DEVELOPMENT OF A MANDATORY CODE FOR SHIPS OPERATING IN POLAR WATERS

Report of the Working Group on Development of a Mandatory Polar Code

General

1. The Working Group on Development of a Mandatory Polar Code met from 25 to 27 October 2010 under the chairmanship of Mrs. Turid Stemre (Norway).

2. The Group was attended by delegations from:

ARGENTINA MARSHALL ISLANDS
BAHAMAS NETHERLANDS
BELGIUM NEW ZEALAND
CANADA NORWAY
CHILE PANAMA
CHINA REPUBLIC OF KOREA
DENMARK RUSSIAN FEDERATION
FINLAND SPAIN
FRANCE SWEDEN
GERMANY UNITED KINGDOM
ICELAND UNITED STATES
JAPAN VANUATU

by a representative from the following Associate Member of IMO:

HONG KONG, CHINA

by an observer from the following intergovernmental organization:

EUROPEAN COMMISSION (EC)
and observers from the following non-governmental organizations in consultative status:

INTERNATIONAL CHAMBER OF SHIPPING (ICS)
BIMCO
INTERNATIONAL ASSOCIATION OF CLASSIFICATION SOCIETIES (IACS)
OIL COMPANIES INTERNATIONAL MARINE FORUM (OCIMF)
FRIENDS OF THE EARTH INTERNATIONAL (FOEI)
INTERNATIONAL ASSOCIATION OF DRILLING CONTRACTORS (IADC)
COMMUNITY OF EUROPEAN SHIPYARD’S ASSOCIATIONS (CESA)
INTERNATIONAL COUNCIL OF MARINE INDUSTRY ASSOCIATIONS (ICOMIA)
INTERNATIONAL FEDERATION OF SHIPMASTERS’ ASSOCIATIONS (IFSMA)
INTERNATIONAL ASSOCIATION OF INDEPENDENT TANKER OWNERS (INTERTANKO)
THE INSTITUTE OF MARINE ENGINEERING, SCIENCE AND TECHNOLOGY (IMarEST)
CRUISE LINES INTERNATIONAL ASSOCIATION (CLIA)
WORLD WIDE FUND FOR NATURE (WWF)
THE ROYAL INSTITUTION OF NAVAL ARCHITECTS (RINA)
INTERFERRY
PACIFIC ENVIRONMENT

Terms of Reference

3 Taking into account comments and decisions made in plenary, the working group was instructed to:

.1 further develop the draft International Code of safety for ships operating in polar waters (Polar Code), on the basis of the report of the correspondence group (DE 54/13/3), taking into account documents DE 54/13, DE 54/13/1, DE 54/13/2, DE 54/13/5, DE 54/13/6, DE 54/13/7, DE 54/13/8, DE 54/13/9, DE 54/13/10 and DE 54/13/11, as well as the information provided in documents DE 54/INF.2, DE 54/INF.3, DE 54/INF.5, DE 54/INF.8 and MSC 57/INF.15;

.2 consider whether it is necessary to re-establish the correspondence group and, if so, prepare terms of reference for consideration by the Sub-Committee; and

.3 submit a written report to plenary by Thursday, 28 October 2010.

General exchange of views

4 The group, in acknowledging that the polar environment imposes variable additional demands on ships, their systems and operation beyond the existing requirements of SOLAS and MARPOL and other relevant binding IMO instruments, agreed that the purpose of the Code was to supplement these relevant instruments for ships operating in polar waters in order to address the risks that are specific to operations in polar waters such as the environmental conditions and the remoteness of the operation. A further aim of the Code was to address the possible impact of shipping operations on the environment.

5 The group noted that while Arctic and Antarctic waters have a number of similarities, there are also significant differences. While the Code is intended to apply as a whole to both Arctic and Antarctic, the group agreed that the legal and geographical differences between the two areas would need to be taken into account.
Geographical areas

6 The group had an exchange of views on the geographical boundaries of application of the Code.

7 The group, concluded that the definitions of Arctic and Antarctic waters as defined in the present Guidelines, as set out in resolution A.1024(26), serve the purpose for the present discussion in defining the general geographical scope of application of the Code.

8 The group, while noting that such definitions might have to be revisited once the Code is further developed, recognized that any intent to change such definitions would have certain repercussions, in particular as these might already be defined in existing IMO mandatory instruments, e.g., Antarctic in MARPOL, and any deviation might in fact not be possible. In this context, the group agreed that any change to such definitions will most likely need to be supported by submissions to the appropriate IMO body.

