No. 14 Hatch cover securing and tightness

(1986) (Rev 1 1996) (Corr.1 June 2000) (Rev.2 July 2005) (Corr.1 Oct 2005)

1. Application

1.1 The following recommendations apply to steel hatch covers that are fitted to hatch openings on weather decks.

1.2 These recommendations, when relevant, also apply to the non-weathertight hatch covers which are accepted on container ships in accordance with the UI LL 64.

1.3 Where large relative movements between cover and ship structure or between cover elements are expected for ships having comparatively long/wide hatch ways, the application of these arrangements specified in this Recommendation for the gasket and securing arrangements are to be specially considered.

2. Design and Weathertightness

2.1 General

2.1.1 The weight of covers and any cargo stowed thereon, together with inertial forces generated by ship motions, are to be transmitted to the ship structure through suitable contact, such as continuous steel to steel contact of the cover skirt plate with the ship's structure or by means of defined bearing pads.

2.2 Weathertight Hatch Covers

2.2.1 The arrangement of weathertight hatch covers is to be such that weathertightness can be maintained in all sea conditions.

2.2.2 Weathertight sealings are to be obtained by a continuous gasket of relatively soft elastic material compressed to achieve the necessary weathertightness. Similar sealing is to be arranged between cross-joint elements. Where fitted, compression flat bars or angles are to be well rounded where in contact with the gasket and are to be made of a corrosion-resistant material.

2.2.3 The gasket material is to be of a quality suitable for all environmental conditions likely to be experienced by the ship, and is to be compatible with the cargoes carried. The material and form of gasket selected is to be considered in conjunction with the type of cover, the securing arrangement and the expected relative movement between cover and ship structure. The gasket is to be effectively secured to the cover.

3. Drainage Arrangement

3.1 General

3.1.1 Drain openings are to be arranged at the ends of drain channels and are to be provided with effective means for preventing ingress of water from outside, such as non-return valves or equivalent.

3.2 Weathertight Hatch Covers

3.2.1 Drainage is to be arranged inside the line of gasket by means of a gutter bar or vertical extension of the hatch side and end coaming.

3.2.2 Cross-joints of multi-panel covers are to be arranged with drainage of water from the space above the gasket and a drainage channel below the gasket.

3.2.3 If a continuous outer steel contact between cover and ship structure is arranged, drainage from the space between the steel contact and the gasket is also to be provided.

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4. Securing Devices

4.1 General

4.1.1 Devices used to secure hatch covers, i.e. bolts, wedges or similar, are to be suitably spaced along the coamings and between cover elements.

4.1.2 The minimum gross sectional area of each securing device is not to be less than:

$$A = \frac{1{,}4\,\overline{a}}{f} \quad (cm^2)$$

where

$\overline{a}$ = half the distance between the two adjacent securing devices, measured along hatch cover periphery, see Fig. 1 [m]

$f = (\sigma_F/235)^m$

σ_F = minimum upper yield stress of the material, not to be taken greater than 70% of the ultimate tensile strength [N/mm^2]

m = 0,75 for $\sigma_F > 235$ N/mm^2
= 1,00 for $\sigma_F \leq 235$ N/mm^2

Where the packing line pressure (see 4.2.2) exceeds 5 N/mm, the cross-sectional area of the securing devices is to be increased in direct proportion.

Rods or bolts are to have a minimum gross diameter not less than 19 mm for hatchways exceeding 5 m^2 in area.

4.1.3 Securing devices are to be of reliable construction and securely attached to the hatchway coamings, decks or covers. Individual securing devices on each cover are to have approximately the same stiffness characteristics.

4.1.4 Where rod cleats are fitted, resilient washers or cushions are to be incorporated.

4.1.5 Where hydraulic cleating is adopted, a positive means is to be provided to ensure that it remains mechanically locked in the closed position in the event of failure of the hydraulic system.

4.2 Weathertight Hatch Covers

4.2.1 Arrangement and spacing of securing devices are to be determined with due attention to the effectiveness for weathertightness, depending upon the type and the size of the hatch cover, as well as on the stiffness of the cover edges between the securing devices.

4.2.2 Between cover and coaming and at cross-joints, a packing line pressure sufficient to obtain weathertightness is to be maintained by the securing devices. The packing line pressure is to be specified.

4.2.3 The cover edge stiffness is to be sufficient to maintain adequate sealing pressure between securing devices. The gross moment of inertia of edge elements is not to be less than:

$I = 6\,pa^4$ [cm^4]

where
p = packing line pressure, with $p \geq 5$ [N/mm]

a = maximum of the distances, a_i, between two consecutive securing devices, measured along the hatch cover periphery (see Fig. 1), not to be taken as less than 2.5 a_c, [m]

a_c : max ($a_{1.1}$, $a_{1.2}$) [m]

