

RULES FOR BUILDING AND CLASSING

BULK CARRIERS FOR SERVICE ON THE GREAT LAKES 2017

Guide to Color Coding Used in Online Version of the Rules

The following summarizes the colors corresponding to Rule Changes, Corrigenda items and editorial changes in the Rules files which are available for download.

Rule Changes:

NOTICE NO. 1 – July 2017 (effective 1 July 2017)

Corrigenda:

CORRIGENDA/EDITORIALS – 10 April 2017

Editorials:

Editorial Changes

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RULES FOR BUILDING AND CLASSING

BULK CARRIERS FOR SERVICE ON THE GREAT LAKES 2017

(Updated July 2017 – see next page)

**American Bureau of Shipping
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the State of New York 1862**

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Updates

July 2017 consolidation includes:

- April 2017 version plus Notice No. 1

April 2017 consolidation includes:

- January 2017 version plus Corrigenda/Editorials



RULES FOR BUILDING AND CLASSING

BULK CARRIERS FOR SERVICE ON THE GREAT LAKES

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Notices and General Information

Introduction

For the year 2017 edition of the *Rules for Building and Classing Bulk Carriers for Service on the Great Lakes*, the Rules have been re-organized and re-formatted for the purpose of improving their ease of use. In this regard, we advise the following primary changes.

1. The year 2017 edition is a complete re-print of the Great Lakes Bulk Carrier Rules.
2. A new numbering system was incorporated into the Rules, in accordance with Table 2, which organizes the requirements into “Parts,” “Chapters” and “Sections”. A comparison of the old “1978” numbering system versus the new “2017” numbering system is shown in Appendix 1 as a guide map for users who are familiar with the existing Rules.
3. The 2017 edition of the Rules becomes effective on 1 January 2017.
4. The effective date of each technical change is shown in parenthesis at the end of the subsection/paragraph titles within the text of each Part. Unless a particular date and month are shown, the years in parentheses refer to the following effective dates:

(2000) and after	1 January 2000 (and subsequent years)	(1995)	15 May 1995
(1999)	12 May 1999	(1994)	9 May 1994
(1998)	13 May 1998	(1993)	11 May 1993
(1997)	19 May 1997	(1992)	13 May 1992
(1996)	9 May 1996		

5. The Rule Changes contained in the previously published Notices 1 through 4 to the 1978 Great Lakes Bulk Carrier Rules (together with Corrigenda) have been incorporated into the text of the reformatted 2017 Great Lakes Bulk Carrier Rules.
6. Until the next edition of the Great Lakes Bulk Carrier Rules is published, Rule Change Notices and/or Corrigenda, as necessary, will be published on the ABS website – www.eagle.org – and will be available free for downloading. It is not intended to publish hard copies of future Notices and/or Corrigenda to existing Rules or Guides. The consolidated edition of the *Rules for Building and Classing Bulk Carriers for Service on the Great Lakes*, which includes Notices and/or Corrigenda using different colors for easy recognition, will be published on the ABS website only when Notices and/or Corrigenda are issued.
7. The listing of CLASSIFICATION SYMBOLS AND NOTATIONS is available from the Rules and Guides Downloads page of the ABS website www.eagle.org for download.

TABLE 1
Applicable Editions of Booklets Comprising 2017 Great Lakes Bulk Carrier Rules

Rules for Building and Classing Bulk Carriers for Service on the Great Lakes		
Notices and General Information		2017
Part 1:	Conditions of Classification (Supplement to the <i>ABS Rules for Conditions of Classification</i>) ⁽²⁾	2017
Part 3:	Hull Construction and Equipment	2017
Rules for Conditions of Classification – not included ^(1,2)		
Part 1:	Rules for Conditions of Classification	2017
Rules for Materials and Welding – not included ⁽¹⁾		
Part 2:	Rules for Materials and Welding	2017
Rules for Survey After Construction – not included ⁽¹⁾		
Part 7:	Rules for Survey After Construction	2017

Notes:

- 1 These Rules are available for download from the ABS website at www.eagle.org, Rules and Guides, Downloads or may be ordered separately from the ABS Publications online catalog at www.eagle.org, Rules and Guides, Catalog.
- 2 The requirements for conditions of classification are contained in the separate, generic *ABS Rules for Conditions of Classification (Part 1)*. Additional specific requirements are contained in Part 1 of these Rules.