9 While noting that it is difficult to impose meaningful geographical limits to areas on the basis of ice coverage, some of those who spoke expressed the preference that the use of geographical area limits should not be disregarded entirely for the Antarctic and that the question should be kept open for the time being.

Application of the Code to ship types

10 The group reiterated the view of the correspondence group that the development of the Code would, in the first instance, focus on ships covered by SOLAS navigating polar waters, in particular passenger and cargo ships.

11 The group however, noted that consideration would also need to be given to the application of the Code to non-SOLAS vessels, including fishing vessels, pleasure craft, MODUs and ships wintering over in ports. However, such a decision would need to be taken at a later stage. The group noted that, in view of this, the use of the term "vessel" instead of "ship" in the Code would also need to be given due consideration at a later date.

Operational limitations

12 The group briefly discussed the issue of operational limitations and agreed that ice classes would be one element of such limitations, depending on ice conditions. The group further noted that the set of Unified Requirements developed by IACS which address essential aspects of construction for ships of polar classes as described in Table 1.1 of resolution A.1024(26), could form the basis of the discussion towards a global harmonized standard. This would not preclude changes at a later stage to the descriptions of the Polar Classes as set out in the resolution. The group also noted that such operational limitations may consist of other elements such as proximity of SAR services and communication capabilities.

13 Some delegations were of the view that operational limitations related to structural requirements for ships operating in the Arctic area should not be based on seasonal or geographical boundaries but on meteorological and ice conditions. This would allow ships strengthened in accordance with the Finnish-Swedish Ice Class Rules and equivalent ice class rules of classifications societies to sail in polar areas depending on ice conditions also in the future.
The group, while noting that the proposed polar class would apply to newly built ships, agreed on the need to develop operational limitations for ships built under the supervision of different recognized organizations including the Finnish-Swedish Ice Class Rules and others. The delegation of Argentina wished to reserve its position on this issue at this stage.

Based on information provided by the Russian Federation on the salient issues to be considered when developing a Polar Code, some delegations supported the notion of the inclusion of an Ice Certificate in the Code but required more information on the issue before a definite decision could be taken on the subject.

The group encouraged the Russian Federation as well as other delegations to provide such information.

Environmental aspects

The group had a preliminary exchange of views on the inclusion of an environmental chapter in the Code.

The group accepted the offer of Norway to prepare a draft of this chapter using, as a basis, the following documents: DE 54/13/7; DE 54/13/8; and DE 54/13/9 as well as the relevant section of the existing guidelines as set out in resolution A.1024(26).

The group invited the Sub-Committee to encourage delegations and interested stakeholders to submit additional information on the subject.

Human element

The group recalled that the amendments to the STCW Convention and Code set to enter into force on 1 January 2012 (under the tacit acceptance procedure) would include new training guidance for personnel serving on board ships operating in polar waters. The group further recalled that the Manila Conference also adopted a number of resolutions, including one on measures to ensure the competency of masters and officers of ships operating in polar waters.

The group encouraged the STW Sub-Committee, subject to MSC's approval, to develop mandatory training requirements in parallel to the development of the Code. The group also noted that development of a model course would be beneficial and agreed to bring this to the attention of the STW Sub-Committee, subject to MSC's approval.

The group agreed that, as it developed the operational aspect of the Code, additional measures related to manning and training specific to polar operations might need to be considered to address the wider aspects of the human element as a result of operating in the harsh conditions of polar regions such as exposure to strong winds and extreme temperature and light conditions which might impact on human physiology and cognitive behaviour – aspects which may not be necessarily catered for under the new amendments of the STCW.

Structure of the Code and the risk/goal-based approach

The group reiterated the view expressed by the correspondence group that the Code would be structured as follows:

.1 Part A – mandatory requirements;
Part B – additional guidance in applying the requirements of Part A; and
Part C – additional information on the methodology used to develop the requirements (part A) and guidance (part B) which could serve as institutional memory when further work would be undertaken in the future.

The group recalled that the Sub-Committee had endorsed the utilization of a risk-based/goal-based approach, as proposed by Germany (DE 54/13/1), including the development of goals and functional requirements which would be supported by prescriptive provisions.

In this context, the group noted that the goals and functional requirements in the proposal were put forward as examples but, at the same time, could serve as a basis for further development of the Code.

The group further noted that such an approach gave sufficient flexibility for alternative designs and arrangements.

During the discussion, some delegations referred to the information in the present guidelines set out in resolution A.1024(26) which could be used to complement a goal-based approach.

With a view to progress the work further, the group:

1. developed provisional text to describe the goals of the Code;
2. developed provisional main groupings of conditions to which additional safety and environmental hazards under the Code would apply;
3. defined specific hazards under these main groupings;
4. drew up a list of the possible consequences of the specific hazards; and
5. prepared a matrix of .2, .3, .4 which is set out at annex 1.

