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ARCTIC ICE REGIME SHIPPING SYSTEM (AIRSS) STANDARD

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Canada

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TABLE OF CONTENTS

- 1 INTRODUCTION..... 1**
- 1.1 General 1
- 1.2 POLARIS 1
- 2 INTERPRETATIONS 1**
- 3 ICE NUMERAL CALCULATION 2**
- 3.1 General 2
- 4 ICE MULTIPLIERS 2**
- 4.1 General 2
- 4.2 Decayed Ice 3
- 4.3 Ridged Ice 3
- 4.4 Traces of Ice..... 3
- 4.5 Escorted Vessels 3
- 4.6 Tug and Barge Operations..... 3
- 5 TABLE 1 - ICE MULTIPLIERS 4**
- 6 ICE REGIME ROUTING MESSAGE..... 5**
- 6.1 General 5
- APPENDIX A -Ice Regime Routing Message Template..... 6**

1 INTRODUCTION

1.1 General

1.1.1 The Arctic Ice Regime Shipping System (AIRSS) standard sets out the methodology to be used by the Master to assess vessel operations capabilities and limitations in ice when navigating in the circumstances described in section 8(2) of the *Arctic Shipping Safety and Pollution Prevention Regulations (ASSPPR)*. It also describes the format of the message that is to be sent, as required by section 9 of the ASSPPR.

1.1.2 The basis of AIRSS is an evaluation of the risks posed to the vessel by ice conditions in relation to the vessel's ice class or type and as such, it is a decision support tool to be used by the Master when navigating in ice. In all cases, due caution must be exercised, taking into account such factors as the speed, condition and characteristics of the vessel, current and forecasted environmental conditions, and an understanding of the anticipated vessel-ice interactions.

1.2 POLARIS

1.2.1 Section 8(2) of the ASSPPR also permits the use of the International Maritime Organization (IMO) Polar Operational Limit Assessment Risk Indexing System (POLARIS), as set out in the Appendix to IMO Circular MSC.1/Circ.1519. When using POLARIS, the Master of the vessel is also required by section 9 of the ASSPPR to send a message to the Minister before entering a Shipping Safety Control Zone. The message format is the same one as required under AIRSS and is described in Appendix A.

2 INTERPRETATIONS

Definitions from the ASSPPR

Canadian Arctic Class (CAC) a class attributed to a vessel by the Minister stating the vessel is in accordance with the applicable standards of TP 12260 Equivalent Standards for the Construction of Arctic Class Ships, published by Transport Canada.

POLARIS means the Polar Operational Limit Assessment Risk Indexing System, as set out in the Appendix to the IMO Circular MSC.1/Circ.1519. (POLARIS)

Shipping Safety Control Zone has the same meaning as in the Shipping Safety Control Zones Order. (*zone de contrôle de la sécurité de la navigation*)

Type in relation to a vessel, is a type set out in column 1 of Schedule 2 of the ASSPPR corresponding to the classifications given by the organization set out in the heading to any of Columns 2 to 13 of the Schedule, as complying with the construction standards required by the organization. (Type)

Ice regime means a description of an area with a relatively consistent distribution of any mix of ice types, including open water.

New Ice, Nilas, Brash Ice, Multi-Year Ice, Second-Year Ice, Thick First-Year Ice, or Medium First-Year Ice has the same meaning as defined in the World Meteorological Organization sea-ice nomenclature, WMO No.259.

Open Water for the purpose of this standard includes Bergy Water and any concentration of New Ice, Nilas, or loose Brash Ice.

Ridge, Rubble, or Hummocking has the same meaning as defined in the World Meteorological Organization sea-ice nomenclature, WMO No.259.

Thaw Holes, Rotten Ice has the same meaning as defined in the World Meteorological Organization sea-ice nomenclature, WMO No.259.

3 ICE NUMERAL CALCULATION

3.1 General

3.1.1 The Ice Numeral (IN) is used to assess the risk posed by operation in a given ice regime, and is determined as follows:

$$IN = (C_1 \times IM_1) + (C_2 \times IM_2) + (C_3 \times IM_3) + \dots (C_n \times IM_n)$$

Where:

IN = Ice Numeral

$C_1 \dots C_n$ are the concentrations (in tenths) of ice types within the ice regime;
and

$IM_1 \dots IM_n$ are the corresponding Ice Multipliers for each ice type.

4 ICE MULTIPLIERS

4.1 General

4.1.1 For the purpose of this standard, ice types and definitions conform to the World Meteorological Organization nomenclature with the exception of Open Water, which is defined in section 2.

4.1.2 The values of Ice Multiplier (IM) to be used in the calculation of the ice numeral for an ice regime are determined from Table 1, based on the vessel ice class or type as well as the ice types found in the ice regime.

4.1.3 CAC 1 and 2 vessels are permitted near complete unrestricted navigation under section 8(1) of the ASSPPR and therefore have not been assigned IMs in this standard.

4.2 Decayed Ice

- 4.2.1 If ice of types Multi-Year, Second-Year, Thick First-Year, or Medium First-Year has formed Thaw Holes or is Rotten Ice, the corresponding IM may be increased by a value of 1.

4.3 Ridged Ice

- 4.3.1 If the total ice concentration in a regime is 6/10 (six tenths) or greater, and 3/10 (three tenths) or more is of an ice type (other than Brash Ice) that is deformed by Ridges, Rubbles or Hummocking, the IM must be decreased by a value of 1.

4.4 Traces of Ice

- 4.4.1 A trace (less than 1/10 concentration) of ice, which may be reported in forecast or indicated on the left side (outside) of an egg code¹, is not required to be accounted for in the calculation of the Ice Numeral for an ice regime. However, if a trace of old ice is encountered within a regime, extra caution should be exercised when navigating due to the risk that this form of ice creates.

