	850	9	180	9	183	57	140	35	72	129	20	66	25.8
3.5	850	11	180	9	183	65	135	38	69	133	24	69	26.3
3.5	850	13	180	9	183	71	130	41	68	131	25	67	26.7
4.0	850	11	280	11	228	68	182	44	76	169	25	70	66.5
4.0	850	14	280	11	236	87	195	58	78	178	33	71	67.8
4.0	850	17	280	11	244	109	199	71	77	187	42	72	68.9
5.0	850	14	400	16	265	91	229	63	82	202	35	72	124.3
5.0	850	18	400	16	276	119	237	82	81	212	46	73	127.3
5.0	850	22	400	16	279	152	234	102	79	216	59	73	129.7

Table D1.1c

Angles – Method 1: Ultimate Strength – Load cases with utilization buckling factor 1.0

Panel geometry							Case 1	Case 2	Case 3 Bi-axial			Case 4 Bi-axial w/pressure			
Length of panel l	Stiffener spacing s	Net Plate thick. t_{net}	Stiff. Height d_w	Web thick. $t_{w\text{-}net}$	Flange Breadth d_f	Net Flange thick. $t_{f\text{-}net}$	Axial stress σ_x	Trans. stress σ_y	Axial stress σ_x	Trans. stress σ_y	Shear stress τ	Axial stress σ_x	Trans. stress σ_y	Shear stress τ	Press. P
m	mm	mm	mm	mm	mm	mm	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	kN/m²
2.5	850	9	200	6	90	11	206	73	143	41	66	147	26	67	74.8
2.5	850	11	200	6	90	11	211	85	157	51	71	155	31	69	75.7
2.5	850	13	200	6	90	11	218	98	174	63	75	165	37	71	76.5
3.0	850	11	300	8	90	13	220	79	166	48	72	163	29	70	108.2
3.0	850	14	300	8	90	13	232	98	191	65	78	177	37	72	110
3.0	850	17	300	8	90	13	247	121	214	84	82	189	46	72	111.6
3.5	850	14	350	9	100	14	247	93	202	61	77	187	35	71	115.7
3.5	850	18	350	9	100	14	262	124	225	85	81	199	47	72	117.9
3.5	850	22	350	9	100	14	269	159	234	111	82	213	63	75	119.8
3.5	850	9	200	6	90	11	186	57	140	35	72	132	20	67	38.2
3.5	850	11	200	6	90	11	204	68	161	43	75	147	25	68	38.6
3.5	850	13	200	6	90	11	207	81	159	50	73	154	30	70	39.0
4.0	850	11	300	8	90	13	218	66	170	41	74	159	24	69	60.8
4.0	850	14	300	8	90	13	229	85	187	56	77	171	32	71	61.9
4.0	850	17	300	8	90	13	240	107	193	69	76	182	41	72	62.8
5.0	850	14	350	9	100	14	235	78	189	50	76	176	29	71	56.7
5.0	850	18	350	9	100	14	248	108	193	67	74	188	41	72	57.8
5.0	850	22	350	9	100	14	252	115	183	67	69	179	41	67	58.7

Table D1.1d

T bars – Method 1: Ultimate Strength – Load cases with utilization buckling factor 1.0

Panel geometry							Case 1	Case 2	Case 3 Bi-axial			Case 4 Bi-axial w/pressure			
Length of panel l	Stiffener spacing s	Net Plate thick. t_{net}	Stiff. Height d_w	Web thick. $t_{w\text{-}net}$	Flange Breadth d_f	Net Flange thick. $t_{f\text{-}net}$	Axial stress σ_x	Trans. stress σ_y	Axial stress σ_x	Trans. stress σ_y	Shear stress τ	Axial stress σ_x	Trans. stress σ_y	Shear stress τ	Press. P
m	mm	mm	mm	mm	mm	mm	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	kN/m²
3.0	850	9	310	8	100	10	212	65	145	36	65	153	23	68	103.0
3.0	850	12	310	8	100	10	220	82	169	50	72	165	31	71	105.2
3.0	850	15	310	8	100	10	235	104	195	69	78	181	40	73	106.9
3.5	850	13	462	9	150	12	248	86	191	53	73	186	32	71	196.9
3.5	850	16	462	9	150	12	261	108	216	72	78	199	41	72	200.1
3.5	850	19	462	9	150	12	273	132	241	93	84	211	51	73	202.7
4.5	850	15	613	10	200	13	251	93	209	62	79	193	36	73	227.6
4.5	850	20	613	10	200	13	280	133	247	94	83	216	51	73	233.1
4.5	850	25	613	10	200	13	289	179	259	128	85	222	69	73	237.3
4.0	850	9	310	8	100	10	201	54	147	31	69	147	20	69	58.0
4.0	850	12	310	8	100	10	218	70	174	45	75	160	26	69	59.2
4.0	850	15	310	8	100	10	230	91	188	60	77	174	34	72	60.1
5.0	850	13	462	9	150	12	240	72	192	46	76	182	27	71	96.5
5.0	850	16	462	9	150	12	253	93	213	62	79	189	35	71	98.1
5.0	850	19	462	9	150	12	264	117	220	78	79	202	45	72	99.3
6.0	850	15	613	10	200	13	254	83	211	55	78	190	31	71	128.0
6.0	850	20	613	10	200	13	273	122	229	82	79	208	46	72	131.1
6.0	850	25	613	10	200	13	282	167	231	109	77	214	63	72	133.5