When developing the list of the possible consequences, the group agreed to include the domino effect – "when a consequence gives rise to another".

With regard to paragraph 28.4, the group recognized that some apparent duplication might exist in the list, however, it was felt that such apparent duplication would be useful at this stage to ensure that the list was as comprehensive as possible.

The group noted that the risk assessment study submitted by CLIA (DE 54/INF.2) contained valuable information, in particular in Appendix 2 to that document. The group agreed that this could be used to further populate the list of possible consequences of the specific hazards.

The group also recognized that this list was not exhaustive and may need further work. It agreed to invite the Sub-Committee to establish a correspondence group to review this work.

The group had an extensive exchange of views on Section 4 – Related Functional requirements. Some of the delegations were of the view that the purpose of this text was to set the scene for the further elaboration of the detailed functional requirements under the
specific goals. Thus, sub-paragraphs (4.1 to 4.6; annex 2 refers) were not necessary, at the same time it was recognized that some of the subparagraphs contained valuable principles that should not be lost. These delegations expressed the view that, whilst this section may not be warranted, using some of the elements in the opening paragraph of Section 4 could be used to qualify the paragraph under the Section 2 titled – Goals.

34 Other delegations were of the opinion that, with some amendments, it could be placed in the Preambular section of the Code. One delegation was of the opinion that reference to the issue that "measures should be suitable for the intended operation of the ship" should also be considered in this paragraph.

35 Some delegations also expressed the view that the development of a list of definitions using existing IMO instruments would be useful as this would give a common understanding of the issues during discussions.

36 Based on the annex to DE 54/13/3 and DE 54/INF.3, the group further developed the structure and also began to develop some text around the structure. This is set out at annex 3.

37 The group, while recognizing that the work to date was in a preliminary stage and no agreement had been reached on the text, invited the Sub-Committee to note the progress to date on the development of the mandatory code for ships operating in polar waters.

Establishment of a correspondence group at DE 55

38 The group noted that DE 55 is tentatively scheduled to take place in March 2011 and, based on these dates, the first deadline for submission of documents was 17 December 2010. In light of the short time available to Member Governments and interested parties to actively participate in a meaningful exchange on all aspects of the Code, the group agreed to recommend to the Sub-Committee that, should it agree to the establishment of a correspondence group, the focus of the work should be on the existing matrix as set out in annex 1. The group developed the following proposed terms of reference:

.1 using annex 1 to document DE 54/WP.3 as a basis, to review the information in the matrix, identify any gaps and provide additional information to address the gaps identified; and

.2 to submit a report to DE 55.

39 Recognizing the tight deadlines to complete this work (2012) and in order to progress the work, the group also recommended to the Sub-Committee to invite MSC 88 to consider that the development of the Polar Code be treated as an urgent matter for MSC 89.

Action requested of the Sub-Committee

40 The Sub-Committee is invited to approve the report in general and, in particular, to:

.1 encourage Member Governments and international organizations to provide further information on the Ice Certificate (paragraph 16);

.2 encourage Member Governments and international organizations and interested stakeholders to submit additional information on the environmental aspects of polar shipping (paragraph 19);
.3 invite the STW Sub-Committee, subject to the approval of the MSC, to develop the training requirements for polar waters in parallel to the development of the Polar Code (paragraph 21);

.4 note that development of a model course for polar waters would be beneficial and to bring this to the attention of the STW Sub-Committee, subject to the approval of the MSC (paragraph 21);

.5 note the progress to date on the development of the mandatory code for ships operating in polar waters, recognizing that the work is at a preliminary stage and no agreement had been reached on the text for a draft Code (paragraphs 25 to 37 and annex 3);

.6 agree to establish a correspondence group with the terms of reference as set out in paragraph 38; and

.7 endorse the recommendation to invite MSC 88 to consider that the development of the Polar Code be treated as an urgent matter for MSC 89 (paragraph 39).