TABLE 2
Division and Numbering of Rules

<i>Division</i>	<i>Number</i>
Part	Part 1
Chapter	Part 1, Chapter 1
Section	Section 1-1-1
Subsection (see Note 1)	1-1-1/1
Paragraph (see Note 1)	1-1-1/1.1
Subparagraph	1-1-1/1.1.1
Item	1-1-1/1.1.1(a)
Subitem	1-1-1/1.1.1(a)i
Appendix	Appendix 1-1-A1 or Appendix 1-A1-1

Note:

- 1 An odd number (1, 3, 5, etc.) numbering system is used for the Rules. The purpose is to permit future insertions of even-numbered paragraphs (2, 4, 6, etc.) of text and to avoid the necessity of having to renumber the existing text and associated cross-references, as applicable, within the Rules and associated process instructions, check sheets, etc.

Change Notice (2017)

TABLE 3 Summary of Changes from the 2017 Rules

Notice No. 1 (effective on 1 July 2017) to the 2017 Rules, is summarized below.

EFFECTIVE DATE 1 July 2017 – shown as *(1 July 2017)*
(based on the contract date for new construction between builder and Owner)

<i>Part/Para. No.</i>	<i>Title/Subject</i>	<i>Status/Remarks</i>
PART 3	Hull Construction and Equipment	
3-2-3/19 (New)	Hopper Slope	To clarify the requirements for the case when the hopper slope is not part of a tank. (Incorporates Notice No. 1)
3-2-6/11 (New)	Construction of Screen Bulkheads	To clarify the requirements for screen bulkheads. (Incorporates Notice No. 1)

PART

1

Conditions of Classification
(Supplement to the ABS Rules for Conditions of Classification)

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PART

1

Foreword (1 January 2008)

In 2008, Part 1, “Conditions of Classification” was consolidated into a generic booklet, entitled *Rules for Conditions of Classification (Part 1)* for all vessels other than those in offshore service. The purpose of this consolidation was to emphasize the common applicability of the classification requirements in “Part 1” to ABS-classed vessels, other marine structures and their associated machinery, and thereby make “Conditions of Classification” more readily a common Rule of the various ABS Rules and Guides, as appropriate.

Thus, this supplement specifies only the unique requirements applicable to bulk carriers for service on the Great Lakes. This supplement is always to be used with the aforementioned *Rules for Conditions of Classification (Part 1)*.

PART

1

CHAPTER 1 Scope and Conditions of Classification

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PART

1

CHAPTER 1 Scope and Conditions of Classification

SECTION 1 Classification (*1 January 2008*)

The requirements for conditions of classification are contained in the separate, generic *ABS Rules for Conditions of Classification (Part 1)*.

Additional requirements specific to bulk carriers for service on the Great Lakes are contained in the following Sections of this Part.

PART

1

CHAPTER 1 Scope and Conditions of Classification

SECTION 2 Classification Symbols and Notations (*1 January 2008*)

A listing of Classification Symbols and Notations available to the Owners of vessels, offshore drilling and production units and other marine structures and systems, "List of ABS Notations and Symbols" is available from the ABS website "<http://www.eagle.org>".

The following notations are specific to bulk carriers for service on the Great Lakes.

1 Great Lakes Service

Vessels which have been built under the supervision of the ABS Surveyors to the requirements of the *ABS Rules for Building and Classing Steel Vessels*, except where these are modified by the requirements contained in these Rules, or to their equivalent, will be classed and distinguished in the *Record* by the symbols **✕ A1 Great Lakes Service**.

3 Unloading Equipment

Where the vessel has been specially arranged and provided with special equipment for unloading, it will be distinguished in the *Record* with an appropriate notation regarding the arrangements.

5 Heavy Density Cargoes

Where the vessel has been specially reinforced for the carriage of heavy-density cargoes, special loading arrangements, or both, it will be distinguished in the *Record* with a notation describing the special arrangements. Full particulars of the loading conditions and the maximum density of the cargoes to be provided for are to be given on the basic design plans.