Table D1.1e

Flatbar stiffeners – Method 2: Buckling Strength – Load cases with utilization buckling factor 1.0

Panel geometry					Case 1	Case 2	Case 3 Bi-axial			Case 4 Bi-axial w/pressure			
Length of panel l	Stiffener spacing s	Net Plate thick. t_{net}	Stiff. Height d_w	Web thick. $t_{w\text{-}net}$	Axial stress σ_x	Trans. stress σ_y	Axial stress σ_x	Trans. stress σ_y	Shear stress τ	Axial stress σ_x	Trans. stress σ_y	Shear stress τ	Pressure P
m	mm	mm	mm	mm	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	kN/m²
2.5	850	7	150	7	55	16	35	10	24	40	7	27	15.0
2.5	850	9	150	7	86	26	53	18	36	60	13	42	15.4
2.5	850	12	150	7	132	46	87	33	62	90	22	65	16.0
3.0	850	9	200	9	92	25	57	18	34	66	13	40	23.5
3.0	850	12	200	9	153	44	97	30	58	111	21	66	23.5
3.0	850	15	200	9	168	68	124	38	74	122	24	74	23.5
3.5	850	12	300	14	164	45	118	29	57	130	20	63	56.0
3.5	850	16	300	14	223	76	188	46	91	179	28	86	56.0
3.5	850	20	300	14	235	118	210	51	101	190	30	92	56.0
3.5	850	7	150	7	55	14	33	8	31	36	6	34	8.0
3.5	850	9	150	7	86	24	53	13	49	58	9	54	8.0
3.5	850	12	150	7	91	39	65	16	61	66	10	61	8.0
4.0	850	9	200	9	91	23	62	14	42	67	9	45	13.2
4.0	850	12	200	9	140	41	101	22	68	100	14	66	13.2
4.0	850	15	200	9	133	55	100	22	67	100	14	67	13.2
5.0	850	12	300	14	165	41	121	25	63	131	17	69	27.4
5.0	850	16	300	14	199	71	156	33	82	151	20	80	27.4
5.0	850	20	300	14	201	83	156	33	81	153	20	80	27.4

Table D1.1f

HP-bulb flats – Method 2: Buckling Strength – Load cases with utilization buckling factor 1.0

Panel geometry					Case 1	Case 2	Case 3 Bi-axial			Case 4 Bi-axial w/pressure			
Length of panel l	Stiffener spacing s	Net Plate thick. t_{net}	Stiff. Height d_w	Web thick. $t_{w\text{-}net}$	Axial stress σ_x	Trans. stress σ_y	Axial stress σ_x	Trans. stress σ_y	Shear stress τ	Axial stress σ_x	Trans. stress σ_y	Shear stress τ	Pressure P
m	mm	mm	mm	mm	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	kN/m²
2.5	850	9	180	9	109	29	68	20	33	80	15	39	50.6
2.5	850	11	180	9	146	42	89	30	42	106	22	50	51.5
2.5	850	13	180	9	191	56	111	42	51	136	32	62	52.3
3.0	850	11	280	11	175	46	116	33	48	140	24	57	118.3
3.0	850	14	280	11	241	66	152	50	59	185	39	73	120.6
3.0	850	17	280	11	252	93	190	74	71	194	47	73	122.5
3.5	850	14	400	16	270	79	184	60	64	209	42	73	253.6
3.5	850	18	400	16	279	112	228	89	77	219	54	74	259.7
3.5	850	22	400	16	288	155	265	124	87	230	67	75	264.7
3.5	850	9	180	9	109	25	72	18	37	82	13	42	25.8
3.5	850	11	180	9	146	36	95	27	48	107	19	56	26.3
3.5	850	13	180	9	183	50	120	38	63	131	25	67	26.7
4.0	850	11	280	11	176	39	128	31	53	142	21	59	66.5
4.0	850	14	280	11	236	59	164	49	65	178	33	71	67.8
4.0	850	17	280	11	244	85	199	71	77	187	42	72	68.9
5.0	850	14	400	16	265	66	195	54	70	202	35	72	124.3
5.0	850	18	400	16	276	98	237	82	81	212	46	73	127.3
5.0	850	22	400	16	279	140	234	102	79	216	59	73	129.7