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## ANNEX 1

### HAZARD MATRIX

<table>
<thead>
<tr>
<th>Conditions/Areas of concern</th>
<th>Potential hazards</th>
<th>Possible consequences</th>
<th>Potential result</th>
<th>GAP</th>
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</thead>
<tbody>
<tr>
<td>1. Environmental conditions</td>
<td>1.1 Low air temperatures</td>
<td>1.1.1 Loss of performance of material exposed to low temperature 1.1.2 Malfunction of machinery 1.1.3 Freezing of fluid/cargo 1.1.4 Thicker viscosity fluid/cargo and machinery 1.1.5 Effect of cold cargo to hull materials 1.1.6 Loss of functionality of operating and emergency equipment 1.1.7 Loss of functionality of doors and closing appliances 1.1.8 Reduced survival time/hypothermia 1.1.9 Reduced human performance, physical and cognitive functions 1.1.10 Ice on deck and superstructure 1.1.11 Freezing of ballast 1.1.12 Limitation of SAR capabilities</td>
<td>1.1.2.1 Reduced manoeuvrability</td>
<td>1.1.2.1.1 Grounding, stranding, trapped in ice</td>
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<td>1.2 Low water temperatures</td>
<td>1.2.1 Reduced survival time 1.2.2 Malfunction of fluid systems 1.2.3 Clogging of inlets and outlets</td>
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<td>Conditions/Areas of concern</td>
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<td>1.3 Extreme and rapidly changing weather condition</td>
<td>1.3.1</td>
<td>Difficult to prepare for or avoid dangerous weather conditions</td>
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<td>1.3.2</td>
<td>Propulsion and/or manoeuvring difficulties</td>
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<td>1.3.3</td>
<td>Reduced survivability/ hypothermia</td>
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<td>1.3.4</td>
<td>Increased risk of human error</td>
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<td>1.3.5</td>
<td>Injuries due to ice flow/falling on deck</td>
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<td>1.3.6</td>
<td>Capsize and operational threats to smaller vessels, auxiliary boats and tenders</td>
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<td></td>
<td>1.3.7</td>
<td>Limitation of SAR capabilities</td>
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<td>1.4 Presence and variability of sea ice</td>
<td>1.4.1</td>
<td>Structure failure due to impact with ice or pressured ice</td>
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<td>1.4.2</td>
<td>Hull penetration</td>
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<td>1.4.3</td>
<td>Hull structure deformation</td>
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<td>1.4.4</td>
<td>Disturbance in navigation due to icebergs</td>
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<td>1.4.5</td>
<td>Propulsion and/or manoeuvring difficulties/failure</td>
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<td>1.4.6</td>
<td>Different stability characteristics in ice</td>
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<td>1.4.7</td>
<td>Damage to anti-collision systems</td>
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<td>1.4.8</td>
<td>Reduced propulsion system capacities</td>
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<td>1.4.9</td>
<td>Inability to operate evacuation systems due to surrounding ice</td>
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<td>Conditions/Areas of concern</td>
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|                             | 1.5 Ice on deck and superstructures | 1.5.1 Reduced stability  
1.5.2 Mal or no function of equipment and systems (incl LSA and FP) on deck  
1.5.3 Malfunction of navigational aids  
1.5.4 Injuries to personnel  
1.5.5 Blocking of air intakes, air ventilation and pressure release valves  
1.5.6 Exposure of personnel to de-ice (chemicals)  
1.5.7 Possibility of damage to equipment during de-icing (hammer)  
1.5.8 Malfunctioning of deck machinery  
1.5.9 Overload due to ice  
1.5.10 Restrictions of human activities  
1.5.11 Hypothermia | | | |
| 1.6 [presence of glacial ice] | | | | |
| 1.7 [instability of ice features] | | | | |
| 2. High latitude | 2.1 Reduced navigational aids | 2.1.1 Grounding, stranding, trapped in ice  
2.1.2 Impact with ice or other structures  
2.1.3 Lack of signals/disturbance DGPS  
2.1.4 Unstable gyro | 2.1.2.1 Injuries or fatalities | |
<table>
<thead>
<tr>
<th>Conditions/Areas of concern</th>
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<tr>
<td>2.2 Varying availability of charts/hydrographical information</td>
<td>2.2.1 Grounding, stranding</td>
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<td>2.2.2 Voyage planning</td>
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<td>2.2.3 Anchoring</td>
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<td>2.3 Varying availability meteorological information/Ice data</td>
<td>2.3.1 Voyage planning</td>
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<td>2.3.2 Difficult to prepare for or avoid dangerous weather conditions/situations</td>
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<td>2.3.3 Insufficient clothing and supplies (optimistic planning)</td>
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<td>2.4 Variable infrastructure</td>
<td>2.4.1 Insufficient actions to incidents and accidents</td>
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<td>2.4.2 Insufficient spill preparedness</td>
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<td>2.4.3 Limited compliance and enforcement (local infrastructure, waste reception facilitations)</td>
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<td>2.5 Interference with long-range electronic communications</td>
<td>2.5.1 Loss of possibility to send distress messages/contact SAR</td>
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<td>2.5.2 No weather/ice forecast</td>
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<td>2.5.3 Loss of communication possibilities</td>
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<td>2.6 Variable [local] communication capabilities</td>
<td>2.6.1 Communication difficulties</td>
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<td>2.7 Limited search and rescue capabilities</td>
<td>2.7.1 Insufficient response to incidents and accidents</td>
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<td>2.7.2 Lack of medical support</td>
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<td>2.7.3 Capability of emergency source of electrical power</td>
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<td>Conditions/Areas of concern</td>
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<td>2.8 Limited availability of oil spill preparedness</td>
<td>2.8.1 Insufficient response to spills</td>
<td>2.8.1.1 Potential for incidences to escalate</td>
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<td>2.8.2 Damage to ecological systems</td>
<td>2.8.3 Damage to flora and fauna</td>
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<tr>
<td>3. Environmental sensitivity</td>
<td>3.1 Discharges from normal operation</td>
<td>3.1.1 Damage on ice caused by soot</td>
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<tr>
<td>3.2 Oil and chemical spill</td>
<td>3.2.1 Inability to operate pollution response systems due to surrounding ice</td>
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<td>3.3 Air pollution</td>
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<td>4. Human element</td>
<td>4.1 Lack of knowledge personal protection</td>
<td>4.1.1 Injuries due to cold weather</td>
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<td>4.1.2 Cold environment may lead to human errors</td>
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<td>4.2 Unfamiliarity of polar environment</td>
<td>4.2.1 Various physical damages</td>
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<td>4.2.2 Increased risk of human errors</td>
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<td>4.3 Working environment</td>
<td>4.3.1 Inability to work long hours</td>
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<td>4.3.2 Longer recovery time</td>
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<td>4.4 Noise and vibration</td>
<td>4.4.1 Exhaustion</td>
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<td>4.4.2 Lack of rest</td>
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<td>4.5 Light conditions</td>
<td>4.5.1 Disoriented</td>
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<td>4.5.2 Physical effects on eyesight</td>
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ANNEX 2

