

RULES FOR CLASSIFICATION

Yachts

Edition October 2016

Part 3 Hull

Chapter 9 Opening and closing appliances

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FOREWORD

DNV GL rules for classification contain procedural and technical requirements related to obtaining and retaining a class certificate. The rules represent all requirements adopted by the Society as basis for classification.

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CURRENT – CHANGES

This document supersedes the December 2015 edition.

Changes in this document are highlighted in red colour. However, if the changes involve a whole chapter, section or sub-section, normally only the title will be in red colour.

Main changes October 2016, entering into force as from date of publication

- **Sec.1 General**
 - **Sec.1 [2]:** New paragraph structure.
 - **Sec.1 [3]:** New paragraph structure.

Editorial corrections

In addition to the above stated changes, editorial corrections may have been made.

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SECTION 1 GENERAL

1 Application

In this chapter the requirements for the arrangement of openings and closing appliances have been collected. Yachts will be assigned class only after it has been demonstrated that the closing condition, subdivision, buoyancy and intact stability is adequate for the service intended.

2 Procedural requirements

2.1 Documentation requirements for design assessment of vessel

2.1.1 For general requirements to documentation, including full definition of the info codes, see [SHIP Pt.1 Ch.3 Sec.2](#).

For a full definition of the documentation types, see [SHIP Pt.1 Ch.3 Sec.3](#).

2.1.2 Documentation as specified in [Table 1](#) below shall be submitted.

Table 1 Documentation requirements - design assessment of vessel

<i>Object</i>	<i>Documentation type</i>	<i>Additional description</i>	<i>Info</i>
External manhole covers	Z030 – Arrangement plan	External manholes and their covers.	FI
Underwaterlights and cameras	Z030 – Arrangement plan	Underwaterlights and cameras showing that the appliances do not interfere with structural members and distance below the waterline.	FI
	C030 – Detailed drawing	Typical details of hull installation including welding details. Appliance details may also be covered by type approval.	AP
AP = For approval; FI = For information ACO = As carried out; L = Local handling; R = On request; TA = Covered by type approval; VS = Vessel specific			

3 Definitions

3.1 General application

The measures for achieving weather tight integrity shall comply with the International Convention on Load Lines 1966, as amended.

3.2 Initial load line survey report

A report (relevant DNV GL Form) showing all openings, cut-outs, passages, etc. in deck and shell "as built", will be established by the surveyor.

Note:

For yachts that are required to comply with the International Convention on Load Lines 1966, as amended, or respective equivalent arrangements, Form 44.401a applies from $L_{LL} \geq 24$ m.

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3.3 Terms

3.3.1 Watertight

Watertight in relation to a structural element means the capability of preventing the passage of water through the structure in any direction under the head of water likely to occur in any intact or damaged condition; or – if applicable – under the head of water for which the surrounding structure is designed.

3.3.2 Weathertight

Weathertight means that water will not penetrate into the yacht in any sea conditions.

3.3.3 Sprayproof

Sprayproof is, defined as weathertight with allowance of minor seepage during hose testing. The permissible amount is 0.5 litres of water within 3 minutes.

3.3.4 No unauthorized opening

If appliances that may not be opened unauthorised are accessible during the voyage, they shall be fitted with a device which prevents unauthorized opening.

3.3.5 Positions

The positions for the arrangement of hatches, doors, ventilators are defined as follows:

Pos. 1:

- on exposed freeboard decks
- on raised quarter decks
- on exposed superstructure decks within the forward quarter of L_{LL}

Pos. 2:

- on exposed superstructure decks aft of the forward quarter of L_{LL}
- on exposed superstructure decks within the forward quarter of L_{LL} and located at least two standard superstructure heights above the freeboard deck.

SECTION 2 REQUIREMENTS FOR OPENINGS AND CLOSING APPLIANCES IN HULL, DECK, COCKPIT AND SUPERSTRUCTURES

1 Decks

1.1

Coaming heights for deck openings leading below the freeboard deck, to enclosed superstructures or to spaces considered buoyant in the stability calculation are in general to be in accordance with ICLL, as far as reasonable and practicable.

1.2

Where applicable, sill or coaming heights shall comply with national administration requirements.

2 Doors, hatches and ventilators

2.1 General requirements

2.1.1 Doors, hatches and ventilation ducts including their covers, lock tumblers and securing arrangements shall be adequately dimensioned for their purpose and local design loads. Details are to be submitted for approval.

2.1.2 All doors and escape hatches shall be operable from both sides, see also [Pt.4 Ch.11](#). In addition, emergency exit hatches to open deck shall be designed such that the maximum force needed to open the hatch cover does not exceed 150 N. Acceptable measures to achieve this requirement are the use of spring equalizing, counterbalance or other suitable device on the hinge side to reduce the force.

2.1.3 For weathertight doors on yachts, ISO 14884 and ISO 6042 are considered as guidance. For weathertight hatches, ISO 5779 may be applied.

2.2 Ventilators

2.2.1 General

2.2.1.1 The thickness of the coaming plates shall be 7.5 mm where the clear opening sectional area of the ventilator coaming is 300 cm² or less, and 10 mm where the clear opening sectional area exceeds 1 600 cm². Intermediate values are to be determined by direct interpolation. A thickness of 6 mm will generally be considered sufficient within not permanently closed structures.

2.2.1.2 The thickness of ventilator posts shall be at least equal to the thickness of coaming as per [\[2.2.1.1\]](#).

2.2.1.3 Generally the coamings and posts shall pass through the deck and shall be welded to the plating from above and below.