Table D1.1g

Angles – Method 2: Buckling Strength – Load cases with utilization buckling factor 1.0

Panel geometry							Case 1	Case 2	Case 3 Bi-axial			Case 4 Bi-axial w/pressure			
Length of panel l	Stiffener spacing s	Net Plate thick. t_{net}	Stiff. Height d_w	Web thick. $t_{w\text{-}net}$	Flange Breadth d_f	Net Flange thick. $t_{f\text{-}net}$	Axial stress σ_x	Trans. stress σ_y	Axial stress σ_x	Trans. stress σ_y	Shear stress τ	Axial stress σ_x	Trans. stress σ_y	Shear stress τ	Press. P
m	mm	mm	mm	mm	mm	mm	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	kN/m²
2.5	850	9	200	6	90	11	102	33	73	21	34	80	14	36	74.8
2.5	850	11	200	6	90	11	140	44	95	31	43	109	22	49	75.7
2.5	850	13	200	6	90	11	188	59	120	43	52	143	32	61	76.5
3.0	850	11	300	8	90	13	148	44	106	31	46	119	21	51	108.2
3.0	850	14	300	8	90	13	222	65	148	50	60	170	35	69	110
3.0	850	17	300	8	90	13	247	92	188	74	72	189	46	72	111.6
3.5	850	14	350	9	100	14	229	64	159	48	61	179	34	68	115.7
3.5	850	18	350	9	100	14	262	99	218	82	79	199	47	72	117.9
3.5	850	22	350	9	100	14	269	145	234	111	82	213	63	75	119.8
3.5	850	9	200	6	90	11	101	26	73	18	38	80	12	40	38.2
3.5	850	11	200	6	90	11	142	37	100	27	47	110	19	51	38.6
3.5	850	13	200	6	90	11	189	51	126	40	58	145	28	66	39.0
4.0	850	11	300	8	90	13	149	38	111	27	48	120	18	52	60.8
4.0	850	14	300	8	90	13	222	58	155	46	64	171	32	71	61.9
4.0	850	17	300	8	90	13	240	84	193	69	76	182	41	72	62.8
5.0	850	14	350	9	100	14	227	56	164	43	66	176	29	71	56.7
5.0	850	18	350	9	100	14	248	91	193	67	74	188	41	72	57.8
5.0	850	22	350	9	100	14	252	115	183	67	69	179	41	67	58.7

Table D1.1h

T bars – Method 2: Buckling Strength – Load cases with utilization buckling factor 1.0

Panel geometry							Case 1	Case 2	Case 3 Bi-axial			Case 4 Bi-axial w/pressure			
Length of panel l	Stiffener spacing s	Net Plate thick. t_{net}	Stiff. Height d_w	Web thick. $t_{w\text{-}net}$	Flange Breadth d_f	Net Flange thick. $t_{f\text{-}net}$	Axial stress σ_x	Trans. stress σ_y	Axial stress σ_x	Trans. stress σ_y	Shear stress τ	Axial stress σ_x	Trans. stress σ_y	Shear stress τ	Press. P
m	mm	mm	mm	mm	mm	mm	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	kN/m²
3.0	850	9	310	8	100	10	107	29	79	20	35	87	13	39	103.0
3.0	850	12	310	8	100	10	168	47	115	34	49	131	25	56	105.2
3.0	850	15	310	8	100	10	235	71	153	54	61	181	40	73	106.9
3.5	850	13	462	9	150	12	195	57	140	39	54	155	27	59	196.9
3.5	850	16	462	9	150	12	261	81	186	62	67	199	41	72	200.1
3.5	850	19	462	9	150	12	273	110	231	89	80	211	51	73	202.7
4.5	850	15	613	10	200	13	244	72	172	51	65	193	36	73	227.6
4.5	850	20	613	10	200	13	280	118	247	94	83	216	51	73	233.1
4.5	850	25	613	10	200	13	289	178	259	128	85	222	69	73	237.3
4.0	850	9	310	8	100	10	107	25	82	17	38	86	12	40	58.0
4.0	850	12	310	8	100	10	168	42	122	31	52	134	22	58	59.2
4.0	850	15	310	8	100	10	230	65	165	53	67	174	34	72	60.1
5.0	850	13	462	9	150	12	194	50	144	35	57	158	23	62	96.5
5.0	850	16	462	9	150	12	253	73	195	57	72	189	35	71	98.1
5.0	850	19	462	9	150	12	264	101	220	78	79	202	45	72	99.3
6.0	850	15	613	10	200	13	243	66	179	47	66	190	31	71	128.0
6.0	850	20	613	10	200	13	273	112	229	82	79	208	46	72	131.1
6.0	850	25	613	10	200	13	282	167	231	109	77	214	63	72	133.5