GOALS/FUNCTIONAL REQUIREMENTS

4.1 All ships operating in polar waters should be suitable for the intended operation, and have structural arrangements adequate to resist the global and local ice loads and ensure safe performance and appropriate resistance to failure of the hull envelope for the purposes of maintaining stability and preserving the environment.

4.2 All essential systems and shipboard equipment shall be capable of functioning effectively in low temperature.

4.3 All ships operating in polar waters should be able to maintain sufficient manoeuvrability in ice through the design of the propulsion and steering systems capable of withstanding ice impact and sustaining and reversing the thrust in all ice conditions of intended season and region of operation.

4.4 All ships operating in polar waters should have the ability to render assistance, including icebreaking assistance to other vessels.

4.5 The ships operating in polar waters should be fitted with life-saving appliances capable to perform their functions at the minimum anticipated service temperature.

4.6 Any negative effect on the environment or ecological systems due to normal operation shall be avoided.

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ANNEX 3

DRAFT INTERNATIONAL CODE OF SAFETY FOR SHIPS OPERATING IN POLAR WATERS

Preamble

1. The international Code of Safety for Ships Operating in Polar Waters has been developed to increase the safety of ship's operation in these harsh, remote and vulnerable areas.

2. This Code has been developed to be consistent with the United Nations Convention on the Law of the Sea, 1982 ("UNCLOS") and the Antarctic Treaty or other international instruments applicable to polar waters. (Nothing in its contents should be read as conflicting with those treaties.)

3. The Code has been developed as a supplement to relevant conventions and codes for ships operating in polar waters in order to assess and address risks that are specific to operations in polar waters such as the environmental conditions and the remoteness of the operation. Furthermore the Code aims at addressing and assessing the possible impact of shipping operations on the environment and any other factors that are of particular significance in Polar Regions.

4. The Code acknowledges that the polar environment imposes additional demands on ships, its systems and operation beyond the existing requirements of the International Convention for the Safety of Life at Sea (SOLAS), 1974, the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the 1978 Protocol relating thereto (MARPOL 73/78), as amended, and other relevant binding IMO instruments. [Hence it is acknowledged that as well as the harsh physical polar environment posing additional hazards to the ship, its crew, passengers and cargo, the fragile polar marine ecosystems are subject to additional hazards posed by the ship.]

5. While Arctic and Antarctic waters have a number of similarities, there are also significant differences. Hence, although the Code is intended to apply as a whole to both Arctic and Antarctic, the legal and geographical differences between the two areas have been taken into account.

6. The key principles for developing the Polar Code has been to use a risk-based approach in determining scope and to adopt a holistic approach in mitigating all risks to acceptable levels/minimizing risks.

