2017 May 15

**Correspondence Group on Safe Mooring Operations**

**- Round 2 -**

**Coordinator’s remarks**

The CG participants are invited to make comments on the following issues **by 12:00 in Coordinated Universal Time (UTC) on 6th of June (Tuesday)**. Please make comments only on the coordinator’s remarks, and please DO NOT make comments directly on the comments/opinions of the other CG participants, in order to prevent confusion.

When you make comments, it is very much appreciated to use the answer sheet (attached to the E-mail). **Please do not write anything in case of “no comments”, “noted” or something like that**, in order to prepare consolidated comments smoothly, while it is appreciated to clarify “agree” or “oppose” to proposals by the coordinator.

In order to facilitate the preparation for consolidated comments, if you would like to type the answer in this document please:

**.1 DO NOT use “comment insertion” or “track change” function of the M.S. Word; and**

**.2 type full sentences AFTER THE RELEVANT PARAGRAPH, but not after a sentence/word in a paragraph, and indicate the relevant sentences/words in your comments, as necessary,**

**0 Terms of Reference and provisional time schedule**

**0.1 Terms of Reference for the CG**

***The CG participants are invited to note the following TORs of the group:***

The CG was instructed, taking into account documents MSC 97/19/2, MSC 97/22 (paragraph 19.15), SDC 4/11, SDC 4/11/1, SDC 4/11/2, SDC 4/11/3 and SDC 4/INF.3, and the comments made and decisions taken at SDC 4, to:

.1 further consider the draft revised SOLAS regulation II-1/3-8, based on annex 1 to document SDC 4/11, regarding the design of arrangements and selection of equipment for safe mooring;

.2 further consider the draft new Guidelines for safe mooring operations on all ships, supporting the draft revised SOLAS regulation II-1/3-8, based on annex 2 to document SDC 4/11, regarding the design of arrangements and selection of equipment for safe mooring;

.3 review MSC.1/Circ.1175 and the draft new Guidelines in light of:

.1 recent updates to IACS Unified Requirement (UR) A2, and IACS Recommendation 10; and

.2 ensuring that no duplications or unintended consequences of application are included in the draft new Guidelines referred to in subparagraph .2 above;

.4 consider the references in the draft revised SOLAS regulation II-1/3-8 to the Guidelines as referred to in subparagraphs .2 and .3 above;

.5 develop separate guidelines on safe mooring operations, taking into account the need for any additional guidance on selection, identification, inspection, maintenance and use of mooring lines;

.6 in line with paragraph 3.2.1.3.10 of the Guidance on drafting of amendments to the 1974 SOLAS Convention and related mandatory instruments (MSC.1/Circ.1500), consider any consequential amendments to relevant IMO instruments; and

.7 submit a report to SDC 5.

Basically, TORs .1 to .4 will be coordinated by Mr. Steen Møller Nielsen (Denmark) and TORs .5 and .6 will be coordinated by Dr. Susumu Ota (Japan).

**0.2 Provisional time schedule**

***The CG participants are invited to note the following provisional time schedules:***

|  |  |  |
| --- | --- | --- |
|  | **Commencement** | **Dead line of comments** |
| **Round 1:***Request* on comments on the revised draft:* SOLAS regulation,
* Guidelines on the design of safe mooring arrangements
* MSC.1/Circ.1175 - rev.1
* Proposals on separate guidelines on safe mooring operations
* Comments on consequential amendments to relevant IMO instruments
 | 4th of April. | 20th April |
| **Round 2:**Discussion on the merged outcome of round 1. | 15th of May | 6th of June |
| **Round 3:**Last round for comments and finalization of the draft mandatory SOLAS requirements and the draft guidelines. | Early July | Early August |
| **Draft report check** | Early September | Middle of September |
| **Submission of the report to SDC 5** | 20th October 2017 |  |

The CG participants are invited to note that it takes two weeks to go through the submission procedure in Japanese government. Therefore, the deadline of the submission of the report to Japanese government will be early October.

**1 Draft revised SOLAS regulation II-1/3-8 (TOR .1)**

Taking into account the comments received during round 1, the coordinator prepared the draft revised SOLAS regulation II-1/3-8, for further consideration by the CG, as set out in Annex 1.1 to this document.

*The draft regulation has been rearranged as proposed by United States. The clarifications proposed have been included. As to the comment by OCIMF how to ensure that mooring lines need not be marked with SWL, this seems to be "clarified" in the accompanying guidelines (MSC.1/Circ. 1175/rev.1).*

*Regulation II-1/3-10 deals with strength, integrity and stability of the ship as a whole on bulk carriers and oil tankers. What we are trying to address in revised regulation II-1/3-8 is a specific part of all ship which does not seem to be a core part of regulation II-1/3-10. Accordingly it seems misplaced to include a corresponding reference in this draft regulation. As to use of the wording "facilitate"; it hardly involves improvements or measures to progress safety during mooring operations. Accordingly such wording seems to fall outside the instructions put on the Sub-Committee.*

*At SDC 4 it was decided not to include risk assessments i the draft text for a revised regulation. ALARP is based on such considerations and can therefore not be taken on board by the CG. The existing text covers all involved in mooring operations (be it on board the vessel or at the berth). In the draft guidelines it is clarified that mooring operations include towing operations connected to them.*

***The CG participants are invited to consider the restructure of this paragraph as proposed by United States and the outcome reflected in the draft new SOLAS Regulation II-1/3-8 as set out in Annex 1 to this document.***

***As to the requests to include functional requirements in the SOLAS text, the The CG participants are invited to forward corresponding proposals during round 2.***

**2 Draft new Guidelines for safe mooring operations (TOR .2)**

Taking into account the comments received during round 1, the coordinator prepared the draft new Guidelines for safe mooring operations, for further consideration by the CG, as set out in Annex 2.1 to this document.

Due to the large number of comments and to maintain an overview on what has been considered and been amended, the considerations and the specific action point have been moved to the attached Document "Coordinators remarks TORs 2, Round 1".

***The CG participants are invited to comment on the issues highlighted in "Coordinator’s remarks on comments in the first round, TOR .2" and the outcome reflected in the draft new Guidelines for safe mooring operations set out in Annex 2 to this document.***

**3 Draft revised MSC.1/Circ.1175 (TOR .3)**

Taking into account the comments received during round 1, the coordinator prepared the draft revised MSC.1/Circ.1175, for further consideration by the CG, as set out in Annex 3.1 to this document. The Annotations to the draft revised MSC/Circ.1175 is set out in Annex 4 to this document.

To maintain an overview, the considerations and the specific action point have been moved to the attached Document "Coordinators remarks TORs 3, Round 1".

***The CG participants are invited to comment on the issues highlighted in "Coordinator’s remarks on comments in the first round, TOR .3" and the outcome reflected in the draft revised MSC.1/Circ.1175 set out in Annex 3 to this document.***

**4 References to the Guidelines in the draft revised SOLAS regulation II-1/3-8 (TOR .4)**

It was not the intent that current revision to progress safe mooring operations should include anchor handling operations. This also seems quite evident in the “new” draft SOLAS text paragraphs 2 and 3, as well as the (proposed) definition of mooring operations.

The proposal by Japan for revised footnotes under TOR 1 seems to accommodate the comments by ICS and IACS.

***The CG participants are invited to consider the revised footnotes as reflected in Annex 1.***

**5 Draft separate guidelines on safe mooring operations (TOR .5)**

**5.1 Name and scope of the draft separate guidelines**

In the first round, some participants pointed out the ambiguity of the scope of the draft separate guidelines. I would like to discuss some points with regard to the scope of the guidelines.

**5.1.1 Need for the separate guidelines**

Some participants were of the view that the need for the separate guidelines was questionable. The coordinator would like to postpone the explicit discussion on the need for the separate guidelines, taking into account the terms of reference and that the scope of the guidelines is under discussion.

***The CG participants are invited to note that explicit discussion on the need for the separate guidelines is postponed.***

**5.1.2 Referencing the separate guidelines in MSC.1/Circ.1371**

ICS proposed to include the separate guidelines in “List of Codes, Recommendations, Guidelines and other Safety- and Security-Related Non-Mandatory Instruments”, i.e. MSC.1/Circ.1371. The coordinator agrees to include the reference to the draft separate guidelines in MSC.1/Circ.1371, taking into account that inclusion of the separate guidelines in MSC.1/Circ.1371 does not preclude anything related to the scope of the separate guidelines.

***The CG participants are invited to make comments on the inclusion of the separate guidelines in MSC.1/Circ.1371.***

**5.1.3 Reference to onboard safety management system**

In the first round, the coordinator prepared the draft separate guidelines referring to onboard safety management system. In this regard, ICS did not support to refer to onboard safety management system in the guidelines.

***The CG participants are invited to make comments on referring to onboard safety management system in the draft separate guidelines.***

**5.1.4 Mixture of mooring operations and mooring line considerations**

The United States, pointing out that the separate guidelines were a mix of mooring operations (training, pre-mooring inspections, mooring procedures, etc.) and mooring line considerations, suggested to focus on mooring lines and to rename as “Guidelines for In-Service Maintenance and Inspection of Mooring Lines”.