2 ADVANCED BUCKLING ANALYSIS METHOD

2.1 General

2.1.1 Effects to consider

2.1.1.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

2.1.2 Non linear geometrical behaviour

2.1.2.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

2.1.3 Material behaviour and properties

2.1.3.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

2.1.4 Initial deflections – geometrical imperfections/out-of-flatness

2.1.4.a The geometric and material imperfections that are present in real structures are represented in the buckling models by a set of initial deformations. The model imperfections are characterized by imperfection shapes and amplitudes, of which the shape is the most important parameter. The imperfection shape is chosen as the one which is most critical with respect to the ultimate capacity of the panel, in order that the results are conservative for any stiffened panel. This means that the model imperfection shape is hence often different from the most typical initial deformation shapes occurring in real panels. The model imperfection shape used is scaled so that appropriate imperfection amplitudes are achieved for local deformation of the plate between stiffeners, sideways deformation of the webs, and for lateral deformation of the stiffeners. The default imperfection amplitudes used in the standard advanced buckling assessment program supplied by the Class Societies are as follows:

- Plate between stiffeners: $s/200$
- Stiffener sideways: $l/1000$
- Stiffener lateral: $l/1000$

s being stiffener spacing, and l being stiffener span. As for the imperfection shapes, the imperfection amplitudes are chosen so as to be representative for any stiffened panel. The imperfection values must be considered in close relation to the imperfection shapes used, and they should therefore not be taken as equal to specified tolerance values (i.e. *IACS Shipbuilding and Quality Repair Standard*) or measured values of initial deformation.

2.1.5 Welding induced residual stress

2.1.5.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

2.1.6 Interactions between buckling modes and structural elements

2.1.6.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

2.1.7 Simultaneous acting loads

2.1.7.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

2.1.8 Boundary conditions

2.1.8.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

2.1.9 Model extent

2.1.9.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

2.1.10 Element size for non-linear finite element models

2.1.10.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

3 APPLICATION AND STRUCTURAL MODELLING PRINCIPLES

3.1 General

3.1.1 Scope

3.1.1.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

3.1.2 Boundary conditions

3.1.2.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

3.1.3 Structural idealisation

3.1.3.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

4 ASSESSMENT CRITERIA

4.1 General

4.1.1 Buckling strength assessment methods

4.1.1.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

4.1.2 Method 1: Buckling capacity with allowance for redistribution of load

It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

4.1.3 Method 2: Buckling capacity with no allowance for redistribution of load

4.1.3.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

4.2 Utilisation Factors

4.2.1 General

4.2.1.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

5 STRENGTH ASSESSMENT (FEM) – BUCKLING PROCEDURE

5.1 General

5.1.1 Scope

5.1.1.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

5.2 Structural Modelling and Capacity Assessment Method

5.2.1 General

5.2.1.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

5.2.2 Stiffened panels

5.2.2.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

5.2.3 Unstiffened panels

5.2.3.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

5.3 Load Application

5.3.1 General

5.3.1.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

5.3.2 Average membrane stresses

5.3.2.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

5.3.3 Averaged lateral pressure

5.3.3.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

5.4 Limitations of the Advanced Buckling Assessment Method

5.4.1 General

5.4.1.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

6 ULTIMATE HULL GIRDER STRENGTH ASSESSMENT

6.1 General

6.1.1 Scope

6.1.1.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

6.2 Load Application

6.2.1 General

6.2.1.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.

6.3 Structural Modelling and Buckling Assessment

6.3.1 General

6.3.1.a It is considered that for this topic, no information in addition to that shown in the Rules, is necessary to explain the background.