PART

1

CHAPTER 1 Scope and Conditions of Classification

SECTION 3 Rules for Classification (*1 January 2008*)

1 Application of Rules

These requirements are intended to apply to new vessels of the Great Lakes bulk/carrier type, having machinery aft, at least one complete deck, a double bottom and side tanks, a longitudinal system of framing for the deck and bottom, and two continuous longitudinal bulkheads fitted between the freeboard deck and the bottom shell. They are intended to apply generally to vessels of welded construction, of usual form and having depths not less than $L/15$ at 400 ft (122 in) length and $L/21$ at 700 ft (213 m) length and over. Vessels whose proportions and general characteristics represent departures from the foregoing and whose scantlings and arrangements differ from those specifically mentioned elsewhere in these Rules be subject to special consideration.

These requirements are applicable to those features that are permanent in nature and can be verified by plan review, calculation, physical survey, or other appropriate means. Any statement in the Rules regarding other features is to be considered as a guidance to the designer, builder, Owner, et al.

PART

2

Materials and Welding

The independent booklet, *ABS Rules for Materials and Welding (Part 2)*, for steels, irons, bronzes, etc., is to be referred to. This booklet consists of the following Chapters:

Rules for Testing and Certification of Materials

CHAPTER 1 Materials for Hull Construction

CHAPTER 2 Equipment

CHAPTER 3 Materials for Machinery, Boilers, Pressure Vessels, and Piping

APPENDIX 1 List of Destructive and Nondestructive Tests Required for Materials and Responsibility for Verifying

APPENDIX 4 Procedure for the Approval of Manufacturers of Hull Structural Steel

APPENDIX 5 Procedure for the Approval of Manufacturers of Hull Structural Steels Intended for Welding with High Heat Input

APPENDIX 6 Nondestructive Examination of Marine Steel Castings

APPENDIX 7 Nondestructive Examination of Hull and Machinery Steel Forgings

APPENDIX 8 Additional Approval Procedure for Steel with Enhanced Corrosion Resistance Properties

Rules for Welding and Fabrication

CHAPTER 4 Welding and Fabrication

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APPENDIX 3 Application of Filler Metals to ABS Steels

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Hull Construction and Equipment

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PART

3

CHAPTER 1 General

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PART

3

CHAPTER 1 General

SECTION 1 Definitions

1 Length

L is the length between perpendiculars, in ft (m), measured on the estimated summer load waterline from the fore side of the stem to the centerline of the rudder stock.

3 Breadth

B is the greatest molded breadth, in ft (m).

5 Depth

D is the molded depth at side, in ft (m), measured at the middle of L , from the molded baseline to the top of the strength deck beams.

7 Draft

d is the molded draft, in ft (m), from the molded baseline to the summer load waterline.

9 Strength Deck

The strength deck is the deck which forms the top of the effective hull girder at any part of its length. See 3-2-1/5.1.

PART

3

CHAPTER 1 General

SECTION 2 General Requirements

1 Arrangements

A transverse watertight bulkhead is to be provided at the forward end of the machinery space and a collision bulkhead is to be provided in accordance with Section 3-2-6. An afterpeak bulkhead is to be fitted to enclose the shaft tube in a watertight compartment. In addition, intermediate bulkheads or equivalent supporting arrangements are to be provided in such number and location which will, when acting in conjunction with the web frames and deep arches, provide adequate transverse strength in the hull.

3 Breaks

Special care is to be taken throughout the structure to provide against local stress concentrations at the ends of the cargo spaces, superstructures, etc.

5 Structural Sections

The scantling requirements of these Rules are applicable to structural angles, channels, bars, and rolled or built-up sections. The required section moduli of members; such as girders, webs, etc., supporting frames and stiffeners are to be obtained on an effective width of plating basis as described below unless otherwise noted. The section is to include the structural member in association with an effective width of plating equal to one-half the sum, of spacing on each side of the member, or 33% of the unsupported span ℓ , whichever is less; for girders and webs along hatch openings, an effective breadth of plating equal to one-half the spacing or 16.5% of the unsupported span ℓ , whichever is less, is to be used. The required section modulus of each frame and stiffener is assumed to be provided by the stiffener and one frame space of the plating to which it is attached.