***(1) The CG participants are invited to make comments on the proposal to focus on mooring lines.***

***(2) The CG participants are further invited to make comments on the proposal to rename as “Guidelines for In-Service Maintenance and Inspection of Mooring Lines”.***

The editorial modification of the title proposed by IACS, i.e. “Guidelines on maintenance of mooring equipment and safe mooring operations”, will be considered by the group in the next round, as necessary.

**5.2 Further development of draft separate guidelines**

The coordinator would like to invite the participants to cooperate for further development of the separate guidelines in the second round, while the scope of the guidelines may be changed in near future, under the assumption that the scope is not limited but duplication/reproduction of requirements in the other guidelines such as new Guidelines for safe mooring operations (TOR.2) and MSC.1/Circ.1175/Rev.1 should be eliminated.

***The CG participants are invited to cooperate for further development of the separate guidelines and note the assumptions for the work.***

**5.3 Cover page of the draft separate guidelines**

At this stage, the coordinator prepared the following text, including three titles of the separate guidelines with square brackets, for paragraph 1 of the cover page:

“1 The Maritime Safety Committee, at its [XXX] session [date], having considered a proposal by the Sub-Committee on Ship Design and Construction, at its [XXX] session, and recognizing the importance of safe operation of mooring equipment, mooring lines, and inspection/maintenance of lines [and equipment], approved the [Guidelines on safe mooring operations] [Guidelines on maintenance of mooring equipment and safe mooring operations] [Guidelines for In-Service Maintenance and Inspection of Mooring Lines] , as set out in the annex.”

***The CG participants are invited to note that the above mentioned text will be modified according to the results of discussion on the name and scope of the draft separate guidelines referred to in paragraph 5.1, in particular paragraph 5.1.4 of this document.***

**5.4 Annex to the draft separate guidelines**

**5.4.1 Purpose**

In the first round, the United States proposed to insert new sub-section 1.1 “Purpose” as follows:

“The purpose of these Guidelines is to provide recommendations and guidance for shipboard personnel to conduct in-service inspections of mooring lines, criteria for identifying worn-out lines for removal from service, and criteria for selection of replacement mooring lines.”

***(1) The CG participants are invited to make comments on the insertion of new sub-section “Purpose”.***

***(2) The CG participants are also invited to make comments on the above mentioned proposed text for new sub-section “Purpose”.***

**5.4.2 Application**

In the first round, some participants made comments on the text of application. The coordinator would like to postpone the discussion on the draft application provision.

***The CG participants are invited to note the comments in the first round and that the discussion on the draft application provision is postponed.***

**5.4.3 Terms and definitions**

***The CG participants are invited to note that the discussion on the draft “terms and definitions” is postponed.***

**5.4.4 Selection of mooring lines**

**(1) Sub-Section 2.1**

The draft text in sub-section 2.1 was modified based on the comments in the first round as set out in Annex 4 to this document, taking into account that the comment by OCIMF may cover the comments by France, IACS and ICHCA.

***The CG participants are invited to make comments on the draft text in sub-section 2.1 set out in Annex 4 to this document.***

**(2) Sub-Section 2.2**

The draft text in sub-section 2.2 was modified as proposed by Australia.

***The CG participants are invited to make comments on the draft text in sub-section 2.2 set out in Annex 4 to this document.***

**(3) Sub-Section 2.3**

In the first round, only an editorial comment was made on the draft text in sub-section 2.3. The draft text was modified as proposed by Australia.

***The CG participants are invited to note the draft text in sub-section 2.3 set out in Annex 4 to this document.***

**(4) Sub-Section 2.4**

The draft text in sub-section 2.4 was modified based on the comments in the first round as set out in Annex 4 to this document.

***(i) The CG participants are invited to make comments on the draft text in sub-section 2.4 set out in Annex 4 to this document.***

In the first round, IACS suggested to include the following sentence:

“If not meeting the bend radius recommendations for the considered line, life expectation may reduce and earlier retirement should be considered.”

***(ii) The CG participants are invited to make comments on the inclusion of the above mentioned sentence suggested by IACS in sub-section 2.4.***

**(5) Sub-Section 2.5**

Editorial modification, as proposed by France, was made on the draft text in sub-section 2.5 as set out in Annex 4 to this document.

In the first round, IACS suggested to add the following sentence:

“Fitting of synthetic tails is recommended for ropes comprising low elasticity like wire or high modulus synthetic lines.”

***(i) The CG participants are invited to make comments on the inclusion of the above mentioned sentence suggested by IACS in sub-section 2.5.***

In the first round, OCIMF suggested to add the following sentence:

“Industry and manufacturer guidance should be reviewed to understand detailed effects of stored energy in mooring tails and mooring lines impact on snap-back zones.”

***(ii) The CG participants are invited to make comments on the inclusion of the above mentioned sentence suggested by OCIMF in sub-section 2.5.***

**5.4.5 Basic requirements for safe use of mooring equipment**

***The CG participants are invited to note that section 3 may be deleted or fully rewritten depending on the result of discussion on the scope of the guidelines. See paragraph 5.2 of this document.***

**(1) Sub-Section 3.1**

In the first round, only an editorial comment was made on the draft text in sub-section 3.1. The draft text was modified as proposed by Australia.

***The CG participants are invited to note the draft text in sub-section 3.1 set out in Annex 4 to this document.***

**(2) Sub-Section 3.2**

The draft text in sub-section 3.2 was modified based on the comments in the first round as set out in Annex 4 to this document.

***The CG participants are invited to make comments on the draft text in sub-section 3.2 set out in Annex 4 to this document.***

**(3) Sub-Section 3.3**

The draft text in sub-section 3.3 was modified based on the comments in the first round as set out in Annex 4 to this document.

***The CG participants are invited to make comments on the draft text in sub-section 3.3 set out in Annex 4 to this document.***

**(4) Sub-Section 3.4**

The draft text in sub-section 3.4 was modified based on the comments in the first round as set out in Annex 4 to this document.

***(i) The CG participants are invited to make comments on the draft text in sub-section 3.4 set out in Annex 4 to this document.***

In the first round, INTERTANKO proposed to add the following text at the end of sub‑section 3.5.1 of the revised draft set out in Annex 4 to this document:

“in a language understandable by all involved parties. English to be used if a common language does not exist among all parties.”

***(ii) The CG participants are invited to make comments on the above mentioned text on language proposed by INTERTANKO.***

In the first round, INTERTANKO proposed to add the following text at the end of sub-section 3.5 of the revised draft set out in Annex 4 to this document:

“mooring personnel should stay clear of unsafe/unprotected areas as far as possible throughout the mooring operation as well as between mooring and unmooring of the ship”

***(iii) The CG participants are invited to make comments on the above mentioned text on positions of mooring personnel proposed by INTERTANKO.***

In the first round, some participants suggested to move the following text from sub-section 5.2.12 of Annex 2 “Draft new Guidelines for safe mooring operations” to Annex 5 “Draft separate guidelines on safe mooring operations”, where appropriate position in the draft revised Annex 5 may be sub-section 3.4.3.

“Breast lines provide the maximum transverse restraint and spring lines the maximum longitudinal restraint against vessel movement in athwart and in fore-aft direction, respectively. Head and stern lines are much less effective for these purposes. The applied mooring layout should follow these principles, as far as possible with respect to the port facilities and as far as reasonable with respect to the vertical line angles.”

***(iv) The CG participants are invited to make comments on the inclusion of the above mentioned text on mooring plan into the draft separate guidelines.***

**5.4.6 Inspection and maintenance of mooring lines**

***The CG participants are invited to note that section 4 may be fully rewritten depending on the result of discussion on the scope of the guidelines. See paragraph 5.2 of this document.***

**(1) Structure of section 4**

In the first round, the United States proposed to change the structure of section 4 as follows:

4.1 Inspection of in-service mooring lines

4.2 Maintenance of mooring lines

4.3 Criteria for condemning worn-out mooring lines

4.4 Recordkeeping

***The CG participants are invited to make comments on the proposed structure of section 4,***

***The CG participants are invited to cooperate for further development of section 4, pending the discussion on the structure of this section.***

**(2) Sub-section 4.1**

In the first round, the question was raised regarding “rotation”, which is periodical change of mooring drums for respective mooring lines to equalize the wear of mooring lines.

***(i) The CG participants are invited to make comments on the inclusion of definition of “rotation” of mooring lines.***

The draft text in sub-section 4.1 was modified based on the comments, in particular by OCIMF, in the first round as set out in Annex 4 to this document.

***(ii) The CG participants are invited to make comments on the draft text in sub-section 4.1 set out in Annex 4 to this document.***

**(3) Sub-sections 4.2 and 4.3**

The draft texts in sub-sections 4.2 and 4.3 were modified based on the comments, in particular by OCIMF, in the first round as set out in Annex 4 to this document. On the other hand, Australia proposed to delete these sub-sections.

***(i) The CG participants are invited to make comments on the deletion of sub-sections 4.2 and 4.3.***

***(ii) The CG participants are invited to make comments on the draft texts in sub-sections 4.2 and 4.3 set out in Annex 4 to this document.***

**(4) Criteria of replacement of mooring lines**

The coordinator would like to ask the opinion of the CG on the inclusion of the concrete guidance for replacement of mooring lines. One of the options will be to make reference to specific part of appropriate textbook such as OCIMF MEG 3 (or MEG 4). Another option may be to develop guidance for replacement[[1]](#footnote-1) of mooring lines separately by the CG.

