COUNCIL OF THE EUROPEAN UNION

Brussels, 18 October 2013

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TRANS 537
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REPORT

from:	General Secretariat
to:	COREPER
No. Cion prop.:	14299/13 TRANS 504 MAR 146
Subject:	COMMISSION STAFF WORKING DOCUMENT: IMO - Joint EU submission concerning a proposal for improving the damage stability of new passenger ships (increasing the Required Subdivision Index "R")

Introduction

1. On 26 September 2013 the Commission transmitted to the Council the above mentioned Commission Staff Working Document which contains a draft submission to the first meeting of the International Maritime Organization (IMO) Subcommittee on Ship Design and Construction (SDC 1). The deadline for submitting the document, which is annexed to the this report, is 15 November 2013.

Content of the Commission Staff Working Document

2. In its document, which addresses damage stability requirements under the SOLAS Convention, the Commission proposes to examine options for an increase of the Required Subdivision Index 'R' for passenger ships. Such an increase should lead to an overall raise of the survivability of a ship in case of an accident and thus provide more safety for passengers. The Commission proposal is based on research results of EU-funded projects and is in accordance with the decision taken at the 92nd session of the IMO Maritime Safety Committee (MSC 92) to task SDC 1 with a further examination of studies and existing and new submissions.

3. At Union level, damage stability requirements are dealt with in Directive 2009/45/EC on safety rules and standards for passenger ships.[1]

Outstanding issues

4. The draft submission, which the Shipping Working Party examined and revised in its meetings on 3 and 17 October 2013, was welcomed and endorsed by a majority of delegations. However, DE, FR and IT entered a reservation against the draft submission. The three delegations fully supported a further and broader examination of improving damage stability and survivability at IMO level but considered that the studies on which the Commission bases its proposal need to be further scrutinized and, for the time being, do not contain enough proof of a compelling need for an increase of the safety level.

Conclusion

5. In the light of the above, COREPER is invited to
   - examine and, if possible, resolve the outstanding issue and
   - endorse the text of the draft submission annexed to this report, with a view to transmitting it to the International Maritime Organization before 15 November 2013.

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[1] Directive 2009/45/EC of the European Parliament and the Council of 6 May 2009 on safety rules and standards for passenger ships, OJ L 163, 25. 6. 2009, p. 1.

SUB-COMMITTEE ON SHIP DESIGN AND CONSTRUCTION
1st session
Agenda item 7

SDC 1/7/xx
date
Original: ENGLISH

REVISION OF SOLAS CHAPTER II-1 SUBDIVISION AND DAMAGE STABILITY REGULATIONS

Revision of the Required Subdivision Index 'R'

Submitted by Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, the United Kingdom and the European Commission

SUMMARY

Executive summary:	In this document it is proposed to examine Phase 1 options for **an** ~~moderate~~ increase of the Required Subdivision Index 'R' for passenger ships in accordance with the decisions made at MSC 92.
Strategic direction:	5.2
High-level action:	5.2.1
Planned output:	5.2.1.15
Action to be taken:	Paragraph **25**
Related documents:	MSC 92/6/6; MSC 92/6/7; SLF 55/INF.7; SLF 55/INF.8; SLF 55/INF.9

Introduction

1. In this document it is proposed to examine options for **an** ~~moderate~~ increase of the Required Subdivision Index 'R' (hereafter 'R') for passenger ships based on research results of EU-funded projects in accordance with the proposals made in MSC 92/6/6 and MSC 92/6/7 and the decisions made at MSC 92 (paragraph 6.19 of MSC 92/26). The examination of options entails a method for varying the level of 'R'. A proposal is made for where 'R' could be set ~~in the short term~~ with a view to achieve **an** ~~moderate~~ increase in phase 1.

Background

2. In MSC 92/6/6 a two phase approach was proposed for increasing 'R'. As a first phase a moderate increase of 'R' was proposed based on the available research results and taking into account the length of the ship, the number of persons on board and practical and operational aspects. Further to this a number of issues was identified and proposed for fuller consideration in a second phase, which could then lead to a further increase of 'R'.

3. In MSC 92/6/7 the United States commented on MSC 92/6/6 emphasizing the need for an increase of 'R' in the near term and proposing to develop proposals to increase 'R' as part of the comprehensive package of the revisions to the SOLAS chapter II-1 subdivision and damage stability regulations.