TABLE 1
Scantlings – Inch Units

1	2	3	4	5	6	7	8	9
<i>Length of Vessel</i>	<i>Basic Depth</i>	<i>Basic Design Draft</i>	<i>Bottom & Side Shell ^(1,7)</i>	<i>Immersed Box & Stern Plating</i>	<i>Shell at Ends</i>	<i>Forecastle and Poop Sides</i>	<i>Center Keelson ⁽⁸⁾</i>	<i>Floors & Side Keelson</i>
400	26.67	16.0	0.40	0.45	0.42	0.36	33½ × 0.42	0.30
410	26.97	16.4	0.41	0.45	0.42	0.36	34¼ × 0.42	0.30
420	27.27	16.8	0.42	0.46	0.42	0.36	34¾ × 0.43	0.31
430	27.56	17.2	0.43	0.46	0.42	0.36	35½ × 0.43	0.31
440	27.85	17.6	0.44	0.47	0.42	0.36	36 × 0.44	0.32
450	28.13	18.0	0.45	0.47	0.42	0.36	36¾ × 0.44	0.32
460	28.40	18.4	0.46	0.47	0.43	0.37	37½ × 0.44	0.32
470	28.66	18.8	0.47	0.48	0.43	0.37	38 × 0.45	0.33
480	28.92	19.2	0.48	0.48	0.43	0.37	38¾ × 0.45	0.33
490	29.17	19.6	0.49	0.48	0.43	0.37	39¼ × 0.46	0.34
500	29.41	20.0	0.50	0.49	0.43	0.37	40 × 0.46	0.34
510	29.65	20.4	0.50	0.49	0.43	0.37	40¾ × 0.46	0.34
520	29.89	20.8	0.51	0.49	0.44	0.38	41¼ × 0.47	0.35
530	30.11	21.2	0.52	0.49	0.44	0.38	42 × 0.47	0.35
540	30.34	21.6	0.53	0.50	0.44	0.38	42½ × 0.48	0.36
550	30.56	22.0	0.54	0.50	0.44	0.38	41¼ × 0.48	0.36
560	30.77	22.4	0.55	0.51	0.44	0.38	44 × 0.48	0.36
570	30.98	22.8	0.56	0.51	0.45	0.39	34½ × 0.49	0.37
580	31.18	23.2	0.57	0.52	0.45	0.39	45¼ × 0.49	0.37
590	31.38	23.6	0.58	0.52	0.45	0.39	45¾ × 0.50	0.38
600	31.58	24.0	0.59	0.53	0.45	0.39	46½ × 0.50	0.38
610	31.77	24.4	0.60	0.53	0.45	0.39	47¼ × 0.50	0.38
620	31.96	24.8	0.61	0.53	0.46	0.40	47½ × 0.51	0.39
630	32.14	25.2	0.62	0.54	0.46	0.40	48½ × 0.51	0.39
640	32.32	25.6	0.63	0.54	0.46	0.40	49 × 0.52	0.40
650	32.50	26.0	0.64	0.54	0.46	0.40	45¾ × 0.52	0.40
660	32.67	26.4	0.65	0.55	0.46	0.40	48½ × 0.52	0.40
670	32.84	26.8	0.66	0.55	0.47	0.41	51 × 0.53	0.41
680	33.01	27.2	0.67	0.55	0.47	0.41	45¾ × 0.53	0.41
690	33.17	27.6	0.68	0.56	0.47	0.41	47¼ × 0.54	0.42
700	33.33	28.0	0.69	0.56	0.47	0.41	53 × 0.54	0.42
710	33.81	28.0	0.69	0.57	0.47	0.41	53¼ × 0.54	0.42
720	34.29	28.0	0.70	0.57	0.48	0.42	53½ × 0.55	0.43
730	34.76	28.0	0.71	0.58	0.48	0.42	53¾ × 0.55	0.43
740	35.24	28.0	0.72	0.58	0.48	0.42	54 × 0.56	0.44