***The CG participants are invited to make comments on the inclusion of the concrete guidance for replacement of mooring lines.***

**(5) Other requirements**

The coordinator agrees with the opinion that draft section 4 is poor, while this section may be the essential part of the draft separate guidelines.

***The CG participants are invited to provide input for section 4.***

**5.4.7 Reference**

***The CG participants are invited to provide information on the latest reference for the inclusion in the draft separate guidelines.***

**5.4.8 Inclusion of some requirements in the draft new guidelines (Annex 2)**

In the first round, it was suggested to move the following requirements from Annex 2 to Annex 5:

“4.2 In order to achieve the appropriate goal, the mooring arrangement should be designed and arranged in order to ensure that:

.3 in normal mooring operations, only mooring lines that are permanently fixed to a winch is needed;

[.17 the ship is provided with appropriate information about the mooring arrangement and its intended use included in the Towing and arrangements plan;]

[.20 mooring equipment and lines can be properly maintained in good condition for its intended purpose.]”

The coordinator believes that the requirement in draft sub-section 4.2.20 is under consideration in detail and it is not necessary to include the above mentioned text.

***(1) The CG participants are invited to make comments on the inclusion of the requirement in draft sub-section 4.2.3 of Annex 2.***

***(2) The CG participants are invited to make comments on the inclusion of the requirement in draft sub-section 4.2.17 of Annex 2.***

**6 Consequential amendments to relevant IMO instruments (TOR .6)**

In the first round, the following two IMO instruments are identified as those which may be amended consequentially:

.1 Resolution A.1104(29) “Survey Guidelines under the Harmonized System of Survey and Certification (HSSC), 2015”;

.2 FAL.2/Circ.127-MEPC.1/Circ.817-MSC.1/Circ.1462 “List of certificates and documents required to be carried on board ships, 2013”; and

.3 MSC.1/Circ.1371 “List of Codes, Recommendations, Guidelines and other Safety- and Security-Related Non-Mandatory Instruments”.

**6.1 Resolution A.1104(29)**

The provisions related to “mooring” are as follows:

(CI) 2.1.1.25 examining the calculation and drawings for the sufficient safe working load of towing and mooring equipment to enable the safe conduct of all towing and mooring operation in normal operation of the ship (SOLAS 74/04 reg.II-1/3-8);

(CI) 2.1.3.72 confirming that the towing and mooring equipment is properly marked with any restriction associated with its safe operation (SOLAS 74/04 reg.II-1/3-8);

(CA) 2.2.2.2 examining the anchoring and mooring equipment as far as can be seen. For ships built after 01/01/2007, confirming that the towing and mooring equipment is properly marked with any restriction associated with its safe operation (SOLAS 74/04 reg.II-1/3-8);

(CR) 2.4.2.3 examination of anchoring and mooring equipment for which purpose the anchors should be lowered and raised using the windlass.

Italy proposed to amend paragraph (CI) 2.1.1.25 as follows:

“examining the calculation, **manual** and drawings for the sufficient safe working load of towing and mooring equipment to enable the safe conduct of all towing and mooring operation in normal operation of the ship **and related Manufacturers test certificates for mooring lines** (SOLAS 74/04 reg.II-1/3-8);”

The proposed amendment can be separated as follows:

.1 add the words “, manual” after the words “examining the calculation”; and

.2 add the words “and related certificates of test for mooring lines provided by the manufacturers” after the words “normal operation of the ship”. Here, I slightly modify the wording for clarity.

I would like to ask the opinion of the CG on the above mentioned proposals, separately.

***The CG participants are invited to make comments on the addition of the words “, manual”.***

***The CG participants are invited to make comments on reference to certificates of tests for mooring lines.***

**6.2 FAL.2/Circ.127-MEPC.1/Circ.817-MSC.1/Circ.1462**

The table in the annex to FAL.2/Circ.127-MEPC.1/Circ.817-MSC.1/Circ.1462 has the following 12 parts:

.1 “All ships to which the referenced convention applies”;

.2 “In addition to the certificates listed in section 1 above, passenger ships shall carry:”;

.3 “In addition to the certificates listed in section 1 above, cargo ships shall carry:”;

.4 “In addition to the certificates listed in sections 1 and 3 above, where appropriate, any ship carrying noxious liquid chemical substances in bulk shall carry:”;

.5 “In addition to the certificates listed in sections 1 and 3 above, where applicable, any chemical tanker shall carry:”;

.6 “In addition to the certificates listed in sections 1 and 3 above, where applicable, any gas carrier shall carry:”;

.7 “In addition to the certificates listed in sections 1, and 2 or 3 above, where applicable, any high-speed craft shall carry:”;

.8 “In addition to the certificates listed in sections 1, and 2 or 3 above, where applicable, any ship carrying dangerous goods shall carry:”;

.9 “In addition to the certificates listed in sections 1, and 2 or 3 above, where applicable, any ship carrying dangerous goods in packaged form shall carry:”;

.10 “In addition to the certificates listed in sections 1, and 2 or 3 above, where applicable, any ship carrying INF cargo shall carry:”;

.11 “In addition to the certificates listed in sections 1, and 2 or 3 above, where applicable, any Nuclear Ship shall carry:”; and

.12 “Other certificates and documents which are not mandatory”.

Italy proposed to add the following row in the first part of the table in the annex to FAL.2/Circ.127-MEPC.1/Circ.817-MSC.1/Circ.1462:

|  |  |  |
| --- | --- | --- |
| **No.** | **Contents** | **Reference** |
|  | **Towing and mooring arrangement plan/manual***Explanation should be inserted* | SOLAS 1974,Regulation II-1/3-8Guidelines ….. |

***The CG participants are invited to make comments on the proposed addition of the row in the table in the annex to FAL.2/Circ.127-MEPC.1/Circ.817-MSC.1/Circ.1462***

**6.3 MSC.1/Circ.1371**

As mentioned by ICS, MSC.1/Circ.1371 may need to be amended to include newly developed guidelines. Please note that MSC/Circ.1175 is included in the annex to MSC.1/Circ.1371. Therefore, depending on the results of discussion under TORs 2, 3 and 5, MSC.1/Circ.1371 may need to be amended as follows:

.1 new guidelines developed under TOR .2 will be added;

.2 subject to the decision on the application of MSC/Circ.1175/Rev.1:

.2.1 MSC/Circ.1175 will be replaced with MSC/Circ.1175/Rev.1; or

.2.2 MSC/Circ.1175/Rev.1 will be added; and

.3 separate guidelines developed under TOR .5 will be added.

I would like to postpone the consideration on the amendment to MSC.1/Circ.1371 and wait for the discussion under TORs 2, 3 and 5.

***The CG participants are invited to note that the consideration on the amendment to MSC.1/Circ.1371 is postponed.***

**ANNEX 1**

**DRAFT REVISED SOLAS REGULATION II-1/3-8**

1 This regulation applies to all ships constructed on or after 1 January 2007.

.1 Paragraphs 5 and 6 additionally apply to ships constructed on or after [date…].

.2 This regulation does not apply to towing arrangements provided in accordance with regulation 3-4.

.3 For the purpose of this paragraph, the expression ship constructed on or after [date of entry into force] means:

.1 for which the building contract is placed on or after [date of entry into force]; or

.2 in the absence of a building contract, the keel of which is laid or which is at a similar stage of construction on or after [date of entry into force plus 6 months]; or

.3 the delivery of which is on or after [date of entry into force plus [three years][48 months]].

2 Ships shall be provided with mooring arrangements, equipment and fittings of sufficient safe working load to enable the safe conduct of all towing and mooring operations associated with the normal operation of the ship;

3 Mooring arrangements, equipment and fittings provided in accordance with paragraph 2 above shall meet the appropriate requirements of the Administration or an organization recognized by the Administration under regulation I/6;\* and

4 Each fitting or item of equipment provided under this regulation shall be clearly marked with any restrictions associated with its safe operation, taking into account the strength of the supporting ship's structure and its attachment to it.

5 For ships of 3,000 gross tonnage and above the design of the mooring arrangement and the selection of appropriate mooring equipment shall be based on guidelines developed by the Organization\*\*, to [ensure safe mooring operation including occupational health and safety/facilitate safe operation] during mooring operations [and whilst the vessel remains berthed].

6 Ships of less than 3,000 gross tonnage shall comply with the requirement in paragraph 5 above as far as reasonable and practicable, or with applicable national standards of the Administration [which provide/provided they offer] an equivalent level of safety.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\* Refer to the Guidance on shipboard towing and mooring equipment, MSC.1/Circ.1175) for ships constructed on or after 1 January 2007 and before [date of entry into force] and MSC.1/Circ.1175/rev.1 for the ships constructed on or after [date of entry into force]).

\*\* Refer to the Guidelines on the design of safe mooring arrangements (MSC.1/Circ.[…])."

**ANNEX 2**

**DRAFT GUIDELINES ON [DESIGN, ARRANGEMENT AND SELECTION OF APPROPRIATE EQUIPMENT/THE DESIGN OF THE MOORING ARRANGEMENT AND THE SELECTION OF APPROPRIATE MOORING EQUIPMENT]** **FOR SAFE MOORING .**

**1 Introduction**

1.1 Historical evolution in ship designs, especially the design of large ships have resulted in optimized performance and a greater degree of complexity; this has not been extended to the design of ships mooring arrangements. In order to improve occupational health and safety during mooring operations on new ships, new design methods for mooring operations should be introduced to enable the safe conduct of all normal towing and mooring operations associated with the operation of the ship also taking into account likely mooring configurations.