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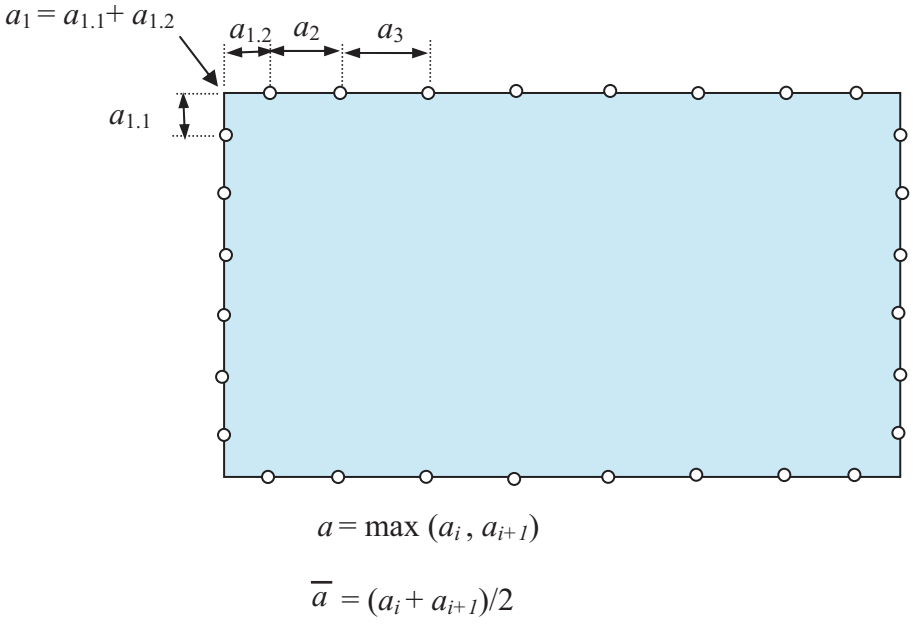

Fig. 1 Distance between securing devices, measured along hatch cover periphery

When calculating the actual gross moment of inertia of the edge element, the effective breadth of the attached plating of the hatch cover, in m, is to be taken equal to the lesser of the following values:

- 0,165 a
- half the distance between the edge element and the adjacent primary member

4.2.4 The angle section or equivalent section bearing the rubber seal is to be of adequate size and well integrated with the cover edge element structure to ensure uniform sealing pressure all along the line of contact

5. Securing Arrangement for Hatch Covers carrying Deck Cargo

5.1 In addition to the recommendations given in 4, all hatch covers, especially those carrying deck cargo are to be effectively secured against horizontal shifting due to the horizontal forces arising from ship motions.

5.2 To prevent damage to hatch covers and ship structure, the location of stoppers is to be compatible with the relative movements between hatch covers and ship structure. The number should be as small as practically possible.

5.3 Considerations are to be given for assessment of cargo loads that towards the end of the ship vertical acceleration forces may exceed the gravity force. The resulting lifting forces must be considered when dimensioning the securing devices according to 4. Also lifting forces from cargo secured on the hatch cover during rolling are to be taken into account.

5.4 Hatch coamings and supporting structure are to be adequately stiffened to accommodate the loading from hatch covers.

5.5 At cross-joints of multi-panel covers vertical guides (male/female) are to be fitted to prevent excessive relative vertical deflections between loaded/unloaded panels.

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5.6 In the absence of hatch cover lifting under loads arising from the ship's rolling motion, securing devices for non-weathertight hatch covers may be omitted. In such cases, it is to be proven by means of grillage and/or finite element analyses that an equilibrium condition is achieved using compression-only boundary elements for the vertical hatch cover supports. If securing devices are omitted, transverse cover guides are to be effective up to a height h_E above the hatch cover supports, where h_E must not be less than:

h_E = $1{,}75(2se + d^2)^{0.5} - 0{,}75d$ [mm]
$h_{E,min}$ = height of the cover edge plate +150 [mm]

where

e = largest distance from the inner edges of the transverse cover guides to the ends of the cover edge plate [mm]
s = total clearance within the transverse cover guide, with $10 \le s \le 40$ [mm]
d = distance between upper edge of transverse stopper and hatch cover supports [mm]

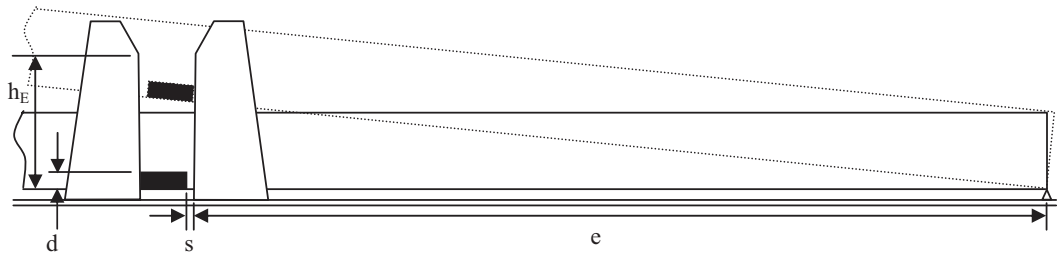

Fig. 2 Height of transverse cover guides

The transverse cover guides and their substructure are to be dimensioned in accordance with the transverse loads acting at a height h_E and an allowable stress defined by each Classification Society.

6. Tightness Testing of Weathertight Hatch Covers

6.1 Upon completion of installation of hatch covers, a chalk test is to be carried out.

6.2 This is to be followed by a hose test with a pressure of water not less than 200 kN/m^2.

The following may be assumed for guidance:

Nozzle diameter :	minimum 12 mm
Water pressure :	sufficient for a free height of water with the stream directed upwards of 10 meters maximum
Distance to structure :	maximum 1,5 meters

6.3 Alternative methods of tightness testing will be considered.

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7. Operation Test

7.1 All hatch covers are to be operationally tested.

8. Operation and Maintenance

8.1 It is recommended that ships with steel hatch covers are supplied with an operation and maintenance manual including:

- Operating and closing instructions
- Maintenance requirements for packings, securing devices and operating items
- Cleaning instructions for the drainage system
- Corrosion prevention instructions
- List of spare parts.