

**A2**

(Jan  
2004)  
(Corr.1  
Feb  
2004)  
Rev.1  
July  
2004)  
(Rev.2  
Sept  
2006)  
(Rev.3  
July  
2007)

## Shipboard fittings and supporting hull structures associated with towing and mooring on conventional vessels

### A 2.0. Application and Definitions

This unified requirement is to apply to design and construction of shipboard fittings and supporting structures used for the normal towing and mooring operations. For the emergency towing arrangements, ships subject to SOLAS regulation II-1/3-4 are to comply with that regulation and resolution MSC.35(63) as may be amended.

The net minimum scantlings of the supporting hull structure are to comply with the requirements given in A 2.1.5 and A 2.2.5. The net thicknesses,  $t_{net}$ , are the member thicknesses necessary to obtain the above required minimum net scantlings. The required gross thicknesses are obtained by adding the total corrosion additions,  $t_c$ , given in A 2.4, to  $t_{net}$ .

For the purpose of this requirement:

- conventional vessels means new displacement-type vessels of 500 GT and above, excluding high speed craft, special purpose vessels, and offshore units of all types.
- shipboard fittings mean those components limited to the following: bollards and bitts, fairleads, stand rollers, chocks used for the normal mooring of the vessel and the similar components used for the normal towing of the vessel. Other components such as capstans, winches, etc. are not covered by this Unified Requirement. Any weld or bolt or equivalent device connecting the shipboard fitting to the supporting structure is part of the shipboard fitting and subject to the Industry standard applicable to this shipboard fitting.
- Supporting hull structures 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 supporting hull structure of capstans, winches, etc. used for the normal towing and mooring operations mentioned above is also subject to this Unified Requirement.
- Industry standard means international standard (ISO, etc.) or standards issued by national association such as DIN or JMSA, etc. which are recognized in the country where the ship is built.

Note:

1) Corr.1 Feb 2004 is to be applied by all Member Societies and Associates to ships contracted for construction after 1 Jan 2005.

2) The "contracted for construction" date means the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. For further details regarding the date of "contract for construction", refer to IACS Procedural Requirement (PR) No. 29.

3) Revision 2 of this UR is to be applied by all IACS Members and Associates to ships contracted for construction from 1 January 2007.

4) Revision 3 of this UR is to be uniformly implemented by all IACS Members and Associates to ships contracted for construction from 1 January 2007.

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### A 2.1. Towing

#### A 2.1.1. Strength

The strength of shipboard fittings used for normal towing operations at bow, sides and stern and their supporting hull structures are to comply with the requirements of this Unified Requirement.

#### A 2.1.2. Arrangement

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

#### A 2.1.3. Load considerations

Unless greater safe working load (SWL) of shipboard fittings is specified by the applicant, the minimum design load to be used is the following value of (1) or (2), whichever is applicable:

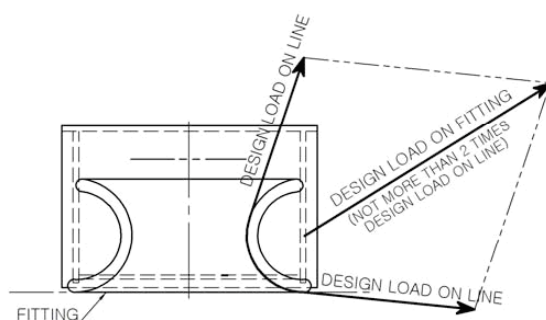
- (1) for normal towing operations (e.g. harbour/manoeuvring), 1.25 times the intended maximum towing load (e.g. static bollard pull) as indicated on the towing and mooring arrangements plan.
- (2) for other towing service (e.g. escort), the nominal breaking strength of the tow line according to the IACS Recommendation No. 10 "Equipment" for the ship's corresponding EN is to be applied. (see Note)

Note: Side projected area including maximum stacks of deck cargoes is to be taken into account for selection of towing lines. For the application of UR A2, the breaking loads of mooring and towing lines specified in IACS Recommendation 10 are mandatory in order to determine the design load applied to shipboard fittings and supporting hull structure. The remainder of IACS Recommendation 10 is for guidance.