1.2 The International Convention for the Safety of Life at Sea (SOLAS), as amended, requires in chapter [II-1, part A, regulation 3-8] that the mooring arrangement in ships of 3,000 gross tonnage or above constructed on or after [1 January 2024] shall be designed and arranged to ensure occupational health and safety of those involved during mooring operations . Ships less than 3,000 gross tonnage constructed on or after [1 January 2024] shall comply with the above requirement, as far as reasonable and practicable, or with applicable national standards of the Administration [which provide/provided they offer] an equivalent level of safety.

1.3 These guidelines are intended for use by Administrations, owners, operators, designers and classification societies when applying the requirement for the design, arrangement and selection of mooring equipment. [The guidelines provide recommendations on how to interpret and apply the provisions of the SOLAS requirements.]

1.3bis Adherence to these guidelines will facilitate compliance with the SOLAS requirements by ship designers, equipment suppliers, shipyards, shipping companies and [port terminal facilities and their employees/ mooring personnel], in understanding their respective roles in the development of better mooring designs [/ensuring safety and occupational health of those participating in mooring operations].

[1.3ter To further improve the safety and occupational health during mooring operations, owners and operators of existing ships are encouraged to take note of these guidelines, and so far as is reasonably practicable, take into consideration the intent of guidance therein.]

1.4 References to mooring in these guidelines include mooring and unmooring and any in -harbour towing operations relating to such mooring operations.

**2 Definitions**

For the purposes of these guidelines:

2.2 Mooring [area] refers to the local deck area where mooring equipment is installed and line-handling takes place. It also includes deck areas where there is a risk of personnel injury in event of snap-back or other failure of mooring equipment. There may be multiple mooring decks on a vessel.

[2.2bis “Mooring arrangements means the configuration of the mooring equipment and fittings and other design features of the ships related to the mooring operation i.e. lighting and communication equipment.”]

[2.2ter Mooring equipment and fittings means items such as winches, capstans, bollards, bitts, fairleads, rollers, chocks etc and also includes mooring lines.]

[2.2quater Mooring operations means mooring and unmooring of the ship and in-harbour towing operations related to mooring and unmooring of the ship.]

[2.2quinquies Mooring personnel means the personnel tasked to assist in the activity of mooring and unmooring ships, either ashore or from mooring boats, carried out within the framework of port marine services”.]

[2.2sexies Mooring boat means the boat handling mooring lines between the ship and ashore during mooring and unmooring operations and does not include harbour ship assist tugs.]

**3 Goals**

[/The goal of these guidelines is to establish a common approach to the implementation and enforcement of the SOLAS requirements on the design and arrangement of mooring systems. They should ensure occupational health and safety of the mooring personnel when operating around the mooring workspace, or engaged in the safe berthing/unberthing of the ship.

[/The equipment selection and mooring arrangement design safety objectives should be to facilitate safe mooring operations and reduce the risk to mooring personnel caused by inappropriate selection and arrangement of equipment and fittings.]

The outcome of the design shall be the creation of a corresponding mooring arrangement, enabling the crew to maintain the ship/shore interface throughout the port call..

**4 Functional objectives**

To achieve the goals as set out above, the mooring equipment should be designed and arranged to ensure that:

.1 the mooring arrangement provides unobstructed access to and operation of the mooring equipment;

.2 the mooring equipment arrangement minimizes the need for complex mooring line configurations during the normal operation of the ship;

.3 [ mooring lines as far as reasonable practical are permanently fixed to a winch;]

.4 [line handling is simplified;]

.6 it is appropriate for the specific ship type and its usual mooring configuration;

.7 there is an unobstructed view of the mooring area for those taking part in the mooring operation.

.8 it minimizes the exposure of mooring personnel, including personnel monitoring lines and supervising the mooring area, to the hazards associated with mooring lines under tension or dynamic load;

.9 mooring lines are appropriate for he planned trade of the ship including the selected mooring winches, fairleads etc. .

[.9bis unnecessary stresses are not added to the mooring lines;

.10 the mooring areas can be adequately illuminated during dark periods;

.11 the mooring area offer sufficient working space;

[.13 those involved in mooring operations are not at risk of tripping over, or being trapped or impacted by free lying mooring lines;]

[.

.15 noise in way of mooring decks does not impair effective communication between the mooring personnel;

.16 effective means of communication is available for supervision at mooring areas;

[.17 the ship is provided with appropriate information about the mooring arrangement, equipment and its intended use;]

.18 a mooring deck surface, which minimizes tripping and slipping hazards, in all anticipated weather conditions, is provided;

.19 wear and stress on mooring lines are minimized through careful deck layout; and

.20 mooring arrangement and equipment can be properly maintained in good condition for its intended purpose.

**5 [Achievement of the objectives/Design and equipment]**

To meet the functional objectives, the following design and equipment features should be considered at an early stage in the design process.

Selection of equipment, fittings and mooring lines should not be undertaken independently. In order to facilitate safe mooring operations it is necessary for mooring equipment, fittings and mooring lines to be considered as a complete system within which all components are compatible.

The guidance in this section on design of equipment and fittings arrangements should be read in conjunctions with the [Revised] guidance on shipboard towing and mooring equipment (MSC/Circ.[1175/[Rev.1]]), with particular reference to the distribution of load and the symmetrical arrangement of mooring lines.

**5.1 Design**

5.1.1 The need for complex mooring line configurations during the normal operation of the ship should be minimized. This should include the use of direct leads from the mooring winch to the fairlead, i.e. mooring arrangements involving a complex mooring line lead across deck by means of guide rollers, pedestal rollers, guide pulleys, bollards, and fairleads should be avoided as far as reasonable possible. Furthermore, the mooring arrangement should be so designed that there is ideally one dedicated fairlead for each mooring line on each side of the ship.

5.1.2 The position of the mooring deck and of the fairleads should be planned with respect to the typical mooring pattern corresponding to the type of ship and to berth configurations typically encountered by the type of ship. In this respect it should be possible to obtain a sufficient length of hawser line from the fairlead to the quayside bollard. Furthermore, the mooring deck should as far as foreseeable be arranged in respect to the vertical distance to the quayside in order to ensure an efficient pull towards the quayside.

5.1.3 Communication (verbal, hand signals, radio, etc.) for both the shipboard and dockside mooring personnel should not be impaired by machinery noise or obstructed lines-of-sight.

5.1.4 The mooring deck should be arranged to give the crew the best possible view of the mooring area. This should involve that:

.1 the officer in charge has the ability to safely obtain an unobstructed view of the mooring deck as well as the berth arrangements planned to be used;

.2 the winch-operator has an unobstructed view of the mooring area [and personnel] involved;

.3 mooring personnel, have an unobstructed view of the mooring area in which they are planned to operate; and

.4 illumination is provided which allows a clear view of the mooring deck and the equipment and lines being worked during hours of darkness or in conditions of limited visibility.

5.1.5 To provide adequate space for the crew to safely and effectively operate the equipment involved mooring operations should not be impeded by e.g. restricted space for the mooring operation due to ships' structural elements, accommodation, ventilation exhausts, cargo equipment or similar obstacles. [This should involve that:

.1 Throughout the operation, at each mooring station there should be sufficient

space for a minimum of two people.

.2 Next to, or behind, bollards the clear space should be at least 0.4 metres.

.3 In front of the bollard or the place where a person works on securing or

releasing, there should be a clear breadth of at least 1.2 metres.

.4 Space behind the winch head, i.e. the place where a person stands when

casting, should be at least 2 metres. Alongside the winch head there should be

a space of at least 1 metre.

.5 Next to the wire drum there should be a clear space with a breadth of at least

0.6 metres.]

.6 The distance between shipside fairleads and winches should be at least [1.8m]

5.1.6 To design the mooring arrangement so that the crew is at no stage exposed to lines under tension through snap back or by sudden movements of mooring lines, the following issues should be considered:

.1 to establish short distances from mooring winch to fairlead,

.2 placing - as far as possible - the mooring winch directly before the fairlead,

.3 enclosing the mooring line(s) behind barrier(s),

.4 use of mooring lines with reduced recoil risk or snapback protection,

.5 alternative design(s) where crew members do not need to work close to or have to pass mooring lines under tension or potentially under tension., or

.6 use of appropriate, alternative means to moor the ship, including but not limited to automated mooring systems.

5.1.7 To minimize manual handling of towing and mooring lines, the following should be considered:

.1 use of dedicated mooring lines on winches,

.2 use of spooling equipment,

.3 placing winches close to the fairleads of ship side served, or

.4 a sufficient number of mooring winches, fairleads, bollards and other fittings.

**5.2 [Mooring] Equipment**

5.2.1 A sufficient number of mooring winches should be installed [so that, during normal mooring operations, manual use of winch drum ends, stoppers, capstans and bitts are minimized as far as possible/to ensure vessel can be adequately secured at the jetty through the use of sufficient winch mounted lines with direct leads].

5.2.2 As far as reasonably practical, mooring winches should be selected that are designed to prevent unsafe and unhealthy work situations through manual handling of mooring lines. If e.g. split-drum type mooring winches are fitted, the layout should be designed to prevent manual intervention in transfer of the mooring line from storage drum to winch drum and vice versa.

