

**S1A**

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# **Additional Requirements for Loading Conditions, Loading Manuals and Loading Instruments for Bulk Carriers, Ore Carriers and Combination Carriers**

## **S1A.1 - Application**

Bulk Carriers, Ore Carriers and Combination Carriers (see URZ11) of 150 m length and above, which are contracted for construction before 1st July 1998 are to be provided with an approved loading instrument of a type to the satisfaction of the Society not later than their entry into service or 1st January 1999, whichever occurs later.

In addition, Bulk Carriers of 150 m length and above where one or more cargo holds are bounded by the side shell only, which were contracted for construction before 1st July 1998 are to be provided, with an approved loading manual with typical loading sequences where the vessel is loaded from commencement of cargo loading to reaching full deadweight capacity, for homogeneous conditions, relevant part load conditions and alternate conditions where applicable. Typical unloading sequences for these conditions shall also be included. Annex 1 contains, as guidance only, an example of a Loading Sequence Summary Form. Annex 2 contains guidance for loading and unloading sequences for existing bulk carriers.

Bulk Carriers, Ore Carriers and Combination Carriers of 150m length and above, which are contracted for construction on or after 1st July 1998, are to be provided with an approved Loading Manual and approved computer-based Loading Instrument, in accordance with S1A.2 , S1A.3 and S1A.4. Annex 3 contains guidance for loading and unloading sequences for new bulk carriers.

## **S1A.2 - Definitions**

### **S1A.2.1 - Loading Manual**

Loading Manual is a document which describes:

- a) the loading conditions on which the design of the ship has been based, including permissible limits of still water bending moments and shear forces;
- b) the results of the calculations of still water bending moments, shear forces and where applicable, limitations due to torsional loads;
- c) for bulk carriers, envelope results and permissible limits of still water bending moments and shear forces in the hold flooded condition according to S17 as applicable;
- d) the cargo hold(s) or combination of cargo holds that might be empty at full draught. If no cargo hold is allowed to be empty at full draught, this is to be clearly stated in the loading manual;
- e) maximum allowable and minimum required mass of cargo and double bottom contents of each hold as a function of the draught at mid-hold position;
- f) maximum allowable and minimum required mass of cargo and double bottom contents of any two adjacent holds as a function of the mean draught in way of these holds. This mean draught may be calculated by averaging the draught of the two mid-hold positions;
- g) maximum allowable tank top loading together with specification of the nature of the cargo for cargoes other than bulk cargoes;
- h) maximum allowable load on deck and hatch covers. If the vessel is not approved to carry load on deck or hatch covers, this is to be clearly stated in the loading manual;
- i) the maximum rate of ballast change together with the advice that a load plan is to be agreed with the terminal on the basis of the achievable rates of change of ballast.

Notes: 1. The latest date for implementation for requirements in S1A.2.1(f) is 1st July 1999.  
2. The latest date for implementation for requirements in S1A.2.2(b) is 1st July 1999.  
3. The latest date for implementation for requirements in S1A.4(d) is 1st July 1999.  
4. Changes introduced in Rev.3 are to be uniformly implemented by IACS Members and Associates from 1 July 2001.  
5. 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.

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**S1A.2.2 - Loading Instrument**

A loading instrument is an approved digital system as defined in S1. In addition to the requirements in S1, it shall ascertain as applicable that:

- a) the mass of cargo and double bottom contents in way of each hold as a function of the draught at mid-hold position;
- b) the mass of cargo and double bottom contents of any two adjacent holds as a function of the mean draught in way of these holds;
- c) the still water bending moment and shear forces in the hold flooded conditions according to S17;

are within permissible values.