The design load is to be applied through the tow line according to the arrangement shown on the towing and mooring arrangements plan.

When a specific SWL is applied for a shipboard fitting at the request of the applicant, by which the design load will be greater than the above minimum values, the strength of the fitting is to be designed using this specific design load.

The method of application of the design load to the fittings and supporting hull structures is to be taken into account such that the total load need not be more than twice the design load, i.e. no more than one turn of one line (see figure below).



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(cont)**A 2.1.4. Shipboard fittings**

The selection of shipboard fittings is to be made by the shipyard in accordance with an Industry standard (e.g. ISO3913 Shipbuilding Welded Steel Bollards) accepted by the society. When the shipboard fitting is not selected from an accepted Industry standard, the design load used to assess its strength and its attachment to the ship is to be in accordance with A 2.1.3

**A 2.1.5. Supporting hull structure****(1) Arrangement**

The reinforced members (carling) beneath shipboard fittings are to be effectively arranged for any variation of direction (horizontally and vertically) of the towing forces (which is to be not less than the Design Load as per A 2.1.3) acting through the arrangement of connection to the shipboard fittings.

**(2) Acting point of towing force**

The acting point of the towing force on shipboard fittings is to be taken at the attachment point of a towing line or at a change in its direction.

**(3) Allowable stresses**

Allowable stresses under the design load conditions as specified in A2.1.3 are as follows:

Normal stress: 100% of the specified minimum yield point of the material;  
Shearing stress: 60% of the specified minimum yield point of the material;

No stress concentration factors being taken into account.

Normal stress is the sum of bending stress and axial stress with the corresponding shearing stress acting perpendicular to the normal stress.

**A 2.1.6. Safe Working Load (SWL)**

- 1) The SWL used for normal towing operations (e.g. harbour/manoeuvring) is not to exceed 80% of the design load per A 2.1.3(1) and the SWL used for other towing operations (e.g. escort) is not to exceed the design load per A 2.1.3(2). For fittings used for both normal and other towing operations, the greater of the design loads of A 2.1.3(1) and A 2.1.3(2) is to be used.
- 2) The SWL of each shipboard fitting is to be marked (by weld bead or equivalent) on the deck fittings used for towing.
- 3) The above requirements on SWL apply for a single post basis (no more than one turn of one cable).
- 4) The towing and mooring arrangements plan mentioned in A 2.3 is to define the method of use of towing lines.

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(cont)**A 2.2. Mooring****A 2.2.1. Strength**

The strength of shipboard fittings used for mooring operations and their supporting hull structures are to comply with the requirements of this Unified Requirement.

**A 2.2.2. Arrangement**

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

**A 2.2.3. Load considerations**

- 1) Unless greater safe working load (SWL) of shipboard fittings is specified by the applicant, the design load applied to shipboard fittings and supporting hull structures is to be 1.25 times the breaking strength of the mooring line according to the IACS Recommendation No. 10 "Equipment" for the ship's corresponding EN. (see Note)

Notes:

1. Side projected area including maximum stacks of deck cargoes is to be taken into account for assessment of lateral wind forces, arrangements of tug boats and selection of mooring lines.
  2. For the application of UR A2, the breaking loads of mooring ~~and towing~~ lines specified in IACS Recommendation 10 are mandatory in order to determine the design load applied to shipboard fittings and supporting hull structure.
  3. In line with the footnote of Table 5 of IACS Recommendation No. 10, for the individual mooring lines with breaking strength above 490 kN, this breaking strength may be reduced with corresponding increase of number of the mooring lines, provided that the total breaking load of all lines aboard the ship is not less than the total loads as specified. The number of mooring lines is not to be less than 6 and no one line is to have a strength less than 490 kN. (See also A2.3, Mooring arrangement plan.)
  4. The remainder of IACS Recommendation 10 is for guidance.
- 2) The design load applied to supporting hull structures for winches, etc. is to be 1.25 times the intended maximum brake holding load and, for capstans, 1.25 times the maximum hauling-in force.
  - 3) The design load is to be applied through the mooring line according to the arrangement shown on the towing and mooring arrangements plan.
  - 4) The method of application of the design load to the fittings and supporting hull structures is to be taken into account such that the total load need not be more than twice the design load specified in 1) above, i.e. no more than one turn of one line.
  - 5) When a specific SWL is applied for a shipboard fitting at the request of the applicant, by which the design load will be greater than the above minimum values, the strength of the fitting is to be designed using this specific design load.

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(cont)**A 2.2.4. Shipboard fittings**

The selection of shipboard fittings is to be made by the shipyard in accordance with an Industry standard (e.g. ISO3913 Shipbuilding Welded Steel Bollards) accepted by the society. When the shipboard fitting is not selected from an accepted Industry standard, the design load used to assess its strength and its attachment to the ship is to be in accordance with A 2.2.3

**A 2.2.5. Supporting hull structure****(1) Arrangement**

Arrangement of the reinforced members (carling) beneath shipboard fittings is to consider any variation of direction (horizontally and vertically) of the mooring forces (which is to be not less than the Design Load as per A 2.2.3) acting through the arrangement of connection to the shipboard fittings.

**(2) Acting point of mooring force**

The acting point of the mooring force on shipboard fittings is to be taken at the attachment point of a mooring line or at a change in its direction.

**(3) Allowable stresses**

Allowable stresses under the design load conditions as specified in A2.2.3 are as follows:

Normal stress: 100% of the specified minimum yield point of the material;  
Shearing stress: 60% of the specified minimum yield point of the material;

No stress concentration factors being taken into account. Normal stress is the sum of bending stress and axial stress with the corresponding shearing stress acting perpendicular to the normal stress.

**A 2.2.6. Safe Working Load (SWL)**

- 1) The SWL is not to exceed 80% of the design load per A 2.2.3.
- 2) The SWL of each shipboard fitting is to be marked (by weld bead or equivalent) on the deck fittings used for mooring.
- 3) The above requirements on SWL apply for a single post basis (no more than one turn of one cable).
- 4) The towing and mooring arrangements plan mentioned in A 2.3 is to define the method of use of mooring lines.

**A 2.3. Towing and mooring arrangements plan**

- 1) The SWL for the intended use for each shipboard fitting is to be noted in the towing and mooring arrangements plan available on board for the guidance of the Master.
- 2) Information provided on the plan is to include in respect of each shipboard fitting:
  - .1 location on the ship;

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- .2 fitting type;
  - .3 SWL;
  - .4 purpose (mooring/harbour towing/escort towing); and
  - .5 manner of applying towing or mooring line load including limiting fleet angles.
- 3) Where the arrangements and details of deck fittings and their supporting hull structures are designed based on the mooring arrangements as permitted in Note 3 to A 2.2.3.1, the following information is to be clearly indicated on the plan:

- .1 the arrangement of mooring lines showing number of lines (N), together with
- .2 the breaking strength of each mooring line (BS).

This information is to be incorporated into the pilot card in order to provide the pilot proper information on harbour/escorting operations.

**A 2.4. Corrosion Addition**

The total corrosion addition,  $t_c$ , in mm, for both sides of the hull supporting structure is not to be less than the following values:

- Ships covered by CSR for bulk carriers and CSR for double hull oil tankers: Total corrosion additions defined in these rules
- Other ships: 2.0

**A 2.5. Survey After Construction**

The condition of deck fittings, their pedestals, if any, and the hull structures in the vicinity of the fittings are to be examined in accordance with the society's Rules. The wastage allowances as specified by the society's Rules are not to exceed the corrosion addition as specified in A2.4.

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