5.2.3 The mooring arrangement should be designed to ensure flexibility during exceptional mooring operations, e.g.

.1 a sufficient number of winch drum ends/capstans, bollards and fittings related to mooring should be available on each mooring deck; and

[.2 additional (loose) mooring lines should be stored close to and easily accessible to the winch drum/bollard where they are expected to be used.]

[.3 Storage provided should minimize the exposure to harmful environments (eg: water, chemical, cargo, extreme temperature).]

5.2.4 Mooring winches should be so designed that minimal manual handling of mooring lines is needed, e.g.

5.2.5 To avoid overload on mooring winches, outfittings (such as chocks, fairleads and stand rollers) and mooring lines, considerations should be given to fit/adjust mooring winches with brake capacity of less than the Line Design Break Force of the mooring line, mooring lines with integrated high stress indicators or mooring winches which monitor the stress load on the mooring lines.

5.2.6 The mooring equipment and arrangement should be designed such that chafing of the mooring line at fairleas and chocks is prevented. This may be achieved by:

.1 suitable line leads,

.2 sufficient large radians of bearing surfaces at chocks, and

.3 contact surfaces that minimizes chafing.

5.2.7 The mooring equipment and the dedicated mooring lines should at all times be compatible in e.g. design, diameter, strength and suitability, and maintained in line with the original purpose and concept of the mooring arrangement. This should be established through [the mooring and towing arrangement plan as required by [MSC.1/Circ.1175.Rev.1]/ the mooring manual (which may be part of the SMS)] which informs upon:

.1 a mooring arrangement plan or other means of information about the mooring equipment (i.e. numbers and location of winches, pedestal leads, fair leads and rollers);

.2 the mooring winches installed, design limitations and safe working loads;

.3 the appropriate mooring lines, including tails, and connecting apparatus to be used and the planned operating parameters/maximum permissible loads;

.4 the planned mooring arrangement, including the most appropriate lead of mooring lines during common mooring operations;

[.5 relevant mooring procedures on the specific ship, including potential snap-back risk areas across the mooring deck;] and

[.6 proper maintenance and inspection of the mooring equipment , including parameters on [the identification and handling of worn-out mooring lines/the condition monitoring and retirement of mooring lines before mooring line failure.] The frequency of inspection and maintenance should be based on the manufacturer's recommendations, ship operator experiences, the conditions the equipment is exposed to and the frequency of use, so as to ensure that excessive wear or damage is identified prior to failure and the equipment remains fit for purpose.]

5.2.8 Mooring ropes, wires, tails and associated attachments should be controlled and certified. Manufacturer's certificates for mooring lines, joining shackles and synthetic tails should be kept in a file or with the mooring manual, clearly showing to which winch each particular component has been fitted.

5.2.9 As far as possible, [but alt least for lines in the same service, (e.g. headlines, breastlines or springs), mooring lines of the same diameter and type (i.e. material) should be used..

[5.2.10 Mooring lines should as far as possible be arranged so that lines in the same service are about the same length between the ship and the shore bollard.]

[5.2.11 No extra weight other than monkey-fists should be attached to the heaving lines for any reason.]

[5.2.12 Breast lines provide the maximum transverse restraint and spring lines the maximum longitudinal restraint against vessel movement in athwart and in fore-aft direction, respectively. Head and stern lines are much less effective for these purposes. The applied mooring layout should follow these principles, as far as possible with respect to port facilities typically encountered by the considered ship type.]

**[6 Preferred techniques (for different system components]**

6.1 The complete mooring arrangement should be planned at the early design phase in order to identify occupational health and safety risks to those involved in the mooring operation. This should include a study of the interface of the ships mooring equipment and the anticipated shore mooring equipment that the ship may encounter with respect to its effectiveness. Furthermore, this should include an analysis of external loads that can be reasonably anticipated, such as the load exerted by wind, current, sea and passing ships.

6.2 Risks [of injury and occupational health] should be identified and assessed and measures should be initiated to eliminate or minimize risks through appropriate design solutions and by use of appropriate equipment. This process should be based on a hazard identification exercise and should be finalized before planned construction.

6.3 As a tool to ensure that the functional objectives reflected in section 4 are identified and that the risks of the planned mooring arrangement are mitigated in accordance with the aims of paragraphs 6.1 and 6.2, a corresponding safetyassessment should be conducted and, validated by an independent competent person(s)”.

6.4 A representative range of assessments should be developed covering relevant mooring patterns with emphasis on all major risk contributors. As a minimum all mooring decks and equipment should be addressed at design level.

6.5 Involved areas/items should be analyzed for example including but not limited to:

.1 operation, activity, equipment or component under consideration;

.2 aspect under consideration;

.3 significant hazards;

.4 "Who is at risk?";

.5 the port/terminal side of the operations; and

.6 reviews upon management of change in equipment circumstances.

6.6 The second part of the assessment is to establish the actions needed to reduce identified risks to acceptable parameters. This part should for example include the following:

.1 mitigation measure(s) taken by designer;

.2 effectiveness of the measures to eliminate the risk;

.3 description of action taken;

.4 reason why action was not taken at a higher mitigation/elimination level, and approval authority to allow work to proceed;

.5 recommendations which may be used in conjunction with mitigating measures;

.6 notes to assist the recipient in further reducing the residual hazard risk; and

.7 reference to standard(s), industry guidance and legislation.

6.7 The assessment should be evaluated by an independent competent person. The evaluation should be made in connection with the authority approval of the mooring arrangement, thus ensuring an acceptable level of safety.

6.8 The acceptable level of risk of hazard should be established taking into account common international standards and industry guidance. The approval of the assessment must reflect the common risk assessment or a set of individual minimum criteria related to unsafe situations with a high level of likelihood combined with a major or serious level of severity.]

**ANNEX 3**

**Draft annex to MSC.1/Circ.1175/Rev.1**

**SHIPBOARD EQUIPMENT, FITTINGS AND SUPPORTING HULL STRUCTURES**

**ASSOCIATED WITH TOWING AND MOORING**

**1 Application**

1.1 Under regulation II-1/3-8 of the 1974 SOLAS Convention, as adopted by resolution MSC.194(80) in 2005, new displacement type ships, except high-speed craft and offshore units, shall be provided with arrangements, equipment and fittings of sufficient safe working load to enable the safe conduct of all towing and mooring operations associated with the normal operations of the ship. The arrangements, equipment and fittings shall meet the appropriate requirements of the Administration or an organization recognized by the Administration.

1.2 MSC.1/Circ.1175/Rev.1 should apply to ships constructed on or after [date of entry into force]. To ships constructed on or after 1 January 2007 and before [date of entry into force], MSC.1/Circ.1175 should apply

1.3 This circular is intended to provide standards for the design and construction of shipboard fittings and supporting hull structures associated with towing and mooring, which Administrations are recommended to implement. The provisions of this guidance do not require tow lines nor mandate standards for mooring lines onboard the ship. Furthermore, this guidance is not applicable to design and construction of shipboard fittings and supporting hull structures used for special towing services defined as:

.1 *Escort towing*: Towing service required in some estuaries to control the ship in case of failures of the propulsion or steering system. It should be referred to local escort requirements;

.2 *Canal transit towing*: Towing service for ships transiting canals, e.g. the Panama Canal. It should be referred to local canal transit requirements; and

.3 *Emergency towing for tankers*: Towing service to assist tankers in case of emergency. It should be referred to paragraph 1 of SOLAS regulation II-1/3-4.

1.4 Equipment that is used for both towing and mooring should be in accordance with sections 3 and 4.

**2 Definitions**

For the purpose of this guidance:

2.1 *Normal towing* means towing operations necessary for maneuvering in ports and sheltered waters associated with the normal operations of the ship.

2.2 *Other towing* means towing by another ship or a tug, e.g. such as to assist the ship in case of emergency as given in SOLAS Regulation II-1/3-4 Paragraph 2 for ships, not subject to SOLAS Regulation II-1/3-4 Paragraph 1, but intended to be fitted with equipment for other towing.

2.3 *Shipboard fittings* mean bollards and bitts, fairleads, pedestal rollers and chocks used for normal mooring of the ship and similar components used for normal or other towing of the ship. Other components such as capstans, winches, etc. are not covered by this guidance. Any weld, bolt or other fastening connecting the shipboard fitting to the supporting hull structure is part of the shipboard fitting and subject to any industry standard applicable to such fitting.

2.4 *Supporting hull structure* means that part of the ship structure on/in which the shipboard fitting is placed and which is directly submitted to the forces exerted on the shipboard fitting. The hull structure supporting capstans, winches, etc. used for normal or other towing and mooring operations mentioned above should also be subject to this guidance.

[2.5 Attachment means the welding which attaches a shipboard fitting to the supporting hull structure.]

2.6 *Industry standard* means international or national standards which are recognized in the country where the ship is built, subject to the approval of the Administration.

**3 Towing**

**3.1 Strength**

The strength of shipboard fittings used for normal towing operations[, their attachments] and their supporting hull structures should comply with the provisions of 3.2 to 3.6. Where a ship is equipped with shipboard fittings intended to be used for other towing services, also the strength of these fittings and their supporting hull structures should comply with these provisions.