**S1A.3 - Conditions of Approval of Loading Manuals**

In addition to the requirements given in S1.2.2, the following conditions, subdivided into departure and arrival conditions as appropriate, are to be included in the Loading Manual:

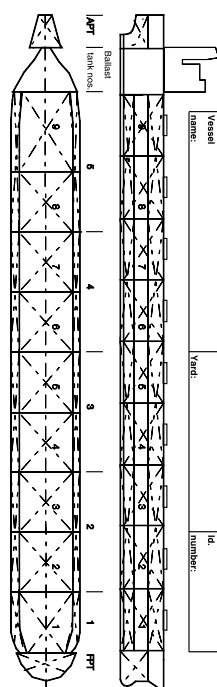
- a) alternate light and heavy cargo loading conditions at maximum draught, where applicable;
- b) homogeneous light and heavy cargo loading conditions at maximum draught;
- c) ballast conditions. For vessels having ballast holds adjacent to topside wing, hopper and double bottom tanks, it shall be strengthwise acceptable that the ballast holds are filled when the topside wing, hopper and double bottom tanks are empty;
- d) short voyage conditions where the vessel is to be loaded to maximum draught but with limited amount of bunkers;
- e) multiple port loading/unloading conditions;
- f) deck cargo conditions, where applicable;
- g) typical loading sequences where the vessel is loaded from commencement of cargo loading to reaching full deadweight capacity, for homogeneous conditions, relevant part load conditions and alternate conditions where applicable. Typical unloading sequences for these conditions shall also be included. The typical loading/unloading sequences shall also be developed to not exceed applicable strength limitations. The typical loading sequences shall also be developed paying due attention to loading rate and the deballasting capability. Annex 1 contains, as guidance only, an example of a Loading Sequence Summary Form.
- h) typical sequences for change of ballast at sea, where applicable.

**S1A.4 - Condition of Approval of Loading Instruments**

The loading instrument is subject to approval. In addition to the requirements given in S1.2.3, the approval is to include as applicable:

- a) acceptance of hull girder bending moment limits for all read-out points
- b) acceptance of hull girder shear force limits for all read-out points
- c) acceptance of limits for mass of cargo and double bottom contents of each hold as a function of draught
- d) acceptance of limits for mass of cargo and double bottom contents in any two adjacent holds as a function of draught.

## Guidance on Typical Loading Sequence Summary Form



Volume of Hold, Vh (m <sup>3</sup> )							
Height of hold, h (m)							

[illegible][illegible]

Hold content at end of loading/discharging							
Clutch mass							
Total mass loaded/discharged (t)							

[illegible]

Port	Condition at commencement of loading/discharging
(Specific or typical)	Condition at end of loading/discharging
Total mass of cargo to be loaded/discharged:	
Dock water	Maximum
Density ( $\text{t/m}^3$ )	Loading/discharging rate: Maximum
Number of loading/dischargers	Average Loading/discharging rate: Average Ballasting/deballasting rate: Ballasting/deballasting rate:

**Note:** During each pour it has to be controlled that allowable limits for hull girder shear forces, bending moments and mass in holds are not exceeded. Loading/discharging operations may have to be paused to allow for ballasting/deballasting in order to keep actual values within limits.

Ballast content at commencement of loading/discharge (t/ton)					
	Bill no. 5	Bill no. 6	Bill no. 3	Bill no. 4	Bill no. 2
APT					PFT

Commencement of loading/discharge (ton)		
T all	T min	T mid
		Maximum
(m)	(m)	S.E. (%) B.M. (%)

[illegible]

Ballist content at end of feeding/afterfeeding									Values at end of feeding/afterfeeding (min)					
APT	Ball. no. 5	Ball. no. 4	No. 5 fold	Ball. no. 3	No. 4 fold	Ball. no. 2	Ball. no. 1	FPT	T <sub>all</sub>	T <sub>1min</sub>	T <sub>2wd</sub>	Maximum	S.E. (%)	B.M. (%)
									(m)	(m)	(m)			