7. (The Code focuses on ship systems but acknowledges that the safety of crew, ship and cargo and the protection of the environment and ecological systems also draws on systems external to the ship such as communication and navigation systems as well as search and rescue and pollution response capability.)

8. Part A of this Code has been developed to supplement the requirements of SOLAS, MARPOL and other relevant conventions for ships to which those Conventions apply, taking account of the additional hazards in polar operating environments.

9. Part B of this Code has been developed to provide for additional guidance in applying the requirements of Part A.
Part A
Mandatory requirements regarding the provisions of [ships][vessels] operating in polar waters

1 General

1.1 Introduction

This part of the Code contains the mandatory provisions to which reference is made in ... relevant parts of SOLAS and MARPOL (when amended).

1.2 Definitions

For the purpose of the Code, unless expressly provided otherwise, the terms used have the meanings defined in the following paragraphs. Terms used, but not defined in the Code, are to be interpreted as they are defined in the relevant Conventions.

1.2.1 Administration means the Government of the State whose flag the ship is entitled to fly.

1.2.2 Polar waters includes both Arctic and Antarctic waters.

1.2.3 Arctic waters means those waters which are located north of a line from the latitude 58º00’0 N and longitude 042º00’0 W to latitude 64º37’0 N, longitude 035º27’0 W and thence by a rhumb line to Sørkapp, Jan Mayen and by the southern shore of Jan Mayen to the Island of Bjørnøya, and thence by a great circle line from the Island of Bjørnøya to Cap Kanin Nos and hence by the northern shore of the Asian Continent eastward to the Bering Strait and thence from the Bering Strait westward to latitude 60º N as far as Il’pyrskiy and following the 60th North parallel eastward as far as and including Etolin Strait and thence by the northern shore of the North American continent as far south as latitude 60º N and thence eastward along parallel of latitude 60º N, to longitude 56º37’1 W and thence to the latitude 58º00’0 N, longitude 042º00’0 W (see figure 1).

1.2.4 Antarctic waters means those waters which are south of 60º S (see figure 2).

1.2.5 Ice-covered waters means polar waters where local ice conditions present a structural risk to a ship.

1.3 Application

[To be decided]

2 Goals

2.1 The goal of this Code is to ensure safety and protection of the [marine] environment in [ship] [vessel] operation in polar waters by addressing risk arising from the hazards inherent in polar waters not specifically considered by other instruments of the Organization.

3 Functional requirements

3.1 In order to achieve its goal, this Code embodies a number of functional requirements and, where appropriate, these are supplemented by prescriptive measures, addressing the additional hazards deviating from those outside the polar areas.
4 Additional hazards

The additional safety and environmental hazards considered by the Code are mainly related to the following conditions:

- Environmental conditions
- High latitude
- Environmental sensitivity
- Human element

[See annex 1]

5 Functions

The goals given above should be achieved by designing the [ships] [vessels] operating in polar waters in accordance with the requirements resulting from the [operational limitations] [boundary conditions] and for the following functions:

5.1 Structural integrity (ship structure);
5.2 Stability and floatability (intact and damage);
5.3 Seakeeping performance (dynamic stability);
5.4 Watertight and weathertight integrity;
5.5 Manoeuvrability (steering);
5.6 Propulsion (including auxiliary systems);
5.7 Habitability (accommodation and escape measures);
5.8 Anchoring and towing measures;
5.9 Fire protection/safety;
5.10 Life-saving appliances and arrangements;
5.11 Navigation;
5.12 Communication; and
5.13 Emergency control (Safe return to port, evacuation)

6 [Operational limitations] [Boundary conditions]

6.1 Environmental boundary conditions

The environmental boundary conditions specified within this section of the Code prescribe the conditions to determine the loads acting on the ship as well as crew and passengers. These loads should be regarded as loads acting additional to the loads specified in other IMO regulations relevant for the vessel under consideration. These boundary conditions should be considered for design and operation. The environmental boundary conditions should be specified for (taking into consideration the weather variation in polar waters as well as incident related extension of the voyage):

- ice thickness
- temperatures
- wind;
- current (with ice);
- wave heights; etc

Note: IACS Unified Requirements for Polar Class Ships
6.2 Operational boundary conditions

Boundary conditions specified in this section of the Code should be considered in design and operation. The environmental boundary conditions should be specified (taking into consideration the weather variation in polar waters as well as incident related extension of the voyage):

- rescue/evacuation time after abandonment of vessel (victuals, ...);
- communication distances;
- infrastructure for rescue of crew and passengers after abandonment of vessel;
- etc.