**3.2 Arrangements**

Shipboard fittings for towing should be located on stiffeners and/or girders, which are part of the deck construction so as to facilitate efficient distribution of the towing load. Other equivalent arrangements may be accepted (for chocks in bulwarks, etc.) provided the strength is confirmed adequate for the intended service.

**3.3 Load considerations**

3.3.1 The minimum design load applied to supporting hull structures for shipboard fittings:

.1 for normal towing operations should be 1.25 times the intended maximum towing load (e.g. static bollard pull) as indicated on the towing and mooring arrangements plan;

.2 for other towing service should be the minimum breaking strength of the tow line defined in Appendix A; and

.3 for fittings intended to be used for, both, normal and other towing operations, should be the greater of the design loads according to (1) and (2).

3.3.2 The design load should be applied to fittings in all directions that may occur by taking into account the arrangement shown on the towing and mooring arrangements plan. Where the towing line takes a turn at a fitting the total design load applied to the fitting is equal to the resultant of the design loads acting on the line. However, in no case does the design load applied to the fitting need to be more than twice the design load on the line as specified in 3.3.1 (see figure below).



**3.4 Shipboard fittings**

3.4.1 Shipboard fittings may be selected from an industry standards accepted by the Administration and at least based on the following loads:

.1 For normal towing operations, the intended maximum towing load (e.g. static bollard pull) as indicated on the towing and mooring arrangements plan;

.2 for other towing service, the minimum breaking strength of the tow line according to Appendix A; and

.3 for fittings intended to be used for, both, normal and other towing operations, the greater of the loads according to .1 and .2.

3.4.2 Towing bitts (double bollards) may be chosen for the towing line attached with eye splice if the industry standard distinguishes between different methods to attach the line, i.e. [at least one round turn followed by] figure-of-eight or eye splice attachment.

3.4.3 When the shipboard fitting is not selected from an accepted industry standard, the strength of the fitting and of its attachment to the supporting hull structure should be in accordance with 3.3 and 3.5. [Towing bitts (double bollards) should at least resist the loads caused by the towing line attached with eye splice.]

**3.5 Supporting hull structure**

3.5.1 The design load applied to supporting hull structures should be in accordance with 3.3.

3.5.2 The reinforcing members beneath shipboard fittings should be effectively arranged for any variation of direction (horizontally and vertically) of the towing forces acting upon the shipboard fittings. Proper alignment of fitting and supporting hull structure should be ensured.

3.5.3 The acting point of the towing force on shipboard fittings should be taken at the attachment point of a towing line or at a change in its direction. [For bollards and bitts the attachment point of the towing line should be taken not less than 4/5 of the tube height above the base (see figure below).]

[]

Design Load on Line

3.5.4 Under the design load conditions as specified in 3.3 the allowable normal stress should be taken as 100% and the allowable shearing stress as 60% of the specified yield point for the material used. Normal stress is the sum of bending stress and axial stress with the corresponding shearing stress acting perpendicular to the normal stress. No stress concentration factors being taken into account.

**3.6 Safe towing load (TOW)**

3.6.1 The safe towing load (TOW) is the load limit for towing purpose.

3.6.2 TOW used for normal towing operations should not exceed 80% of the design load as given in 3.3.1 (1) and TOW used for other towing operations should not exceed 80% of the design load as given in 3.3.1 (2). For fittings used for, both, normal and other towing operations, the greater of the safe towing loads should be used.

3.6.3 For fittings intended to be used for, both, towing and mooring, 4 applies to mooring.

[3.6.4 TOW, in t, of each shipboard fitting should be marked (by weld bead or equivalent) on the deck fittings used for towing. For fittings intended to be used for, both, towing and mooring, SWL, in t, according to 4.6 should be marked in addition to TOW.]

3.6.5 The above provisions on TOW apply for the use with no more than one line. [If not otherwise chosen, for towing bitts (double bollards) TOW is the load limit for a towing line attached with eye-splice.]

3.6.6 The towing and mooring arrangements plan described in section 5 should define the method of use of towing lines.

**4 Mooring**

**4.1 Strength**

The strength of shipboard fittings used for mooring operations[, their attachments] and supporting hull structures as well as the strength of supporting hull structures of winches and capstans should comply with the provisions of 4.2 to 4.6.

**4.2 Arrangements**

Shipboard fittings, winches, and capstans for mooring should be located on stiffeners and/or girders, which are part of the deck construction so as to facilitate efficient distribution of the mooring load. Other equivalent arrangements may be accepted (for chocks in bulwarks, etc.) provided the strength is confirmed adequate for the service.

**4.3 Load considerations**

4.3.1 The minimum design load applied to supporting hull structures:

.1 for shipboard fittings should be 1.15 times the minimum breaking strength of the mooring line provided in accordance with Appendix A;

.2 for winches should be 1.25 times the intended maximum brake holding load, where the maximum brake holding load should be assumed not less than 80% of the minimum breaking strength of the mooring line according to Appendix A; and

.3 for capstans, 1.25 times the maximum hauling-in force.

4.3.2 The design load should be applied to fittings in all directions that may occur by taking into account the arrangement shown on the towing and mooring arrangements plan. Where the mooring line takes a turn at a fitting the total design load applied to the fitting is equal to the resultant of the design loads acting on the line. However, in no case does the design load need to be more than twice the design load on the line as specified in 4.3.1 (see figure in 3.3).

**4.4 Shipboard fittings**

4.4.1 Shipboard fittings may be selected from an industry standards accepted[[2]](#footnote-2) by the Administration and at least based on the minimum breaking strength of the mooring line according to Appendix A.

[4.4.2 Mooring bitts (double bollards) should be chosen for the mooring line attached in figure-of-eight fashion if the industry standard distinguishes between different methods to attach the line, i.e. figure-of-eight or eye splice attachment./All shipboard fitting’s (eg: bollards, bitts, fairleads, etc) should be chosen for the mooring line designed to be utilized with them. This means the SWL of the fitting should be equal to or greater than the breaking force of the mooring line.]]

4.4.3 When the shipboard fitting is not selected from an accepted industry standard, the strength of the fittings and of its attachment to the supporting hull structureshould be in accordance with 4.3 and 4.5. Mooring bitts (double bollards) should resist the loads caused by the mooring line attached in figure-of-eight fashion.

**4.5 Supporting hull structure**

4.5.1 The design load applied to supporting hull structures should be in accordance with 4.3.

4.5.2 Arrangement of reinforcing members beneath shipboard fittings, winches and capstans should consider any variation of direction (horizontally and vertically) of the mooring forces acting upon the shipboard fittings. Proper alignment of fitting and supporting hull structure should be ensured.

4.5.3 The acting point of the mooring force on shipboard fittings should be taken at the attachment point of a mooring line or at a change in its direction. [For bollards and bitts the attachment point of the mooring line should be taken not less than 4/5 of the tube height above the base, see a) in figure below. However, if fins are fitted to the bollard tubes to keep the mooring line as low as possible, the attachment point of the mooring line may be taken at the location of the fins, see b) in figure below.]

[]

4.5.4 Under the design load conditions as specified in 4.3 the allowable normal stress should be taken as 100% and the allowable shearing stress as 60% of the specified yield point for the material used. Normal stress is the sum of bending stress and axial stress with the corresponding shearing stress acting perpendicular to the normal stress. No stress concentration factors being taken into account.

**4.6 Safe working load (SWL)**

4.6.1 The Safe Working Load (SWL) is the load limit for fixed or permanent equipment for mooring purpose (e.g. bollards, bitts, rollers, chocks, etc.).

4.6.2 The SWL should not exceed the [line design break force/minimum breaking strength] of the mooring line according to Appendix A.

4.6.3 The SWL, in t, of each shipboard fitting should be marked (by weld bead or equivalent) on the deck fittings used for mooring. For fittings intended to be used for, both, mooring and towing, TOW, in t, according to 3.6 should be marked in addition to SWL.

4.6.4 The above provisions on SWL apply for the use with no more than one mooring line.

4.6.5 The towing and mooring arrangements plan described in section 5 should define the method of use of mooring lines.

**5 Towing and mooring arrangements plan**

5.1 The SWL and TOW for the intended use for each shipboard fitting should be noted in the towing and mooring arrangements plan available on board for the guidance of the Master. It should be noted that TOW is the load limit for towing purpose and SWL that for mooring purpose. If not otherwise chosen, for towing bitts it should be noted that TOW is the load limit for a towing line attached [].

5.2 Information provided on the plan should include in respect of each shipboard fitting:

.1 location on the ship;

.2 fitting type;

.3 SWL / TOW;

.4 purpose (mooring/harbour towing/other towing);

.5 method of applying load of towing or mooring line including limiting fleet angles.

[5.3 Furthermore, information provided on the plan is to include:

.1 the arrangement of mooring lines showing number of lines (N);

.2 the minimum breaking strength of each mooring line (MBL);

[.2bis the line design break force of each mooring line and the Working Load Limit (WLL);]

.3 the acceptable environmental conditions as given in Appendix A, A.3 for the recommended minimum breaking strength of mooring lines for ships with Equipment Number EN > 2000:

.1 30 second mean wind speed from any direction (vW or vW\* according to A.3.1.3 or A.3.2.2, respectively); and

.2 Maximum current speed acting on bow or stern (±10°)]

[5.4 The information as given in 5.2 and 5.3 is to be incorporated into the pilot card in order to provide the pilot with proper information on harbour and other towing operations.]

