

SUB-COMMITTEE ON SHIP DESIGN AND
CONSTRUCTION
1st session
Agenda item 11

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**DEVELOPMENT OF GUIDELINES FOR USE OF FIBRE REINFORCED
PLASTIC (FRP) WITHIN SHIP STRUCTURES**

Report of the correspondence group

Submitted by Sweden

SUMMARY

Executive summary: This document provides the report of the Correspondence Group on *Development of Guidelines for Use of Fibre Reinforced Plastic (FRP) Within Ship Structures*

Strategic direction: 5.2

High-level action: 5.2.1

Planned output: 5.2.1.23

Action to be taken: Paragraph 19

Related documents: FP 56/12, FP 56/12/1, FP 56/12/2, FP 56/INF.9, FP 56/23, paragraph 12.5 and SDC 1/INF.5

Background

1 The Sub-Committee on Fire Protection, at its fifty-sixth session, agreed to establish a Correspondence Group on *Development of Guidelines for Use of Fibre Reinforced Plastic (FRP) Within Ship Structures*, under the coordination of Sweden, in order to progress the work intersessionally. The group was instructed to take into account documents FP 56/12, FP 56/12/1, FP 56/12/2 and FP 56/INF.9 and the discussion at FP 56, and were given the following terms of reference:

- .1 determine the possible use of FRP composite structures in the light of SOLAS regulation II-2/17, having regard to regulations II-2/2.1 (Fire safety objectives), II-2/2.2 (Functional requirements) and II-2/2.3 (Achievement of the fire safety objectives);
- .2 review available fire testing results and research and methodologies with regard to FRP composite structures in ships, as well as current regulations and relevant applications of FRP composite structures;

- .3 develop draft guidelines to be used for assessment and testing of FRP structures;
- .4 discuss if any relevant new procedures and qualification criteria for fire testing and classification of FRP composite structures are required for use on SOLAS ships;
- .5 consider document FP 56/9/7 (IACS) and advise the Sub-Committee accordingly; and
- .6 submit a written report to FP 57.

General

2 Representatives from the following Member Governments participated in the group:

CHINA	NETHERLANDS
DENMARK	NORWAY
FINLAND	REPUBLIC OF KOREA
FRANCE	SWEDEN
ITALY	UNITED KINGDOM
JAPAN	UNITED STATES

and observers from the following non-governmental organizations:

INTERFERRY
INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

3 The contributions from the participants of the group were mainly focussed on the terms of reference (t.o.r) 1 and 3.

Discussion

T.o.r. 1 – To determine the possible use of FRP composite structures in the light of SOLAS regulation II-2/17, having regard to regulations II-2/2.1 (Fire safety objectives), II-2/2.2 (Functional requirements) and II-2/2.3 (Achievement of the fire safety objectives)

4 Regarding t.o.r. 1, the work within the group consisted mainly of two lengthy discussions and some short comments that could be summarized hereunder.

5 Firstly, the group made a short recollection of the discussions leading to the inclusion of regulation 17 into chapter II-2. One of the main reasons for making the comprehensive review of chapter II-2 was to introduce modern fire prevention and firefighting technology and philosophy. The intention of regulation II-2/17 is to make it possible to use an alternative design to fulfil the requirements in the present prescribed regulations, and that any requirement in chapter II-2 could be replaced by an alternative design as long as the alternative design provides at least the same level of safety, including alternative materials in the structures. However, there are some differing opinions about the intended use of regulation II-2/17, particularly, whether regulation II-2/2.2 would prevent the use of regulation II-2/17 to justify FRP in ships structures.

6 It was also mentioned that the *Guidelines on alternative design and arrangements for fire safety* (MSC/Circ.1002) includes just a procedural method to make assessments and that the ISO standard, referred to in the circular, has been revised. This highlights the fact that the knowledge about fire safety engineering is constantly increasing. It is thus more important to focus on the intention of the regulations than the exact wording.

7 The group agreed that regulation II-2/17 allows deviations from parts B, C, D, E and G and that any alternative design must meet the fire safety objectives in regulation II-2/2. There were, however, two views on how to do this.

8 One view is that the nature of the objectives is such that how they shall be achieved in a prescriptive way is determined from the regulations in parts B, C, D, E and G in chapter II-2. However, for an alternative design, the fire safety objectives should be considered met if the alternative design achieves sufficient safety, at least equivalent to a prescriptive design. Consequently, any prescriptive requirement in parts B, C, D, E and G in chapter II-2 can be deviated and the achievement of the fire safety objectives for an alternative design is determined implicitly.