7 Structural integrity (ship structure)

7.1 Goals

The goal of this chapter is to provide that ships operating in polar waters are adequate to resist the global and local environmental loads characteristic of their polar class, or, if not a polar class ship, the environmental loads for the voyages to be undertaken.

7.2 Functions

To achieve the above-mentioned goals, the following functions have to be provided under the specific conditions of polar waters:

7.2.1 materials; and

7.2.2 dimension of structure/structural arrangement.

7.3 Functional requirements

7.3.1 Materials

The materials used should be selected to ensure a safe operation of the vessel by:

7.3.1.1 providing adequate toughness/ductility to avoid NASF (non accidental structural failure, brittle failure) under the boundary conditions specified for the Polar Class and the location;

7.3.1.2 providing adequate hardness to resist structure/ice interaction under the boundary conditions specified for the polar class and the location;

7.3.1.3 providing adequate abrasion resistance for structure/ice interaction under the boundary conditions specified for the polar class and the location;

7.3.1.4 providing adequate corrosion resistance under the boundary conditions specified for the polar class and the location;

7.3.1.5 providing adequate claddings for ice-strengthened areas under the boundary conditions specified for the polar class and the location;
7.3.2 Dimension of structure/structural arrangement

The structure of the vessel should be designed to ensure a safe operation by:

7.3.2.1 providing adequate strength to resist the ice loads under the boundary conditions specified for the polar class;
7.3.2.2 providing adequate arrangements to limit damage resulting from accidental overloads to local areas; and

7.4 Regulations/requirements

8 Stability and floatability (intact and damage)

8.1 Goals

The goal of this chapter is to provide an adequate stability and floatability of ships operating in polar waters taking into consideration of the boundary conditions related to the polar class specified for a vessel.

8.2 Functions

To comply with the above-mentioned goal the following functions have to be provided under the specific boundary conditions of the polar class specified for a vessel:

8.2.1 provide adequate static stability for operating in ice with approved limitations;
8.2.2 provide adequate protection of tanks containing environmental polluting substances;
8.2.3 provide adequate protection of cargo holds carrying environmental polluting substances;

8.3 Functional requirements

To achieve the above-mentioned goals, following functions have to be provided under the specific conditions of polar waters:

8.3.1 stability in damaged conditions;
8.3.2 subdivision;

8.4 Dimension of structure/structural arrangement

8.5 Regulations/requirements

8.5.1 Stability in damaged conditions

All ships of polar class or equivalent shall be able to withstand flooding resulting from hull penetration due to ice impact. The residual stability following ice damage should be such that the factor $s_i$, as defined in SOLAS regulation II-1/7.2, has $s_i = 1$ for all loading conditions.
8.5.2 Subdivision

8.5.2.1 Subject to paragraphs 3.4.2 and 3.4.3, no polar class ship or ship with a polar class equivalency may carry any pollutant directly against the outer shell. Any pollutant shall be separated from the outer shell of the ship by double skin construction of at least 760 mm in width.

8.5.2.2 All new ships with polar class notation shall have double bottoms over the breadth and the length between forepeak and after peak bulkheads. Double bottom height shall be in accordance with the rules of the classification societies in force. Double bottoms may not be used for the carriage of pollutants except where a double skin construction complying with paragraph 5.2.1 is provided, or where working liquids are carried in way of main machinery spaces in tanks not exceeding 20 m³ individual volume.

8.5.2.3 Double bottoms in ships of polar classes 6 and 7 or ships with equivalencies to polar classes 6 or 7 may be used for the carriage of any working liquids where the tanks are aft of midships and within the flat of bottom.

8.5.2.4 All ships with polar class notation or equivalency ships that have icebreaking bow forms and short forepeaks may dispense with double bottoms up to the forepeak bulkhead in the area of the inclined stem, provided that the watertight compartments between the forepeak bulkhead and the bulkhead at the junction between the stem and the keel are not used to carry pollutants.