**APPENDIX A**

**MOORING AND TOW LINES**

**A.1 General**

A.1.1 The mooring lines for ships with Equipment Number EN of less than or equal to 2000 are given in A.2. For other ships the mooring lines are given in A.3.

A.1.2 The tow lines are given in A.2.

A.1.3 The Equipment Number EN should be calculated in compliance with Appendix B. Deck cargo as given by the loading manual should be included for the determination of side-projected area A.

**A.2** **Mooring lines for ships with EN ≤ 2000 and tow lines**

A.2.1 The minimum recommended mooring lines for ships having an Equipment Number EN of less than or equal to 2000 are given in Table A.1.

A.2.2 For ships having the ratio A/EN > 0.9 the following number of lines should be added to the number of mooring lines as given by Table A.1:

One line where 0.9 <  ≤ 1.1,

two lines where 1.1 <  ≤ 1.2,

three lines where 1.2 < .

A.2.3 The tow lines are given in Table A.1 and are intended as own tow line of a ship to be

towed by a tug or other ship.

**Table A.1 Mooring and tow lines for ships with EN ≤ 2000**

|  |  |  |
| --- | --- | --- |
| **EQUIPMENT NUMBER** | **MOORING LINES** | **TOW LINE\*** |
| **Exceeding** | **Not exceeding** | **No. of mooring lines** | **Minimum breaking strength (kN)** | **Minimum breaking strength (kN)** |
| ***1*** | ***2*** | ***3*** | ***4*** | ***5*** |
| 50 | 70 | 3 | 37 | 98 |
| 70 | 90 | 3 | 40 | 98 |
| 90 | 110 | 3 | 42 | 98 |
| 110 | 130 | 3 | 48 | 98 |
| 130 | 150 | 3 | 53 | 98 |
| 150 | 175 | 3 | 59 | 98 |
| 175 | 205 | 3 | 64 | 112 |
| 205 | 240 | 4 | 69 | 129 |
| 240 | 280 | 4 | 75 | 150 |
| 280 | 320 | 4 | 80 | 174 |
| 320 | 360 | 4 | 85 | 207 |
| 360 | 400 | 4 | 96 | 224 |
| 400 | 450 | 4 | 107 | 250 |
| 450 | 500 | 4 | 117 | 277 |
| 500 | 550 | 4 | 134 | 306 |
| 550 | 600 | 4 | 143 | 338 |
| 600 | 660 | 4 | 160 | 370 |
| 660 | 720 | 4 | 171 | 406 |
| 720 | 780 | 4 | 187 | 441 |
| 780 | 840 | 4 | 202 | 479 |
| 840 | 910 | 4 | 218 | 518 |
| 910 | 980 | 4 | 235 | 559 |
| 980 | 1060 | 4 | 250 | 603 |
| 1060 | 1140 | 4 | 272 | 647 |
| 1140 | 1220 | 4 | 293 | 691 |
| 1220 | 1300 | 4 | 309 | 738 |
| 1300 | 1390 | 4 | 336 | 786 |
| 1390 | 1480 | 4 | 352 | 836 |
| 1480 | 1570 | 5 | 352 | 888 |
| 1570 | 1670 | 5 | 362 | 941 |
| 1670 | 1790 | 5 | 384 | 1024 |
| 1790 | 1930 | 5 | 411 | 1109 |
| 1930 | 2080 | 5\*\* | 437\*\* | 1168 |
| 2080 | 2230 | \*\* | \*\* | 1259 |
| 2230 | 2380 | \*\* | \*\* | 1356 |
| 2380 | 2530 | \*\* | \*\* | 1453 |
| 2530 | - | \*\* | \*\* | 1471 |

\* Information is provided in relation to 3.3.1 and provision onboard of such a line is not necessary under this guidance.

\*\* For ships with EN > 2000 see A.3.

**A.3** **Mooring lines for ships with EN > 2000**

**A.3.1 General**

A.3.1.1 Breast lines provide the maximum transverse restraint and spring lines the maximum longitudinal restraint against vessel movement in athwart and in fore-aft direction, respectively. Head and stern lines are much less effective for these purposes. The applied mooring layout should follow these principles, as far as possible with respect to the port facilities and as far as reasonable with respect to the vertical line angles.

The following is defined with respect to the purpose of mooring lines, see also figure below:

.1 Breast line: A mooring line that is deployed perpendicular to the ship, restraining the ship in the off-berth direction.

.2 Spring line: A mooring line that is deployed almost parallel to the ship, restraining the ship in fore or aft direction.

.3 Head/Stern line: A mooring line that is oriented between longitudinal and transverse direction, restraining the ship in the off-berth and in fore or aft direction. The amount of restraint in fore or aft and off-berth direction depends on the line angle relative to these directions.

Breast line

Stern line

Spring lines

Head line

Breast line

A.3.1.2 The strength of mooring lines and the number of head, stern, and breast lines for ships with an Equipment Number EN > 2000 are based on the side-projected area A1. Side projected area A1 should be calculated similar to the side-projected area A according to Appendix B but considering the following conditions:

.1 For oil tankers, chemical tankers, bulk carriers, and ore carriers the lightest ballast draft should be considered for the calculation of the side-projected area A1. For other ships the lightest draft of usual loading conditions should be considered if the ratio of the freeboard in the lightest draft and the full load condition is equal to or above two. Usual loading conditions mean loading conditions as given by the trim and stability booklet that are to be expected to regularly occur during operation and, in particular, excluding light weight conditions, propeller inspection conditions, etc.

.2 Wind shielding of the pier can be considered for the calculation of the side-projected area A1 unless the ship is intended to be regularly moored to jetty type piers. A height of the pier surface of 3 m over waterline may be assumed, i.e. the lower part of the side-projected area with a height of 3 m above the waterline for the considered loading condition may be disregarded for the calculation of the side-projected area A1.

.3 Deck cargo as given by the loading manual should be included for the determination of side-projected area A1. Deck cargo may not need to be considered if a usual light draft condition without cargo on deck generates a larger side-projected area A1 than the full load condition with cargo on deck. The larger of both side-projected areas should be chosen as side-projected area A1.

A.3.1.3 The mooring lines as given here under are based on a maximum current speed of 1.0 m/s and the following maximum wind speed vw, in m/s:

vw = 25.0 - 0.002 (A1 – 2000) for passenger ships, ferries, and car carriers with 2000 m2 < A1 ≤ 4000 m2

 = 21.0 for passenger ships, ferries, and car carriers with A1 > 4000 m2

 = 25.0 for other ships

A.3.1.4 The wind speed is considered representative of a 30 second mean speed from any direction and at a height of 10 m above the ground. The current speed is considered representative of the maximum current speed acting on bow or stern (±10°) and at a depth of one-half of the mean draft. Furthermore, it is considered that ships are moored to solid piers that provide shielding against cross current.

A.3.1.5 Additional loads caused by, e.g., higher wind or current speeds, cross currents, additional wave loads, or reduced shielding from non-solid piers may need to be particularly considered. Furthermore, it should be observed that unbeneficial mooring layouts can considerably increase the loads on single mooring lines.

**A.3.2 Minimum breaking strength**

A.3.2.1 The minimum breaking strength, in kN, of the mooring lines should be taken as:

MBL = 0.1 · A1 + 350

A.3.2.2 The minimum breaking strength may be limited to 1275 kN (130 t). However, in this case the moorings are to be considered as not sufficient for environmental conditions given by A.3.1.3. For these ships, the acceptable wind speed vw\*, in m/s, can be estimated as follows:

$$v\_{w}^{\*}=v\_{w}∙\sqrt{\frac{MBL^{\*}}{MBL}}$$

where vw is the wind speed as per A3.1.3, MBL\* the breaking strength of the mooring lines intended to be supplied and MBL the breaking strength as recommended according to the above formula. However, the minimum breaking strength should not be taken less than corresponding to an acceptable wind speed of 21 m/s:

$$MBL^{\*} \geq \left(\frac{21}{v\_{w}}\right)^{2}∙MBL$$

A.3.2.3 If lines are intended to be supplied for an acceptable wind speed vw\* higher than vw as per A3.1.3, the minimum breaking strength should be taken as:

$$MBL^{\*} =\left(\frac{v\_{w}^{\*}}{v\_{w}}\right)^{2}∙MBL$$

**A.3.3 Number of mooring lines**

A.3.3.1 The total number of head, stern and breast lines should be taken as:

n = 8.3·10-4 · A1 + 6

A.3.3.2 For oil tankers, chemical tankers, bulk carriers, and ore carriers the total number of head, stern and breast lines should be taken as:

n = 8.3·10-4 · A1 + 4

A.3.3.3 The total number of head, stern and breast lines should be rounded to the nearest whole number.

A.3.3.4 The number of head, stern and breast lines may be increased or decreased in conjunction with an adjustment to the strength of the lines. The adjusted strength, MBL\*, should be taken as:

MBL\* = 1.2 · MBL · n/n\* ≤ MBL for increased number of lines,

MBL\* = MBL · n/n\* for reduced number of lines

where n\* is the increased or decreased total number of head, stern and breast lines and in the number of lines for the considered ship type as calculated by the above formulas without rounding.

A.3.3.5 Vice versa, the strength of head, stern and breast lines may be increased or decreased in conjunction with an adjustment to the number of lines.

A.3.3.6 The total number of spring lines should be taken not less than:

Two lines where EN < 5000,

four lines where EN ≥ 5000.

