

IMO Developments on RoPax Safety

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ABSTRACT

IMO is currently reviewing the overall level of safety of ro-ro passenger ships provided by the new SOLAS 2009 probabilistic damage stability regulations. Doubts remain following recent research projects which highlighted the vulnerability of certain compliant designs to rapid capsize or sinking following straightforward damage scenarios. Until these issues are resolved, all ro-pax ships operating in EU waters must continue to comply additionally with the Stockholm Agreement. The IMO review is due for completion early in 2013 and will be heavily reliant upon the results of further research projects currently in progress. This paper gives a brief overview of the current situation.

KEYWORDS

Ro-Ro; Damage Stability; SOLAS; IMO.

INTRODUCTION

The detailed historical background leading to the re-opening of the ro-pax safety debate at IMO is by now well documented (see, for example, Scott (2010) "Damage Stability of Ro-Pax Ships with WOD" at the 11th ISSW). This paper therefore concentrates on the current situation and how it is hoped that, by early 2013, the IMO SLF sub-committee will be in a position to present any amendments found necessary to SOLAS 2009 to the Maritime Safety Committee (MSC) for approval. Some of the likely areas for change are briefly indicated.

The present SOLAS 2009 damage stability regulations make little or no distinction between ro-ro and conventional passenger ships. A considerable number of amendments to the regulations and accompanying explanatory notes were agreed at SLF 53 in January 2011 under the ongoing "SOLAS updates" agenda item which is due for completion at SLF 54 in January 2012. These changes, insofar as they will affect ro-pax ships, are described below.

SLF is dealing with ro-pax ships under a separate agenda item due for completion in 2013. In 2010 little apparent progress was made as we awaited the results of several major new research projects into ro-ro safety due to complete in 2011/12. A very brief outline of the objectives and status of these research projects is included for

information. Some of this ongoing work will no doubt be reported upon independently at this workshop.

At SLF 53 some important conceptual barriers (outlined under "Overview, below) which have so far limited our ability to correct potential deficiencies in the SOLAS 2009 regulations covering ropax safety were removed.

Of some future concern is the extent to which any proposed amendments relating to ro-pax ships will be seen by IMO members as a particularly "European" solution comparable to the Regional Agreement under SOLAS90 which allowed the Stockholm Agreement to be implemented under the aegis of IMO.

For background information a brief study is included showing the distribution of ro-pax ships by flag. It tries to show that, although for geographical and trade reasons ro-pax ships are predominantly flagged in Europe, the non-European ro-pax fleet is quite substantial. It will be argued that any corrective measures to SOLAS 2009 should ideally be applied universally rather than by means of a new Regional Agreement.

ACTIVITIES AT IMO – RO-PAX SHIPS

Overview

In 2010 the work of investigating the SOLAS 2009 regulations was largely "on hold" at IMO

pending the outcome of several major research projects due to complete in 2011 and 2012. The report of the ro-ro correspondence group to SLF 53 in January 2011 (Ref. SLF 53/10/1) therefore contained progress reports on these projects (GOALDS, EMSA(2), RP625 and FLOOD-STAND).

In addition, during the course of the SDS Correspondence Group (CG) in 2010 it was felt that the investigative briefs (Terms of Reference) were too narrow as they were restricted only to issues of water-on-deck. The EMSA(1) project in particular had found that rapid sinkage due to insufficient reserve buoyancy rather than loss of stability due to WOD could occur, particularly in LLH (long lower hold) vessels compliant with SOLAS 2009.

A request was therefore put to SLF 53 by the CG to expand the scope of the planned output of the agenda item relating to the review of the damage stability of ro-pax ships to cover any suspected safety deficiencies in SOLAS 2009. This request was agreed at SLF 53 and has been put to the Maritime Safety Committee (MSC) for approval at MSC 89 (11th – 20th May, 2011).

Another significant change agreed at SLF 53 is that we are no longer constrained to ensure that SOLAS 2009 provides an equivalent safety level to the previous SOLAS regulations. This would allow us, if found necessary, to increase the “R” factor, for example, without having to go through the regression procedure of applying any new regulations to a range of existing ships – the methodology used in the harmonisation process to try to ensure that some degree of equivalence with the previous regulations had been achieved.