<p>Net load on double bottom = <math>(Mh/V) \cdot h \cdot T \quad (mm^2)</math></p> <p>• where: <math>Mh</math> = Mass in hold + mass in DB (t)</p> <p><math>V</math> = Total volume of hold (m<sup>3</sup>)</p> <p><math>h</math> = height of hold from inner bottom to top of coaming (m)</p> <p><math>T</math> = draught (m)</p>	<p>Approved by:</p> <p>Place, date, stamp and signature</p>
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**EXISTING BULK CARRIERS  
GUIDANCE FOR LOADING/UNLOADING SEQUENCES**

1. UR S1A.1 requires that bulk carriers of 150m length and above, where one or more cargo holds are bounded by the side shell only, which were contracted for construction before 1st July 1998, are to be provided, with an approved loading manual with typical loading sequences where the ship is loaded from commencement of cargo loading to reaching full deadweight capacity, for homogeneous conditions, relevant part loaded conditions and alternate conditions where applicable. Typical unloading sequences shall be included.
2. This requirement will necessitate shipowners and operators to prepare and submit for approval typical loading and unloading sequences.
3. The minimum acceptable number of typical sequences is:
  - one homogeneous full load condition,
  - one part load condition where relevant, such as block loading or two port unloading,
  - one full load alternate hold condition, if the ship is approved for alternate hold loading.
4. The shipowner / operator should select actual loading / unloading sequences, where possible, which may be port specific or typical.
5. The sequence may be prepared using the onboard loading instrument. The selected loading conditions should be built up step by step from commencement of cargo loading to reaching full deadweight capacity. Each time the loading equipment changes position to a new hold defines a step. Each step is to be documented and submitted to the class society. The printout from the loading instrument is generally acceptable. This allows the actual bending moments and shear forces to be verified and prevent the permissible values being exceeded. In addition, the local strength of each hold may need to be considered during the loading.
6. For each loading condition a summary of all steps is to be included. This summary is to highlight the essential information for each step such as:
  - How much cargo is filled in each hold during the different steps,
  - How much ballast is discharged from each ballast tank during the different steps,
  - The maximum still water bending moment and shear at the end of each step,
  - The ship's trim and draught at the end of each step.

Blank summary sheets are attached for reference for typical 5, 7 and 9 hold bulk carriers.

7. The approved typical loading/unloading sequences, may be included in the approved loading manual or take the form of an addendum prepared for purposes of complying with class society requirements. A copy of the approved typical loading/unloading sequences is to be placed onboard the ship.

**ANNEX 3**  
**NEW BULK CARRIERS**  
**GUIDANCE FOR LOADING/UNLOADING SEQUENCES**

1. UR S1A.1 requires that Bulk Carriers, Ore Carriers and Combination Carriers of 150m length and above, which are contracted for construction on or after 1st July 1998, are to be provided with an approved loading manual with typical loading sequences where the ship is loaded from commencement of cargo loading to reaching full deadweight capacity, for homogeneous conditions, relevant part loaded conditions and alternate conditions where applicable. The typical unloading sequences shall be developed paying due attention to the loading rate, the deballasting capacity and the applicable strength limitations.
2. The shipbuilder will be required to prepare and submit for approval typical loading and unloading sequences.
3. The typical loading sequences as relevant should include::
  - alternate light and heavy cargo load condition,
  - homogeneous light and heavy cargo load condition,
  - short voyage condition where the ship is loaded to maximum draught but with limited bunkers
  - multiple port loading / unloading condition,
  - deck cargo condition,
  - block loading.
4. The loading / unloading sequences may be port specific or typical.
5. The sequence is to be built up step by step from commencement of cargo loading to reaching full deadweight capacity. Each time the loading equipment changes position to a new hold defines a step. Each step is to be documented and submitted to the class society. In addition to longitudinal strength, the local strength of each hold is to be considered.
6. For each loading condition a summary of all steps is to be included. This summary is to highlight the essential information for each step such as:
  - How much cargo is filled in each hold during the different steps,
  - How much ballast is discharged from each ballast tank during the different steps,
  - The maximum still water bending moment and shear at the end of each step,
  - The ship's trim and draught at the end of each step.

END