TABLE 1 (continued)
Scantlings – Inch Units

1	2	3	4	5	6	7	8	9
<i>Length of Vessel</i>	<i>Basic Depth</i>	<i>Basic Design Draft</i>	<i>Bottom & Side Shell ^(1,7)</i>	<i>Immersed Box & Stern Plating</i>	<i>Shell at Ends</i>	<i>Forecastle and Poop Sides</i>	<i>Center Keelson ⁽⁸⁾</i>	<i>Floors & Side Keelson</i>
750	35.71	28.0	0.73	0.58	0.48	0.42	54 ¹ / ₄ × 0.56	0.44
760	36.19	28.0	0.74	0.59	0.48	0.42	54 ¹ / ₂ × 0.56	0.44
770	36.67	28.0	0.75	0.59	0.49	0.43	54 ³ / ₄ × 0.57	0.45
780	37.14	28.0	0.76	0.59	0.49	0.43	55 × 0.57	0.45
790	37.62	28.0	0.77	0.60	0.49	0.43	55 ¹ / ₄ × 0.58	0.46
800	38.10	28.0	0.78	0.60	0.49	0.43	55 ¹ / ₂ × 0.58	0.46
810	38.57	28.0	0.79	0.60	0.49	0.43	55 ³ / ₄ × 0.58	0.46
820	39.05	28.0	0.80	0.61	0.50	0.44	56 × 0.59	0.47
830	39.52	28.0	0.81	0.61	0.50	0.44	56 ¹ / ₄ × 0.59	0.47
840	40.00	28.0	0.82	0.61	0.50	0.44	56 ¹ / ₂ × 0.60	0.48
850	40.48	28.0	0.83	0.62	0.50	0.44	56 ³ / ₄ × 0.60	0.48
860	40.95	28.0	0.84	0.62	0.50	0.44	57 × 0.60	0.48
870	41.43	28.0	0.85	0.62	0.50	0.44	57 ¹ / ₄ × 0.61	0.49
880	41.90	28.0	0.86	0.62	0.50	0.44	57 ¹ / ₂ × 0.61	0.49
890	42.38	28.0	0.87	0.62	0.50	0.44	57 ³ / ₄ × 0.62	0.50
900	42.86	28.0	0.88*	0.62	0.50	0.44	58 × 0.62	0.50
910	43.33	28.0	0.88*	0.62	0.50	0.44	58 ¹ / ₄ × 0.62	0.50
920	43.81	28.0	0.89*	0.62	0.50	0.44	58 ¹ / ₂ × 0.62	0.50
930	44.29	28.0	0.90*	0.62	0.50	0.44	58 ³ / ₄ × 0.62	0.50
940	44.76	28.0	0.91*	0.62	0.50	0.44	59 × 0.62	0.50
950	45.24	28.0	0.92*	0.62	0.50	0.44	59 ¹ / ₄ × 0.62	0.50
960	45.71	28.0	0.93*	0.62	0.50	0.44	59 ¹ / ₂ × 0.62	0.50
970	46.19	28.0	0.94*	0.62	0.50	0.44	59 ³ / ₄ × 0.62	0.50
980	46.67	28.0	0.95*	0.62	0.50	0.44	60 × 0.62	0.50
990	47.14	28.0	0.96*	0.62	0.50	0.44	60 ¹ / ₄ × 0.62	0.50
1000	47.62	28.0	0.97*	0.62	0.50	0.44	60 ¹ / ₂ × 0.62	0.50
1100	52.38	28.0	0.97*	0.62	0.50	0.44	60 ³ / ₄ × 0.62	0.50
1200	57.14	28.0	0.97*	0.62	0.50	0.44	61 × 0.62	0.50

* The tabular thickness for side shell plating for vessels 900 ft and over in length may be taken as 0.88 in.

TABLE 1 (continued)
Scantlings – Inch Units

Notes

- 1 *Frame Spacing Correction.* Where the spacing of transverse or longitudinal frames is less than 36 in., the thickness of shell plating within $0.67L$ may be reduced 0.01 in. for each in. of decrease in spacing.
- 2 *Depth Correction.* Where the depth of vessel is greater than the basic depth, col. 2, the thickness of bottom and side plating may be reduced at the rate of 0.005 in. for each additional ft of depth in excess of the tabular value.
- 3 *Draft Correction.* The thickness of bottom and side plating is to be increased 0.01 in. for each ft of draft in excess of the basic draft, col. 3.
- 4 *Transverse Framing Correction.* Where the bottom shell is transversely framed, the thickness of bottom plating and the spacing of side keelsons is to be specially considered.
- 5 *Minimum Thickness.* The thickness t_{min} of shell plating within $0.67L$ amidships, after all corrections have been made, is not to be less than obtained from the following equation.

$$t_{min} = st/36 \text{ in.}$$

where

t = thickness from Col. 4.

s = spacing of frames not to be taken as less than 36 in. at $L = 400$ ft and 30 in. at $L \geq 1000$ ft; intermediate values to be obtained by interpolation.

Where the bottom shell is transversely framed, the minimum thickness of bottom plating is to be specially considered taking into account the buckling characteristics of the bottom shell plating.