9 The second view is that the objectives in part A may not be altered by the regulations in the other parts, since these are fundamental requirements of chapter II-2, and regulation II-2/17 should not be used to alter these provisions.

10 The number of participants commenting on this was very small and the group could, therefore, not reach a consensus, although a majority were in favour of the first view. The Sub-Committee could recall the discussions at FP 56 where a majority of Member States expressed a clear preference for view 1, which would allow for the use of FRP if proper justification according to regulation II-2/17 is provided, while noting that this will require a cautious and prudent approach to ensure an equivalent level of safety to that required by SOLAS chapter II-2 is achieved.

11 Another very important conclusion from the discussion is that the current prescriptive regulations assume non-combustible construction. If regulation II-2/17 is used to justify the use of combustible structure, a thorough review of chapter II-2 is required to find any prescriptive requirements affected by an alternative design that assumes non-combustible construction. A number of examples on requirements that may be affected by using combustible materials for construction were identified. These examples have been included into the proposed guidelines.

T.o.r. 2 – To review available fire testing results and research and methodologies with regard to FRP composite structures in ships

12 The group was provided with a website on the internet where participants could submit information and reports regarding the discussions including fire testing. Some contributions were made but it was pointed out that t.o.r. 1 needs to be resolved first and also that it is more efficient to discuss this when the draft guidelines has been further developed.

T.o.r. 3 – To develop draft guidelines to be used for assessment and testing of FRP structures

13 The discussions about the guidelines were based on the proposed format for the draft guidelines submitted in document FP 56/12. The discussions were limited and one member even proposed that the issue in t.o.r. 1 should be resolved first before further discussions. However, some changes to the draft guidelines were proposed and supported within the group. An updated version of the draft guidelines based on these proposals has

been developed. This has been sent to the Sub-Committee as an information document (SDC 1/INF.5) since the updated version has not been discussed and agreed in detail by the group due to the shortened available time. The Sub-Committee needs to decide on how to progress with the work with the draft guidelines.

T.o.r. 4 – To discuss if any relevant new procedures and qualification criteria for fire testing and classification of FRP composite structures are required

14 This has not been discussed due to background described under t.o.r. 1.

T.o.r. 5 – Consider document FP 56/9/7 (IACS)

15 No input was submitted to the group by the participants.

Further discussions

16 Considering that some participants of the group questioned the use of FRP, that examples were asked for and that an approval for an entire ship is a very large and somewhat difficult task, it would, therefore, be beneficial to gain and collect experience about the use of FRP. The group, therefore, proposes that the scope of the draft guidelines shall be broadened, to not only cover the use of FRP in structures but also other uses of FRP on board ships. This would facilitate the approval process of FRP used in restricted applications on ships. These more restricted alternative designs are easier to evaluate and could provide important information when evaluating a whole ship structure in FRP.

17 The group also proposes to extend the target completion year for this agenda item with one year due to the significant magnitude of these issues and the fact that the date of SDC 1 was changed with short notice. That affected the work within the group and it could also make it possible to adapt the proposed guidelines to incorporate more general use of FRP to gain experience.

18 Finally, more work is required on this item, especially with regards to the draft guidelines. This is partly due to the fact that the fundamental question in t.o.r. 1 has not been finally agreed. If the Sub-Committee could come to a conclusion about this, the work could continue with the draft guidelines. The Sub-Committee also needs to decide how to proceed with the work and whether a new correspondence group may be established.

Action requested of the Sub-Committee

19 The Sub-Committee is invited to note the outcome of the group in general, take action as appropriate, and in particular, to:

- .1 note the discussions regarding the use of FRP in ship structures with regard to SOLAS regulations II-2/2 and II-2/17;
- .2 decide whether the outcome of the discussions in the group in combination with the discussions at FP 56 are enough to allow the use of FRP if properly justified according to regulation II-2/17;
- .3 note the progress of the proposed guidelines as contained in SDC 1/INF.5, in particular the discussion about which current regulations that implies non-combustible structure;

- .4 consider the proposal to extend the target completion year for this agenda item with one year;
 - .5 consider the proposal to extend the scope of the draft guidelines to not only cover FRP in structures but also other use of FRP on board ships; and
 - .6 consider whether the work with this shall continue in a correspondence group.
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