4. The MSC at its 92nd session decided to forward MSC 92/6/6 and MSC 92/6/7, together with the EMSA2 (UoS)[1] and GOALDS[2] studies to the SDC Sub-Committee for their consideration and at the same time instructed the SDC Sub-Committee to examine options for phase 1 that are technically justifiable for raising 'R' and to review other aspects deemed relevant to the issue, such as the length of the ship, the number of persons on board and practical and operational aspects, taking into account actual economic factors, and advise MSC 93 accordingly. Further to this it was decided that the FSA Experts Group would review the UoS and GOALDS studies and report back to MSC 93. During the deliberations it was pointed out that the studies had not been carried out as full FSA's and should therefore not be treated as such.

Options for an ~~moderate~~ increase of 'R'

5. With the entry into force of the SOLAS 2009 damage stability requirements the deterministic concept was replaced by a probabilistic one. While the deterministic concept imposed certain design restrictions on the designer, one of the main advantages of the SOLAS 2009 damage stability requirements is the freedom of design. This also poses no restrictions on the Risk Control Options (RCO's) a designer could implement for the improvement of the damage stability of a ship.

6. In the GOALDS study in total 34 RCO's and combinations thereof have been investigated, which were found to be cost-effective. These concerned alterations of the main dimensions of the ship (Breadth, Depth), the freeboard, watertight subdivision, extra buoyancy above the freeboard deck and combinations thereof. The proposed 'R' in the GOALDS study is based on the combination of the investigated RCO's. There may be other RCO's, which have not been investigated in the GOALDS study, but which are cost-effective, The designer is free to choose whatever option is found to be effective, dependent on the design.

A method for varying 'R'

7. The current formula for the Required Subdivision Index 'R' reads as follows:

$$R = 1 - \frac{5000}{Ls + 2{,}5N + 15225}$$

where: Ls = the subdivision length
N = N1 + 2N2
N1 = number of persons for whom lifeboats are provided
N2 = number of persons (including officers and crew) the ship is permitted to carry in excess of N1.

8. The length Ls represents the size of the ship and can be considered as a determining factor for the extent of damage in case of grounding accidents and also for the extent to which the ship can be subdivided. While the influence of the length Ls in the

[1] UoS – Study of the specific damage stability parameters of Ro-Ro passenger vessels according to SOLAS 2009 including water on deck calculation – Project no EMSA/OP/08/2009. The report and its annexes may be downloaded from http://emsa.europa.eu/implementation-tasks/ship-safety-standards/items/id/1457.html?cid=92
[2] GOAL based Damage Stability project (GOALDS); September 2009 – August 2012

formula is relatively small (maximal approximately 0.3%), it indirectly determines the number of passengers on board which is the determining factor in the formula for setting the level of 'R'.

9. The present formula makes a distinction between the number of persons for whom lifeboats are provided and the number of persons on board in excess of that. It is considered that the necessity of this distinction should be further discussed against the background of the state of the art of the present lifesaving appliances and in the light of the on-going discussions of the revision of chapter III of SOLAS.

10. In general terms the formula for 'R' is a function of Ls and N, which can be written as follows:

$$R = 1 - f(Ls, N)$$

11. The term $f(Ls, N)$ in the formula represents the non-survivability of the ship after a collision and decreases as the number of persons on board increases. The term determines the level of 'R' and therefore by influencing this term, the level of 'R' can be influenced. While this term is now only being influenced by the length (Ls) and the number of persons on board (N), a third parameter 'α' could be introduced which determines the extent to which the term should be taken into account, as follows:

$$R = 1 - [\boldsymbol{\alpha}] * f(Ls, N)$$

$$\text{where:} \quad 0 < [\boldsymbol{\alpha}] \leq 1$$

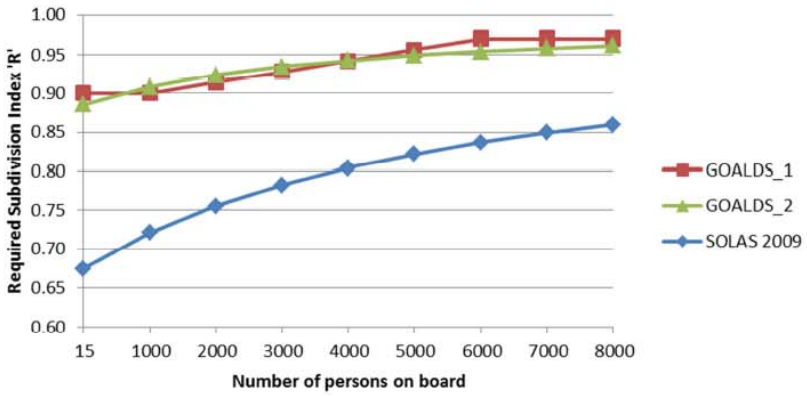
The level of 'R' can now be adjusted as needed by assigning a specific value to 'α'.
A lower value for α means a higher 'R' and therefore a higher survivability of the ship. The introduction of 'α' should be seen as a simple means for adjusting the level of 'R'.