- 6 *Bilge Plating.* The thickness of the bilge plating is to be in all cases 0.06 in. greater than the thickness required for the bottom shell plating.
- 7 *Longitudinal Bulkheads.* Where continuous longitudinal side tank bulkheads are not fitted between the freeboard deck and the bottom shell, the thickness of side shell plating is to be increased 0.04 in.
- 8 *Center Keelson.* Where drafts exceed the basic draft, col. 3, the depth of center keelson is to be increased at the rate of 1 in. per ft of excess draft.

TABLE 1
Scantlings – Metric Units

1	2	3	4	5	6	7	8	9
<i>Length of Vessel</i>	<i>Basic Depth</i>	<i>Basic Design Draft</i>	<i>Bottom & Side Shell ^(1,7)</i>	<i>Immersed Box & Stern Plating</i>	<i>Shell at Ends</i>	<i>Forecastle and Poop Sides</i>	<i>Center Keelson ⁽⁸⁾</i>	<i>Floors & Side Keelson</i>
122	8.13	4.88	10.0	11.5	10.5	9.0	850 × 10.5	7.5
125	8.22	5.00	10.5	11.5	10.5	9.0	870 × 10.5	7.5
128	8.31	5.12	10.5	11.5	10.5	9.0	885 × 11.0	8.0
131	8.40	5.24	11.0	11.5	10.5	9.0	900 × 11.0	8.0
134	4.49	5.36	11.0	12.0	10.5	9.0	915 × 11.0	8.0
137	8.57	5.49	11.5	12.0	10.5	9.0	935 × 11.0	8.0
140	8.66	5.61	11.5	12.0	11.0	9.5	950 × 11.0	8.0
143	8.74	5.73	12.0	12.0	11.0	9.5	965 × 11.5	8.5
146	8.81	5.85	12.0	12.0	11.0	9.5	985 × 11.5	8.5
149	8.89	5.97	12.5	12.0	11.0	9.5	995 × 11.5	8.5
152	8.96	6.10	12.5	12.5	11.0	9.5	1015 × 11.5	8.5
155	9.04	6.22	12.5	12.5	11.0	9.5	1035 × 11.5	8.5
158	9.11	6.34	13.0	12.5	11.0	9.5	1050 × 12.0	9.0
162	9.18	6.46	13.0	12.5	11.0	9.5	1065 × 12.0	9.0
165	9.25	6.58	13.5	12.5	11.0	9.5	1080 × 12.0	9.0
168	9.31	6.71	13.5	12.5	11.0	9.5	1100 × 12.0	9.0
171	9.38	6.83	14.0	13.0	11.0	9.5	1120 × 12.0	9.0
174	9.44	6.95	14.0	13.0	11.5	10.0	1130 × 12.5	9.5
177	9.50	7.07	14.5	13.0	11.5	10.0	1150 × 12.5	9.5
180	9.56	7.19	14.5	13.0	11.5	10.0	1160 × 12.5	9.5
183	9.63	7.31	15.0	13.5	11.5	10.0	1180 × 12.5	9.5
186	9.68	7.44	15.0	13.5	11.5	10.0	1200 × 12.5	9.5
189	9.74	7.56	15.5	13.5	11.5	10.0	1215 × 13.0	10.0
192	9.80	7.68	15.5	13.5	11.5	10.0	1230 × 13.0	10.0
195	9.85	7.80	16.0	13.5	11.5	10.0	1245 × 13.0	10.0
198	9.91	7.92	16.5	13.5	11.5	10.0	1265 × 13.0	10.0
201	9.96	8.05	16.5	14.0	11.5	10.0	1285 × 13.0	10.0
204	10.01	8.17	17.0	14.0	12.0	10.5	1295 × 13.5	10.5
207	10.06	8.29	17.0	14.0	12.0	10.5	1315 × 13.5	10.5
210	10.11	8.41	17.5	14.0	12.0	10.5	1325 × 13.5	10.5
213	10.16	8.53	17.5	14.0	12.0	10.5	1345 × 13.5	10.5
216	10.30	8.53	17.5	14.5	12.0	10.5	1355 × 13.5	10.5
219	10.45	8.53	18.0	14.5	12.0	10.5	1360 × 14.0	11.0
222	10.59	8.53	18.0	14.5	12.0	10.5	1365 × 14.0	11.0
226	10.74	8.53	18.5	14.5	12.0	10.5	1370 × 14.0	11.0

