Local Vessels Advisory Committee

Passenger Seats

Purpose

This paper sets out two proposals of the Marine Department (MD) on passenger seats.

Standard on the attachment of passenger seats

Background

2. Under section 3.5, Chapter V of the Code of Practice – Safety Standards for Class I, II and III Vessels (CoP), the form, design and attachments to the deck of passenger seats should be adequate for the intended service. The seating construction and safety belts on vessels of the type stated in section 4.2, Chapter I should comply with the relevant requirements specified in Chapter XI of the CoP.

3. It was recommended in the Report of the Commission of Inquiry into the Collision of Vessels near Lamma Island on 1 October 2012 that the CoP should be amended to provide for an empirical value or standard against which the attachment of seats to the deck is to be judged, which value or standard should take into consideration their loading not only during a normal voyage but must also cater to excessive stern trim in the course of a marine casualty.

Proposed standard on the attachment of passenger seats

4. MD proposes that every fixed passenger seat on board, except high-speed craft, shall be able to withstand a tensile force no less than 2 250N. Under such a strength requirement, there is no restriction on the means of attachment of passenger seats. It is acceptable for

passenger seats to be attached with the use of through-bolts, electro-welding or the installation of fixed tracks. Passenger seats on high-speed craft shall still follow the attachment requirements set out in the International Code of Safety for High-speed Craft.

5.   MD will accept any one of the following as proof that fixed passenger seats are able to withstand a tensile force no less than 2 250 newtons (N) –

      (a)   Type approval certificate issued by an authorized organization;
      (b)   A tensile force test as verified by MD; or
      (c)   Compliance with the strength calculation below.

Strength calculation

6.   The <u>screw size</u> of fixed passenger seats shall be no less than the value calculated in accordance with the formula below (See **Annex** for examples) –

$$S.A = \frac{16{,}500 * no.\,of\,seat}{\sigma * no.\,of\,bolt}$$

      S.A.   Screw shank area (mm^2)
      σ Yield strength
            (e.g. normal screws made of steel or aluminium alloy = 240 N/mm^2; and SS316 screws made of stainless steel = 340 N/mm^2)

7.   If passenger seats are attached to a wooden deck, in addition to the requirement set out in paragraph 6 above, the specific gravity of the wooden deck shall be no less than 0.7 and the <u>screw length</u> shall be no less than the value calculated in accordance with the formula below (See **Annex** for examples) –

$$L = \frac{73}{D}$$

L   Screw length (mm)

D   Screw diameter (mm)

8.   The formulae for strength calculation are based on the mechanics of materials. With an appropriate safety factor, the screw diameter and length to be used are deduced from the maximum shear force and tensile force applied to the screws of a seat on board during collision when the vessel is navigating at its maximum permitted speed.

9.   Forces applied in the aft direction of the seat shall be applied horizontally to the seat back 800 mm above the seat bottom (as illustrated in Figure 1). Forces applied in the transverse seat direction shall be applied horizontally to the seat bottom. If a seating unit consists of more than one seating position, the pushing force shall be applied at each seating position concurrently.

10.   The safety factor of the above formulae is 1.5.

11.   If bolts and nuts are used to pass through aluminium, steel or glass-reinforced-plastic deck for securing the passenger seat, the deck shall remain watertight.

Figure 1

Passenger seat

2.25kN

800 mm

350 mm

350 mm
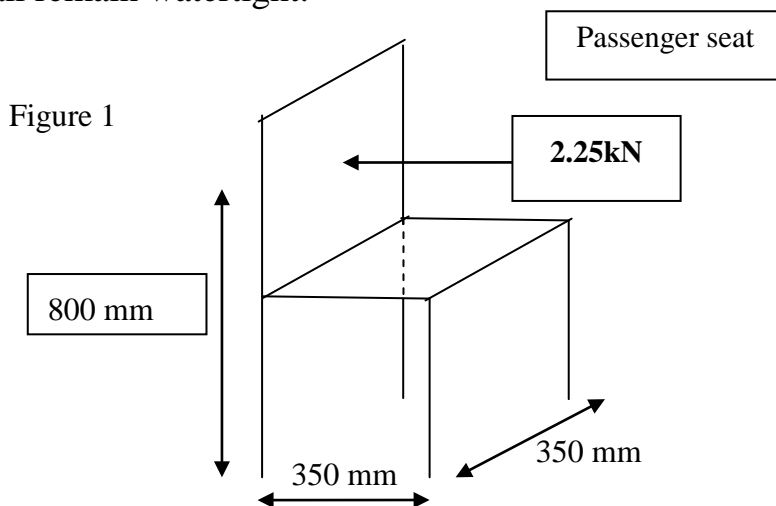
Inspection

12.   MD's ship inspection officers will conduct inspections during the annual survey on whether the fixed passenger seats on board meet the standard set out in paragraph 4 above. Such inspections may include visual inspection, spot check, seat pushing force test, screw yield strength

test, non-destructive test, etc. The seats and their attachment parts may be disassembled for inspection when necessary.