4.5 Escorted Vessels

- 4.5.1 If the track of the escort vessel is wider than the beam of the escorted vessel, the IN shall be calculated based on the thickness, concentration and floe size of ice in the track immediately ahead of the escorted vessel. Concentrations of ice floes less than 2 metres in diameter can be considered "Brash Ice" with an IM of +2.
- 4.5.2 If the track of the icebreaker is narrower than the beam of the escorted vessel, the ice on either side of the track to the beam of the escorted vessel must be included in the assessment of the track.

4.6 Tug and Barge Operations

- 4.6.1 When a tug and tow combination enter an ice regime, the set of IMs selected from Table 1 must correspond to the lightest ice class of the tug and towed vessels.

¹ For information about the Egg Code format, refer to the *Manual of Standard Procedures for Observing and Reporting Ice Conditions* (MANICE) published by the Canadian Ice Service, Environment and Climate Change Canada.

5 TABLE 1 - ICE MULTIPLIERS

Ship Category		Open Water	Grey Ice	Grey White Ice	Thin First Year 1st Stage	Thin First Year 2nd Stage	Medium First Year	Thick First Year	Second Year	Multi Year
	Ice Type Symbol ²	OW	G	GW	FY	FY	MFY	TFY	SY	MY
	Egg Code	1 or 2	4	3 or 5	8	7 or 9	1●	6 or 4●	8●	7● or 9●
CAC 3		2	2	2	2	2	2	2	1	-1
CAC 4		2	2	2	2	2	2	1	-2	-3
Type A		2	2	2	2	2	1	-1	-3	-4
Type B		2	2	1	1	1	-1	-2	-4	-4
Type C		2	2	1	1	-1	-2	-3	-4	-4
Type D		2	2	1	-1	-1	-2	-3	-4	-4
Type E		2	1	-1	-1	-1	-2	-3	-4	-4

² Ice type symbols used on ice prognostic charts may be issued by the Canadian Ice Service, Environment and Climate Change Canada.

6 ICE REGIME ROUTING MESSAGE

6.1 General

- 6.1.1 Every message required by paragraph 9(1) of the ASSPPR must contain all designators listed in Appendix A.
- 6.1.2 The update message required by paragraph 9(2) of the ASSPPR must include designators A to K.
- 6.1.3 Every message must be addressed to TRANSPORT CANADA and be provided to one of the Marine Communications and Traffic Services Centres that is designated by the Canadian Coast Guard to receive NORDREG³ reports.
- 6.1.4 The intended route describe by designator G of Appendix A may include more than one Shipping Safety Control Zone.

³ Refer to the *Northern Canada Vessel Traffic Services Zone Regulations* (SOR/2010-127)

APPENDIX A -ICE REGIME ROUTING MESSAGE TEMPLATE

Item	Designator	Subject	Information
1	A	Vessel	The vessel's name and the name of the state whose flag the vessel is entitled to fly.
2	B	Call Sign and IMO Number	The vessel's call sign and International Maritime Organization (IMO) ship identification number.
3	C	Vessel Ice Class	The Ice Class that corresponds to the Ice Class indicated on the Polar Ship Certificate. For vessels with no Polar Ship Certificate, the Ice Class indicated on the vessel Classification Society Certificate.
4	D	Date & UTC Time	A 6-digit group followed by a Z, the first 2 digits giving the day of the month, the next two digits giving the hour, and the last two digits giving the minutes.
5	E	Final Destination	The name of the final destination.
6	F	Position, Course & Speed	A 4-digit group giving the latitude in degrees and minutes suffixed with N, and a 5-digit group giving the longitude in degrees and minutes suffixed with W. The true course. A 3-digit group. The speed in knots. A 2-digit group.
7	G	Intended Route	A series of 4-digit groups giving the latitude in degrees and minutes suffixed with N, and 5-digit groups giving the longitude in degrees and minutes suffixed with W to describe the planned route.
8	H	Ice Regime(s) to be encountered	For each regime along the planned route, a series of ice concentration in tenths (C), the corresponding ice type (IT) using the ice type symbol or the egg code, followed by the letter IN for AIRSS message or RIO for POLARIS message and the resulting Ice Numeral (IN) or Risk Index Outcome (RIO): AIRSS C ₁ , IT ₁ , C ₂ , IT ₂ , ..., CT _n , IT _n , INxx POLARIS C ₁ , IT ₁ , C ₂ , IT ₂ , ..., CT _n , IT _n , RIOxx

Item	Designator	Subject	Information
9	I	Source(s) of Ice Information	Indicate the source(s) used to determine the ice conditions, e.g. ice charts name/date, visual observations, reports from shore stations and from other ships in the area, helicopter (or drone) reconnaissance, satellite and airborne visual and radar imagery, or other means.
10	J	Other pertinent information or comments	Provide additional information that may have been considered or is pertinent to the assessment, such as limitations associated with the ice regime assessment, near regimes that are likely to drift into the proposed route, alternate route that may be considered, or planned escorting needs.
11	K	Name of Escorting Vessel	Provide the name of the escorting vessel if the ice numeral has been determined for the track of an escorting vessel.
12	L	Ice Navigator(s) and officers certified for ships operating in polar waters	Name(s) and certification information of Ice Navigator(s) and officers certified in accordance with the STCW Convention requirements for ships operating in polar waters.
13	M	Ship Master	Name of the Master and certification information in accordance with the STCW Convention requirement for ships operating in polar waters.