TABLE 1 (continued)
Scantlings – Metric Units

1	2	3	4	5	6	7	8	9
<i>Length of Vessel</i>	<i>Basic Depth</i>	<i>Basic Design Draft</i>	<i>Bottom & Side Shell ^(1,7)</i>	<i>Immersed Box & Stern Plating</i>	<i>Shell at Ends</i>	<i>Forecastle and Poop Sides</i>	<i>Center Keelson ⁽⁸⁾</i>	<i>Floors & Side Keelson</i>
229	10.88	8.53	18.5	14.5	12.0	10.5	1380 × 14.0	11.0
232	11.03	8.53	19.0	15.0	12.0	10.5	1385 × 14.0	11.0
235	11.18	8.53	19.0	15.0	12.5	11.0	1390 × 14.5	11.5
238	11.32	8.53	19.5	15.0	12.5	11.0	1395 × 14.5	11.5
241	11.47	8.53	19.5	15.0	12.5	11.0	1405 × 14.5	11.5
244	11.61	8.53	20.0	15.0	12.5	11.0	1410 × 14.5	11.5
247	11.76	8.53	20.0	15.0	12.5	11.0	1415 × 14.5	11.5
250	11.90	8.53	20.5	15.5	12.5	11.0	1420 × 15.0	12.0
253	12.05	8.53	20.5	15.5	12.5	11.0	1430 × 15.0	12.0
256	12.19	8.53	21.0	15.5	12.5	11.0	1435 × 15.0	12.0
259	12.34	8.53	21.0	15.5	12.5	11.0	1440 × 15.0	12.0
262	12.48	8.53	21.5	15.5	12.5	11.0	1450 × 15.0	12.0
265	12.63	8.53	21.5	15.5	12.5	11.0	1455 × 15.5	12.5
268	12.77	8.53	22.0	15.5	12.5	11.0	1460 × 15.5	12.5
271	12.92	8.53	22.0	15.5	12.5	11.0	1465 × 15.5	12.5
274	13.06	8.53	22.5*	15.5	12.5	11.0	1475 × 15.5	12.5
277	13.21	8.53	22.5*	15.5	12.5	11.0	1480 × 15.5	12.5
280	13.35	8.53	22.5*	15.5	12.5	11.0	1485 × 15.5	12.5
283	13.50	8.53	23.0*	15.5	12.5	11.0	1490 × 15.5	12.5
286	13.64	8.53	23.0*	15.5	12.5	11.0	1500 × 15.5	12.5
290	13.79	8.53	23.5*	15.5	12.5	11.0	1505 × 15.5	12.5
293	13.93	8.53	23.5*	15.5	12.5	11.0	1510 × 15.5	12.5
296	14.08	8.53	24.0*	15.5	12.5	11.0	1520 × 15.5	12.5
299	14.22	8.53	24.0*	15.5	12.5	11.0	1525 × 15.5	12.5
302	14.37	8.53	24.5*	15.5	12.5	11.0	1530 × 15.5	12.5
305	14.51	8.53	24.5*	15.5	12.5	11.0	1535 × 15.5	12.5
335	15.96	8.53	24.5*	15.5	12.5	11.0	1545 × 15.5	12.5
366	17.42	8.53	24.5*	15.5	12.5	11.0	1550 × 15.5	12.5

* The tabular thickness for side shell plating for vessels 274 m and over in length may be taken as 22.5 mm.

TABLE 1 (continued)
Scantlings – Metric Units

Notes

- 1 *Frame Spacing Correction.* Where the spacing of transverse or longitudinal frames is less than 915 mm, the thickness of shell plating within $0.67L$ may be reduced **1.0 mm** for each **100 mm** of decrease in spacing.
- 2 *Depth Correction.* Where the depth of vessel is greater than the basic depth, col. 2, the thickness of bottom and side plating may be reduced at the rate of 0.04 mm for each additional 100 mm of depth in excess of the tabular value.
- 3 *Draft Correction.* The thickness of bottom and side plating is to be increased 0.09 mm for each 100 mm of draft in excess of the basic draft, col. 3.
- 4 *Transverse Framing Correction.* Where the bottom shell is transversely framed, the thickness of bottom plating and the spacing of side keelsons is to be specially considered.
- 5 *Minimum Thickness.* The thickness t_{min} of shell plating within $0.67L$ amidships, after all corrections have been made, is not to be less than obtained from the following equation.

$$t_{min} = st/915 \text{ mm}$$

where

t = thickness from Col. 4.

s = spacing of frames not to be taken as less than 915 mm at $L = 122$ m and 760 mm at $L \geq 305$ m; intermediate values to be obtained by interpolation.