Non-fixed passenger seats

Background

13. Under section 3, Chapter V of the CoP, the maximum passenger capacity for any ferry vessel or launch should be equal to the number of fixed passenger seats provided on board[1]. MD has kept receiving views from passengers, the industry and members of the Islands District Council that under certain circumstances non-fixed seats should be allowed on ferry vessels for the flexible provision of space.

Proposal on non-fixed passenger seats

14. Taking into account public views, site-visit observation and assessment of passenger safety, MD considers that ferry vessels and launches that meet certain requirements could provide a platform stable enough for non-fixed passenger seats, and that would have no significant impact on the safety of passengers on board. MD also notes that passenger vessels in the United Kingdom, the United States of America, Australia and New Zealand are allowed to be equipped with non-fixed passenger seats.

15. MD proposes that a ferry vessel or launch which meets the conditions below may be allowed to take into account the number of non-fixed passenger seats on board in calculating their maximum passenger capacity on a case-by-case basis –

> (a) The maximum design speed for the vessel shall be 15 knots or less;
>
> (b) The vessel shall have a length overall of 55 metres or more and a full-load displacement of 650 tonnes or more;

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[1] For pre-2 January 2007 ferry vessels and launches, the maximum number of passengers on each deck (except the main/sunken deck) should be subject to the condition that every passenger is provided with a fixed seat.

(c) Every non-fixed passenger seat shall be a single-person seat;

(d) Each non-fixed passenger seat shall weigh no more than 6 kilogrammes;

(e) The seating arrangement of non-fixed passenger seats shall be in accordance with Annex G of the CoP (except for the requirement in Annex G that seats must be attached);

(f) Sufficient handrails shall be provided in areas where non-fixed passenger seats are placed;

(g) Effective measures are in place to prevent non-fixed passenger seats from blocking the routes of escape; and

(h) If the vessel plies outside the Victoria port, it shall meet the requirement of damage stability for two-compartment flooding.

Sub-committee on Survey Work of Local Vessels

16.   The Sub-committee on Survey Work of Local Vessels discussed the proposed standard on attachment of passenger seats above at its meetings on 26 June and 29 August 2014, and submits it to this Committee for discussion.

17.   The Sub-committee on Survey Work of Local Vessels discussed the above proposal on non-fixed passenger seats at its meetings on 22 May and 26 June 2014, submits it to this Committee for discussion.

Way Forward

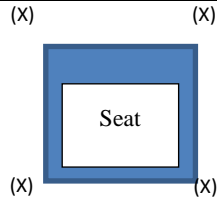18.   Subject to Members' comments, MD will amend the CoP to implement the above two proposals.

Advice Sought

19.   Members are invited to comment on this paper.

Marine Department
September 2014

Calculation of screw size and screw length

Example 1: A 1-seater secured by 4 screws made of steel

(X): Screw position

$$S.A = \frac{16{,}500 * 1}{240 * 4}$$

$= 17.2$ mm^2 Conclusion: If ISO 4.6 Class screws are used, its minimum shank area should be ≥ 17.2 mm^2

For M4 screws:
Its nominal shank area $= 12.6$ mm$^2 < 17.2$ mm^2 (standard not met)
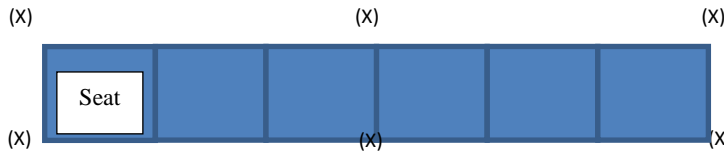
For M5 screws:
Its nominal shank area $= 19.6$ mm$^2 \geq 17.2$ mm^2 (standard met)

If passenger seats are attached to a wooden <u>deck</u>, the minimum screw length should be:

$$L = \frac{73}{5}$$

$= 15$mm

Example 2: A 6-seater secured by 6 screws made of stainless steel

(X): Screw position

$$S.A = \frac{16{,}500 * 6}{340 * 6}$$

$= 48.5$ mm^2 Conclusion: If stainless steel SS316 screws are used, its minimum shank area is 48.5 mm^2

For M8 screws:
Its nominal shank area:
$A_n = (8/2)^2 \times \pi = 50.3$ mm$^2 \geq 48.5$ mm^2 (standard met)