Outstanding issues to be resolved

There remains a lack of certainty in some quarters over the following:

- a) whether SOLAS 2009 was intended to include a built-in allowance for WOD, that is, whether the required “equivalence” was with SOLAS90 only or with (SOLAS90 + Stockholm Agreement).
- b) whether SOLAS 2009 accounts for WOD probabilistically but its effect on the attained index “A” so small that it can be safely discounted.

c) whether SOLAS 2009 achieved equivalence with all the SOLAS subdivision and damage stability regulations (i.e. SOLAS90 Chapter II-1, Part B, Regulations 4 – 8) or only with the damage stability regulation 8. The abolition of the concept of margin line in SOLAS2009 suggested to some that equivalence only with the latter regulation has been achieved which, for ro-pax ships, may have serious safety consequences and may be a reason why sinkage, as opposed to capsize, appears to have re-emerged as a possible loss mode.

d) whether the constant terms “0.12” and “16” in the expression for $s_{final,i}$ in Regulation 7-2.3 should be changed for ro-ro ships to distinguish them from conventional passenger ships and cargo ships. Possible parameter changes other than list, residual GZ and range may need to be considered.

e) whether the Required Index, “R”, should be increased to reduce the number of permitted damage cases having $s_{final,i} = 0$. In ro-pax ships such individual cases can result in rapid loss with consequent heavy casualties and should not be too lightly dismissed.

f) whether there is sufficient awareness that at present the safety level is set on the basis that for a particular damage scenario only 50% of WOD cases will survive. “R” may need to be adjusted to increase this survival rate to a more acceptable level.

It is hoped that a satisfactory resolution of the above issues will be achieved between now and SLF 55 in January 2013.

Specific ro-pax issues under discussion in 2011

- a) One proposal on the agenda for SLF 54 to be discussed by the CG this year is to add a new regulation to try to address the concern in c) above relating to the abolition of the margin line:-

Regulation 7-2.5.2 currently states:

“In all cases “si” is to be taken as zero in those cases where the final waterline, taking into account sinkage, heel and trim, immerses:

.1 the lower edge of openings through which progressive flooding may take place and such flooding is not accounted for in the calculation of factor si. Such openings shall include air-pipes, ventilators and openings which are closed by means of weathertight doors or hatch covers; and

.2 any part of the bulkhead deck in passenger ships considered a horizontal evacuation route for compliance with chapter II-2.”

The proposal is to add another subparagraph:-

.3 for ro-ro passenger ships, when damaged above the bulkhead deck, any part of the bulkhead deck in way of the damage opening in which the residual freeboard is less than [x] metres.

The effect of this proposal on the Attained Index “A” would need to be evaluated for a number of SOLAS 2009 designs to see how significant the change would be for various values of residual freeboard, x. It could also be made more general and applied to all passenger ships with large, un-subdivided spaces near the equilibrium waterplane.

b) The closure requirement in SOLAS2009 Ch II-1 Reg. 17-1.1.2 is for vehicle ramps leading to spaces below the bulkhead deck only to be weathertight, in contrast to other openings penetrating the to be made watertight but there may be objections to this on technical or economic grounds.

Some Regulatory changes agreed at SLF 53

a) Reg 7.3 and 7.6 there is now clarification that the constant displacement method should be used in the final stage of flooding and the added weight method for intermediate stages.

b) Reg 8-1.3 Passenger ships constructed after 1st January 2014 should have either an onboard stability computer or shore-based support to supply operational information to the Master for safe return to port in the event of a flooding casualty.

c) Reg 17.3 has been clarified by stating that air pipes terminating within a superstructure shall be considered as unprotected openings. The intention of this regulation is to ensure that possible up-flooding of volumes above the car deck will be taken into account.

RESEARCH ACTIVITIES

In 2010 the work of investigating the SOLAS 2009 regulations as applied to ro-pax ships was largely “on hold” at IMO pending the outcome of new research projects. Since then RP625 (a UK-funded project undertaken by SSRC) has been

completed but the final report has not yet been released at the time of writing (May 2011). Early indications are that the project has confirmed the usefulness of Index-A as a measure of survivability and therefore as a reliable tool for comparing and highlighting inconsistencies in the safety levels provided by various sets of SOLAS regulations.