The level to which 'R' (and α) could be set in phase 1 ~~short term (phase 1)~~

GOALDS results

12. In order to determine what the level of 'R' might involve ~~in the short term (phase 1)~~ a brief consideration of the results from the GOALDS study, which have been presented in SLF 55/INF.7, SLF 55/INF.8 and SLF 55/INF.9, is pertinent.

13. The results of the GOALDS study show that the Attained Index 'A' (hereafter 'A') could be raised significantly by implementing RCO's that were found to be cost-effective. The GOALDS study therefore concluded that the 'R' could be raised significantly. Two alternative formulations for an increased 'R' were proposed which are both presented in the figure below. Also the 'R' according to the present SOLAS 2009 regulations is shown, assuming 100% life boat capacity and a certain length of the ship corresponding to the number of persons on board.



14. The cost-benefit assessment of the RCO's on which the proposed 'R' by GOALDS is based can be found in the annex of SLF 55/INF.9. As indicated in that paper the sample ships for which the cost-benefit assessment has been carried out were provided by the shipyards involved in the project, i.e. STX-France, STX-Finland, Meyer Werft and Fincantieri, while the financial data for the design measures were provided by those shipyards and the ship operators involved in the project, i.e. RCCL, Carnival Cruise and Color Line.

15. The cost-benefit assessment has been carried out on 4 sample ships, i.e a medium sized and a large sized ropax and cruise ship. The Attained Indices have been calculated according to the proposed GOALDS formulation (for s_i) as well as to the SOLAS 2009 formulation. The assessment whether an RCO would be cost-effective, has been carried out for two risk models. In model A 100% fatalities were assumed after an accident, while in model B a fatality rate of 5% for a 'slow' sinking scenario was considered and 80% for a 'fast' sinking scenario. The ratio fast/slow sinking for cruise and ropax was assumed 18/82 and 50/50 respectively. The NCAF-value (Net Cost Averting a Fatality) of each RCO was determined, while RCO's with a NCAF value of more than $ 7.450.000 were eliminated. This value was based on that presented in the FSA guidelines (1998), which GOALDS adjusted to **the value valid for 2010** ~~present time~~.

16. The report containing the cost-benefit assessment (SLF 55/INF.9) also contains a part where 6 designs have been optimised with respect to safety (i.e. damage stability) and economic and environmental performance. These 6 designs include 2 small ropax, 1 Panamax sized cruise ship and 3 of the above mentioned sample ships (the 2 ropax and the large cruise vessel design). An important conclusion as regards safety from this part is that passenger ships, regardless of size, can be designed cost-effectively with Attained Indices of more than 0,90.

Setting a level for 'R' in the first phase

17. In setting a level for 'R' in the first phase a number of issues should be taken into account: First of all, as instructed by the MSC, practical and operational aspects should be taken into account. As an example for ropax the operational conditions may lead to limitations of the main dimensions, e.g. the maximum Breadth of the ship. For cruise vessels this could concern GM-values which would increase if an increase of the Breadth was chosen as the only RCO, leading to harsh ship motions. From these examples it is obvious that there may be operational aspects that have an effect on the extent to which 'R' can be raised.

18. Secondly the formulation for the s_i factor proposed by GOALDS differs from the one currently used in SOLAS 2009, which will lead to slightly different values for 'A'. Furthermore for the calculation of 'A' for ropax the amended s_i formulation as agreed during SLF 55 should

be used when water enters the vehicle deck, while the residual freeboard option may serve as an alternative, if so decided. This will also lead to slightly different values of 'A'.

19. Thirdly, the result of the FSA Experts Group deliberations (11 – 13 November 2013) may lead to a different appreciation of the RCO's in term of cost-efficiency. While in total 34 different RCO's have been investigated in the GOALDS study this may limit the palette of (combinations of) RCO's to be chosen from, which may reduce the extent to which the level of 'R' is proposed to be increased by the GOALDS study.