9 Seakeeping (dynamic stability)

9.1 Goals

9.2 Functions

9.3 Functional Requirements

9.4 Regulations/Requirements

10 Watertight and weathertight integrity

10.1 Goals

10.2 Functions

10.3 Functional Requirements

10.4 Regulations/Requirements

11 Manoeuvrability (steering)

11.1 Goals

11.2 Functions

11.3 Functional Requirements

11.4 Regulations/Requirements
12 Propulsion (including auxiliary systems)
12.1 Goals
12.2 Functions
12.3 Functional Requirements
12.4 Regulations/Requirements
13 Habitability (accommodation and escape measures)
13.1 Goals
13.2 Functions
13.3 Functional Requirements
13.4 Regulations/Requirements
14 Anchoring and towing measures
14.1 Goals
14.2 Functions
14.3 Functional Requirements
14.4 Regulations/Requirements
14.4.1 Anchoring arrangements
14.4.1.1 Anchoring systems on polar class ships should be provided with an independent means of securing the anchor so that the anchor cable can be disconnected for use as an emergency towing bridle.
14.4.2 Towing arrangement
14.4.2.1 Where fitted, close couple bow to stern towing arrangements should comprise strengthened bow plating on the towed ship, appropriate towing slings, non-interfering positioning of bower anchors and disallowance of bulbous bows. In this case, arrangements should be provided for securing the anchor in the stowed position.
15 Fire safety/protection
15.1 Goals
15.2 Functions
15.3 Functional Requirements
15.4 Regulations/Requirements
16 Life-saving appliances and arrangements

16.1 Goals

The goal of this chapter is to require the fullest practicable degree to provide adequate and readily accessible means for:

16.1.1 escape for passengers and crew in case of abandon ship;
16.1.2 survival in water in the case of person overboard, etc;
16.1.3 survival after abandon ship;
16.1.4 notification of distress and position of survivors; and
16.1.5 rescue/recovering of persons in water and in survival craft.

(Taking into account the specific boundary conditions resulting from the operation in polar waters)

Except where otherwise provided in this Code, the life-saving appliances and arrangements required by this chapter shall meet the detailed specifications set out in chapter III of the SOLAS Convention and the LSA Code and be approved by the Administration.

16.2 Functions

To achieve the goals prescribed in this chapter, the following functions have to be provided under the specific boundary conditions of polar waters:

16.2.1 communication;
16.2.2 personal life-saving;
16.2.3 mass evacuation; and
16.2.4 search and rescue.

16.3 Functional requirements

16.3.1 Communication

The communication measures shall be in place and be designed to ensure communication with search and rescue forces by:

16.3.1.1 providing communication equipment capable to operate within the expected maximum time to rescue;
16.3.1.2 providing communication equipment capable to operate under the boundary conditions specified according to the conditions of operation;
16.3.1.3 providing communication equipment capable to communicate with search and rescue forces according the conditions specified by the polar class (range);

16.3.2 Personal life-saving
16.3.3 Evacuation, mass evacuation

The escape and evacuation measures (e.g., survival crafts) shall be in place and be designed to ensure a safe embarkation of all passenger and crew according to the boundary conditions specified by the polar class of the vessel by:

16.3.3.1 providing muster stations according to the conditions of operation;

16.3.3.2 providing escape routes according to the conditions of operation;

16.3.3.3 carrying life-saving appliances and survival equipment according to the boundary conditions specified by the polar class (e.g., lifeboats that can be used in icy waters, ...);

16.3.3.4 providing evacuation and rescue equipment designed in accordance with the expected maximum time to rescue from shore or other external facilities according to the conditions of operation;

16.3.4 Search and rescue

16.4 Regulations/requirements

17 Navigation

17.1 Goals

17.2 Functions

17.3 Functional requirements

17.4 Regulations/requirements

18 Communications

18.1 Goals

18.2 Functions

18.3 Functional requirements

18.4 Regulations/requirements

19 Operational requirements

19.1 Goals

19.2 Functions

19.3 Functional requirements

19.4 Regulations/requirements
20 Emergency control

20.1 Goals

20.2 Functions

20.3 Functional requirements

20.4 Regulations/requirements

21 Environmental protection

21.1 Goals

21.2 Functions

21.3 Functional requirements

21.4 Regulations/requirements

22 Alternative design

22.1 General

All appliances and arrangements may deviate from the requirements set out in this Code, provided that the alternative design and arrangements meet the intent of the requirements concerned and provide an equivalent level of safety to this chapter. When alternative design or arrangements deviate from the prescriptive requirements of this Code, an engineering analysis, evaluation and approval of the design and arrangements shall be carried out in accordance with MSC/Circ.1002 or document MSC 86/5/3 and shall be approved by the respective Administration.

22.2 Engineering analysis

The engineering analysis shall be prepared and submitted to the Administration, based on the guidelines developed by the Organization and shall include, as a minimum, the following elements:

22.2.1 Exchange of information

The Administration shall communicate to the Organization pertinent information concerning alternative design and arrangements approved by them for circulation to all Contracting Governments.

22.2.2 Re-evaluation due to change of conditions

If the assumptions and operational restrictions that were stipulated in the alternative design and arrangements are changed, the engineering analysis shall be carried out under the changed condition and shall be approved by the Administration.