A.3.3.7 The strength of spring lines should be the same as that of the head, stern and breast lines. If the number of head, stern and breast lines is increased in conjunction with an adjustment to the strength of the lines, the number of spring lines should be likewise increased, but rounded up to the nearest even number.

**APPENDIX B**

**EQUIPMENT NUMBER**

The equipment number (EN) should be calculated as follows:

$$EN=∆^{^{2}/\_{3}}+2.0hB+\frac{A}{10}$$

where:

= moulded displacement, in t, to the Summer Load Waterline

B = moulded breadth, in m

h = effective height, in m, from the Summer Load Waterline to the top of the uppermost house; for the lowest tier ‘h’ should be measured at centreline from the upper deck or from a notional deck line where there is local discontinuity in the upper deck, see figure below for an example

h = a + hi

a = distance, in m, from the Summer Load Waterline amidships to the upper deck

hi = height, in m, on the centreline of each tier of houses having a breadth greater than B/4

A = side-projected area, in m2, of the hull, superstructures and houses above the Summer Load Waterline which are within the equipment length of the ship and also have a breadth greater than B/4.

Summer Load waterline

a

h1

h2

h3

Notional deck line

Upper deck

***NOTES:***

*1 When calculating h, sheer and trim should be ignored, i.e. h is the sum of freeboard amidships plus the height (at centreline) of each tier of houses having a breadth greater than B/4.*

*2 If a house having a breadth greater than B/4 is above a house with a breadth of B/4 or less, then the wide house should be included but the narrow house ignored.*

*3 Screens or bulwarks 1.5 m or more in height should be regarded as parts of houses when determining h and A. The height of the hatch coamings and that of any deck cargo, such as containers, may be disregarded when determining h and A. With regard to determining A, when a bulwark is more than 1.5 m high, the area shown below as A2 should be included in A.*

**

*4 The equipment length of the ships is the length between perpendiculars but should not be less than 96% nor greater than 97% of the extreme length on the Summer Waterline (measured from the forward end of the waterline).*

**ANNEX 4**

**Draft separate guidelines on safe mooring operations**

**MSC.1/Circ.????**

**Date**

**GUIDELINES ON SAFE MOORING OPERATIONS**

1 The Maritime Safety Committee, at its [XXX] session [date], having considered a proposal by the Sub-Committee on Ship Design and Construction, at its [XXX] session, and recognizing the importance of safe operation of mooring equipment, mooring lines, and inspection/maintenance of lines [and equipment], approved the [Guidelines on safe mooring operations] [Guidelines on maintenance of mooring equipment and safe mooring operations] [Guidelines for In-Service Maintenance and Inspection of Mooring Lines] , as set out in the annex.

2 Member Governments are invited to bring the annexed Guidelines to the attention of shipowners, ship managers, bareboat charterers and other organizations or persons responsible for operation of ships, for applying the Guidelines when developing safety management systems of respective ships.

3 Member Governments are also invited to bring the annexed Guidelines to shipmasters, ships' officers and crew and all other parties concerned, for providing guidance on mooring operation including inspection and maintenance of mooring equipment including mooring lines.

\* \* \*

**ANNEX**

**GUIDELINES ON SAFE MOORING OPERATIONS**

**Note: Paragraph numbers will be fixed in the draft CG report.**

**1 General**

[**1.1 Purpose**

The purpose of these Guidelines is to provide recommendations and guidance for shipboard personnel to conduct in-service inspections of mooring lines, criteria for identifying worn-out lines for removal from service, and criteria for selection of replacement mooring lines.]

**1.1 Application**

[These guidelines apply to all ships.] (to be developed.)

**1.2 Terms and definitions**

[For the purpose of these guidelines:

(Definitions in new guidelines corresponding to SOLAS Reg. II-1/3-8 and Revised version of MSC.1/Circ.1175 will be reproduced.)

1.2.xx Mooring personnel is defined as the personnel tasked to assist in the activity of mooring and unmooring ships, either ashore or from mooring boats, carried out within the framework of port marine services (see FAL.6/Circ.11/Rev.1).

1.2.xx Mooring boat is defined as a boat handling mooring lines between the ship and ashore during mooring and unmooring operations and does not include harbour ship assist tugs (see FAL.6/Circ.11/Rev.1).]

(to be developed.)]

**2 Selection of mooring lines**

2.1 Appropriate mooring lines should be selected taking into account, at least, but not limited to, the following properties which depend on material (wires, conventional fibres, synthetic fibres) and construction, length and diameter:

.1 breaking strength;

.2 environmental conditions to be used (e.g. temperature);

.3 linear density;

.4 tenacity;

.5 D/d ratios (ratio of fixed equipment (chock, bollard, bit, etc.) diameter to mooring line diameter);

.6 compression fatigue; and

.7 elongation.

2.2 It should be noted that above mentioned properties will change with usage and exposure to environmental factors over time.

2.3 For wire ropes, corrosion protection (Galvanising) should be considered.

2.4 For both wire and fibre ropes, the acceptable minimum bend radius (D/d ratio) should be taken into consideration as strength and life expectancy of these ropes are directly related to bend radius they are exposed to in service.

2.5 Fitting of a synthetic tail of appropriate length should be considered to provide additional elasticity.

**3 Basic requirements for safe use of mooring equipment**

3.1 The Company should establish procedures for mooring operations and maintenance of mooring equipment, including mooring lines, in the Safety Management System of the ship. The risk that a mooring line may break suddenly should be considered, taking into account appropriate references[[3]](#footnote-3).

3.2 The ship’s officers and crew should be familiar with:

.1 the mooring equipment of the ship, e.g., type, physical properties and conditions such as wear and tear; and

.2 hazards associated with “Snap-back zones of ropes” and “blind sectors” in signaling to the winch man.

3.3 Shore-side mooring personnel should comply with the requirements in FAL.6/Circ.11/Rev.1 “Ship/Port Interface, Guidelines on minimum training and education for mooring personnel”. Prior to commencement of mooring operations, all mooring personnel should understand the planned operation and sequences.

3.4 Prior to the commencement of a mooring operation, the following steps should be taken:

.1 The condition of the following items should be verified from the shore:

.1.1 mooring lines (paying particular attention to any wear caused by friction with the hull); and

.1.2 bollards, mooring hooks and mooring buoys;

.2 The condition of the following items should be verified at the fore and aft mooring areas on board:

.2.1 mooring lines;

.2.2 bollards, fairleads, mooring chocks and capstans;

.2.3 winches, warping ends, windlass, gear covers and brakes; and

.2.4 no extra weight other than monkey-fist is attached to the heaving lines.[[4]](#footnote-4)

.3 The mooring operation should be adequately planned;

.4 An adequate communication should be established among all the personnel involved in the mooring operation ashore and afloat (fore and aft mooring areas, bridge, engine room, pilot, tug boats and mooring boats)

.5 A safety meeting should be held to ensure that:

.5.1 personal protection equipment (e.g. helmet, safety shoes, gloves, high visibility clothing) is available as required;

.5.2 the roles and responsibilities of all the personnel involved in the mooring operation are clearly defined and understood;

.5.3 all crew are appropriately trained and familiar with their duties; and

.5.4 all risks envisaged with mooring operation have been considered and appropriate controls are in place.

3.5 During the mooring operations:

.1 communications should be maintained among all related persons, such as master, officers, crew, pilot, crew on tugs and mooring personnel;

.2 mooring personnel should regularly communicate the current state of mooring lines or tug lines and the direction and speed of the main engine; and

.3 all crew should be equipped with personal protections equipment.

**4 Inspection and maintenance of mooring lines**

4.1 The Company should specify the following topics, based on the guidance provided by the mooring line manufacturer, if available, in the maintenance procedures required in paragraph 3.1 of these guidelines:

.1 condition based monitoring of mooring lines, which may include the rotation and replacement of mooring lines; and

.2 visual inspection by crew before use and by a person competent in mooring line conditional assessment at predetermine intervals, together with a guidance or examples for judgement of replacement of mooring lines, taking into account appropriate references[[5]](#footnote-5).

[4.2 Mooring lines should be inspected as specified in the above mentioned established procedures.

4.3 Mooring lines should be rotated and replaced as specified in the procedures. Mooring lines should be maintained, as well as replaced before failure based on the condition, of the above mentioned established procedures.]

**Reference**

(1) Oil Companies International Marine Forum (OCIMF), “Mooring Equipment Guidelines, 3rd Edition”, ISBN: 9781905331321, 2008

(2) Walter Verloesem AMNI, “The Nautical Institute, Mooring and Anchoring Ships Vol.1, Principle and Practice”, ISBN: 9781906915934, 2009

(3) Walter Verloesem AMNI, “The Nautical Institute, Mooring and Anchoring Ships Vol.2, Inspection and Maintenance”, ISBN: 9781870077941, 2009

1. With regard to containers, “Serious deficiency requiring immediate out of service determination” is set out in CSC.1/Circ.138/Rev.1 [↑](#footnote-ref-1)
2. Iclude a corresponding footnote [↑](#footnote-ref-2)
3. For example references (1) and (2). [↑](#footnote-ref-3)
4. See 5.2.11 of Annex 2 and comments in the first round. [↑](#footnote-ref-4)
5. For example references (1) and (3) [↑](#footnote-ref-5)