RP625 concludes that increases are needed in the subdivision index “R” as the average level of safety provided by SOLAS 2009 is below that of earlier SOLAS regulations most probably because the protection against sinkage provided by the margin line/ floodable length “criteria” has not been transmitted to SOLAS 2009.

In the EMSA(2) project, the model testing of new ro-pax designs has now been completed and the final reports are expected this summer. Preliminary findings appear to indicate that terms “0.12” and “16” in the expression for $S_{final,i}$ need to be changed and the “R” factor increased. It is believed but not yet confirmed that similar proposals will emerge from the GOALDS project. This project still has some time to run but it is thought that early recommendations will be made on the s factor to inform discussions this year at the SDS CG.

FLOODSTAND also has some time to run but has already contributed to the discussions on open watertight doors and on the provision of information to the master for safe return to port (see b) under “Some regulatory changes”, above).

WORLD RO-RO FLEET - DISTRIBUTION

The following figures show that, although the bulk of the world’s ro-pax fleet, including almost all the larger vessels, is based in Europe significant numbers do operate elsewhere which is why it is hoped that any changes needed to SOLAS 2009 for ro-pax ships will be applied universally and not by means of a regional agreement such as the Stockholm Agreement.

It is noteworthy however that few, if any, flag states outside European waters applied the Stockholm Agreement alongside SOLAS90.

IMO has been pursuing a policy through increased technical co-operation of trying to improve the safety standards of passenger vessels in regions of the world lacking the technical

infrastructure to implement and apply the usual safety regulations. It is hoped that eventually not only the SOLAS regulations themselves will be improved but the ability to implement them and enforce them worldwide will lead to a reduction in the heavy casualties still being experienced by ro-pax vessels in certain part of the world.

	Ro-Pax Fleet Size Range (dwt)					
	< 500 t	500 - 2000 t	2000 - 5000 t	5000 - 8000 t	8000 - 12000 t	> 12000 t
Europe	300	259	126	131	52	7
North America	23	42	9	1	1	0
Central America	16	14	20	16	1	0
South America	17	7	0	0	0	0
Africa	14	10	11	2	0	0
Middle East	19	8	10	0	0	0
China+Taipei	4	9	15	14	1	0
Japan	107	52	31	25	0	0
Far East	161	40	19	4	0	0
Australasia	21	5	5	2	0	0
Other	3	0	1	1	0	0

Fig. 1 Ro-Pax world fleet distributed according to region and deadweight.

CONCLUSION

This is very much an interim report on the work currently being undertaken at IMO to look again at the safety aspects of the SOLAS 2009 regulations as applied to ro-pax ships. The amount of additional research work carried out recently has been immense but the conclusions are not yet firmly established. It is hoped that everything will become clearer as the results of the latest research projects are published later this year and that the research teams will be able to provide the IMO regulators with a clear indication of the way

forward to ensure the safety of this most important class of passenger vessel.

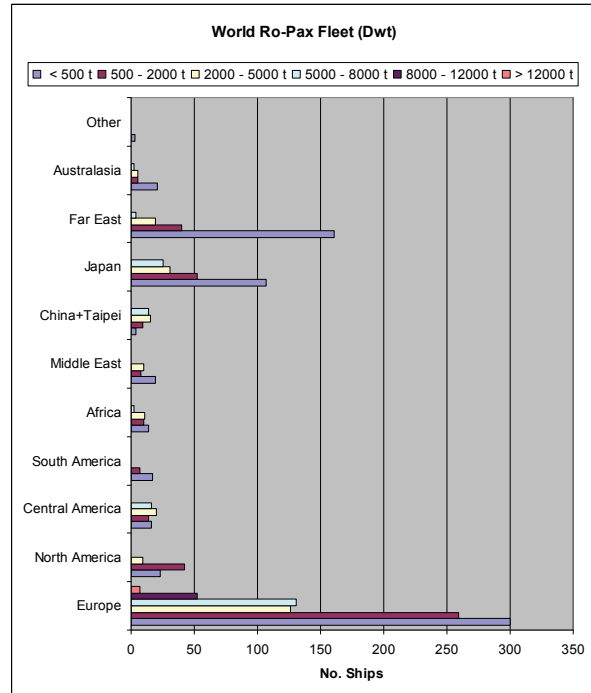


Fig. 2 Ro-Pax world fleet

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