20. Finally, the GOALDS proposal for 'R' is based on the effects and cost-efficiency of the RCO's being implemented on 4 sample ships. While the results are valid for the sample ships, thereby taking into account the assumptions made, the results may be different for other designs. This may be either positive (i.e. leading to higher increases of 'A') or negative (lower increases).

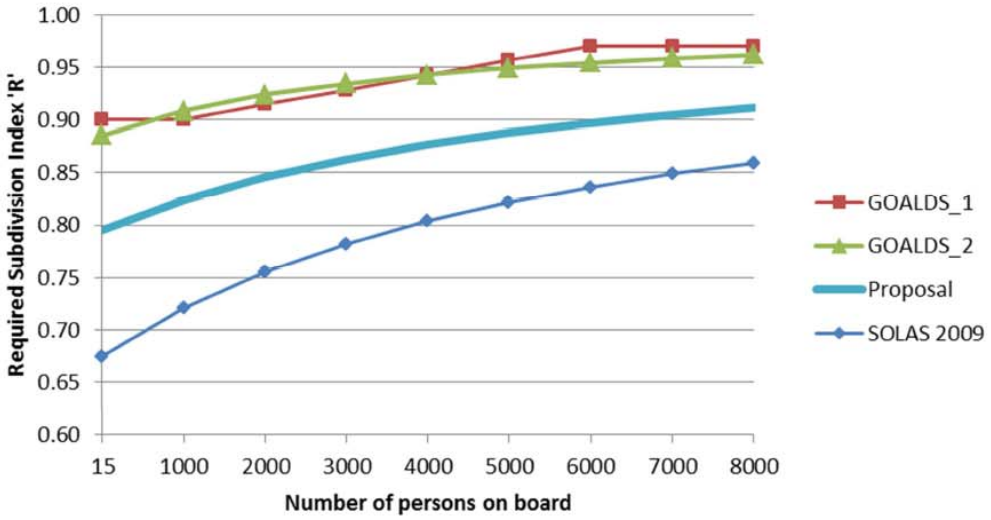
21. Therefore the increase of 'R' proposed by GOALDS may need to be reduced by the above considerations. The exact reduction will only be known after thorough examination which may take considerable time. However, it is anticipated that the above will lead to relatively small decreases of the proposed (significant) increase of 'R' by GOALDS. Furthermore, while scrutinising the GOALDS results it appears that in some cases already one single RCO leads to a larger increase than 50% of what is proposed in the study and it was also demonstrated through optimisation studies that it should be possible to design passenger ships with Attained Indices of 0.90 or more, independent of size.

22. The co-sponsors therefore firmly believe that **an** ~~moderate~~ increase of 50% of 'R' of what is proposed by GOALDS for all new passenger ships is possible, regardless of size. An increase of 'R' beyond this in Phase 2 should be based on an in-depth consideration of the above, including other issues, as deemed necessary. An increase of 50% of 'R' of what is proposed by GOALDS may be achieved by a combination of RCO's, as investigated by GOALDS. However, other RCO's, which have not yet been investigated, may also be effective, depending on the actual design and operational circumstances. For a ship carrying 1000 persons the proposed increase would mean an increase of 12% of 'R' calculated according to the present regulations; for a ship carrying 6000 persons this would mean an increase of 8%.

23. In the formula as presented in paragraph 8 an increase of 50% of the proposed increase of 'R' by GOALDS is achieved when the value of α is set at 0.63. The formula for 'R' would thus read:

$$R = 1 - [\mathbf{0.63}] * \left(\frac{5000}{Ls + 2.5N + 15225}\right)$$

and is presented in the figure below.



Proposal

24. It is proposed to:

a. Introduce a factor for varying the level of 'R' (paragraph 11) in the light of the different risk control options examined by the available research; **the designer remains free to choose whatever option is found to be effective for increasing the Attained Index 'A', dependent on the design ;** and

b. Set this factor at **[**0.63**]** in order to ~~moderately~~ increase the level of 'R' in phase 1 resulting in an approximate increase of 'R' of between 8% (large ships) to 12% (small ships) in relation to present regulations (paragraphs 22 and 23)

Action requested of the Sub-Committee

25. The Sub-Committee is invited to consider the proposals in paragraph 24 and take action, as appropriate.