Where the bottom shell is transversely framed, the minimum thickness of bottom plating is to be specially considered taking into account the buckling characteristics of the bottom shell plating.

- 6 *Bilge Plating.* The thickness of the bilge plating is to be in all cases 1.5 mm greater than the thickness required for the bottom shell plating.
- 7 *Longitudinal Bulkheads.* Where continuous longitudinal side tank bulkheads are not fitted between the freeboard deck and the bottom shell, the thickness of side shell plating is to be increased 1.0 mm.
- 8 *Center Keelson.* Where drafts exceed the basic draft, col. 3, the depth of center keelson is to be increased at the rate of 8.4 mm per 100 mm of excess draft.

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TABLE 2
Thickness and Flanges of Brackets

Where brackets at end connections of girders, webs and stringers are fitted having thicknesses not less than the girder or web plates, the value fort may be modified in accordance with the following:

- Where the face area on the bracket is not less than one-half that on the girder or web and the face bar or flange on the girder or web is carried to the bulkhead or base, the length ℓ may be measured to a point 6 in. (150 mm) on to the bracket.
- Where the face area on the bracket is less than one-half that on the girder or web and the face bar or flange on the girder or web is carried to the bulkhead or base, ℓ may be measured to a point where the area of the bracket and its flange, outside the line of the girder or web, is equal to the flange area on the girder.
- Where the flange area of the girder or web is carried along the face of the bracket, which may be curved for the purpose, ℓ may be measured to the point of the bracket.
- Brackets are not to be considered effective beyond the point where the length of arm on the girder or web is $1\frac{1}{2}$ times the length of the arm on the bulkhead or base; in no case is the allowance in ℓ at either end to exceed one-quarter of the overall length of the girder or web.
- Brackets are not to be considered effective beyond the point where the depth of longer arm exceeds $1\frac{1}{2}$ times the depth of the shorter arm.

Inches				Millimeters			
Depth of Longer Arm	Thickness		Width of Flange	Depth of Longer Arm	Thickness		Width of Flange
	Plain	Flanged			Plain	Flanged	
6.0	0.26			150	6.5		
7.5	0.28			175	7.0		
9.0	0.30	0.26	1 $\frac{1}{4}$	200	7.0	6.5	30
10.5	0.32	0.26	1 $\frac{1}{4}$	225	7.5	6.5	30
12.0	0.34	0.28	1 $\frac{1}{2}$	250	8.0	6.5	30
13.5	0.36	0.28	1 $\frac{1}{2}$	275	8.0	7.0	35
15.0	0.38	0.30	1 $\frac{3}{4}$	300	8.5	7.0	35
16.5	0.40	0.30	1 $\frac{3}{4}$	325	9.0	7.0	40
18.0	0.42	0.32	2	350	9.0	7.5	40
19.5	0.44	0.32	2	375	9.5	7.5	45
21.0	0.46	0.34	2 $\frac{1}{4}$	400	10.0	7.5	45
22.5	0.48	0.34	2 $\frac{1}{4}$	425	10.0	8.0	45
24.0	0.50	0.36	2 $\frac{1}{2}$	450	11.5	8.0	50
25.5		0.36	2 $\frac{1}{2}$	475	11.0	8.0	50
27.0		0.38	2 $\frac{3}{4}$	500	11.0	8.5	55
28.5		0.38	2 $\frac{3}{4}$	525	11.5	8.5	55
30.0		0.40	3	550	12.0	8.5	55
33.0		0.42	3 $\frac{1}{4}$	600	12.5	9.0	60
36.0		0.44	3 $\frac{1}{2}$	650	13.0	9.5	65
39.0		0.46	3 $\frac{3}{4}$	700	14.0	9.5	70
42.0		0.48	4	750	14.5	10.0	75
45.0		0.50	4 $\frac{1}{4}$	800		10.5	80
				850		10.5	85
				900		11.0	90
				950		11.5	90
				1000		11.5	95
				1050		12.0	100
				1100		12.5	105
				1150		12.5	110
				1200		13.0	110

PART 3

CHAPTER 2 Hull Structures and Arrangements

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