2.2.2 Closing appliances for ventilators

2.2.2.1 Inlet and exhaust openings of ventilation systems shall be provided with easily accessible closing appliances, which can be closed weather tight against wash of the sea. These appliances shall be stowed easily accessible in the vicinity of the opening, the location of which should be recorded in available documentation on board, such as the fire control and safety plan.

2.2.2.2 The measures necessary for fire protection are defined in [Pt.4 Ch.11](#).

3 Hull

3.1 General requirements

3.1.1 Openings in the hull shall comply SOLAS Regulation II-1/15-1 *External openings in cargo ships*. Requirements for shell doors are outlined in [Ch.8 Sec.3](#).

3.1.2 All openings, cut-outs, passages, etc. in the shell shall be lockable , so that no water can enter inside the yacht. This does not apply to cockpit drain pipes, if any.

3.1.3 Regarding inlet and outlet fittings on the shell for the cooling and bilge water as well as sewage lines, see [Pt.4 Ch.6](#).

3.2 Doors in watertight bulkheads

3.2.1 Yachts complying with the requirements for commercial service and that are intended to carry the corresponding certificates, shall be equipped with watertight doors complying with SOLAS II-1 Reg. 13. For yachts below 500 GT or for infrequently used openings, approved hinged doors with acoustic and visual alarm locally and on the bridge may be provided as appropriate for the relevant national requirements.

3.3 Underwater lights

3.3.1 Hull openings such as underwater lights and –cameras shall maintain the watertight integrity of the hull. The arrangement shall show that no structural parts such as frames and stringers are impaired by any of the appliances. The minimum distance of the appliance below the waterline as specified by the manufacturer shall be maintained while in use.

3.3.2 Unless protected by a cofferdam with type approved cable penetration, the appliance may only be accepted if it is covered by type approval certification. The installation details including welding require approval regardless of type approval certification.

4 Requirements for tightness and coaming heights

The general requirements, which shall be applied as a minimum, are summarized in [Table 1](#). The relevant coaming heights are defined in [Table 2](#).

Table 1 Requirements for openings and closures

<i>Closure components</i>		<i>Requirements</i>	
		<i>Range of service</i>	
		<i>R0, R1, R3</i>	<i>RE</i>
Shell openings		Watertight ¹ and no unauthorized opening	
External hatches		Weathertight ²	Sprayproof and weathertight for heeling
Doors to enclosed spaces and accesses	Pos.1 and 2	Weathertight	
	All others	Sprayproof	
Ventilation ducts for accommodation		Weathertight	Sprayproof and weathertight for heeling
Ventilation ducts for machinery spaces		Weathertight ³	
Air pipes		Weathertight	Sprayproof and weathertight for heeling
1) Weathertight, if situated above the freeboard deck. 2) Watertight for flush deck hatches, pressure testing in surveyor's presence required. Where the hatch does not protect access below (e.g. cockpit lockers), weathertight is sufficient. 3) It should be noted that this applies only where the machinery space does not need constant ventilation as secondary propulsion. Where the engine is the primary propulsion, coaming height requirements of ICLL for ventilators without closing appliances apply. Equivalent solutions may be specially considered.			

Table 2 Minimum coaming heights for sailing and motor yachts in mm

Closure components	Requirements				
	Position 1	Position 2	No direct access leading below	Normally closed at sea (regardless of position)	Shallow water RE
Shell openings (side scuttles and windows)	500 above waterline				50
Shell openings (shell doors ⁴)	600 ³ above waterline				50
Deck hatches	600	450	Flush	Flush	50 ²
Cockpit hatches	--	--	--	Flush	Flush
Sliding covers/companionways (normally closed at sea)	300	300	Flush	300	50
Door and accesses to enclosed spaces	600 ⁵	380	150	150	50
Ventilation ducts for accommodation	900	760	150	--	150
Ventilation ducts for machinery spaces	900	760	760	--	760
	4 500 ¹	2 300 ¹			
1) Height without weathertight covers.					
2) When used at sea. When closed at sea: flush.					
3) 230 mm of which for the external opening, the remaining 370 mm may be added by an internal sill in the adjoining watertight boundaries.					
4) Shell doors see Ch.8 Sec.3 .					
5) If access is provided from above, 380 mm is sufficient.					

5 Windows, skylights and side scuttles

5.1 Windows and sidescuttles

5.1.1 Closure condition

In any case, window and sidescuttle appliances opening into enclosed spaces (below freeboard/bulkhead deck and enclosed superstructures as defined by ICLL 66) shall be watertight and adequately dimensioned for the intended range of service. Windows are defined in international standards as weathertight appliances; and require additional measures to achieve the same safety level as (watertight) sidescuttles in accordance with ISO 1751. Due consideration shall be given to improving the frame and deadlight for equivalence with ISO 1751.

Note:

The respective ISO-Standards (e.g. ISO 1751, ISO 3903, ISO 21005 and ISO 11336-1) shall be considered as guidance and considered sufficient for achieving the minimum safety level. Design pressures shall be calculated in accordance with ISO 11336-1 as a minimum, if these regulations do not require higher pressures. National regulations may require the pressures to be calculated in accordance with classification rules for seagoing ships in addition.

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5.1.2 Windows and sidescuttles in the hull

Windows and sidescuttles (round or oval openings with an area not exceeding 0.16 m^2 , round or oval openings having areas exceeding 0.16 m^2 shall be treated as windows) in the hull which can be opened shall be kept closed when at sea. Unauthorised opening shall be prohibited. The bottom edge of windows and sidescuttles in the hull shall be at least 500 mm above the flotation plane. Windows and sidescuttles in the hull are not permitted in machinery spaces. The provision of open-able windows and sidescuttles may be restricted by damage stability calculations. Windows in the hull, where permitted, shall be provided with laminated safety glass.

5.1.3 Deadlights and storm covers

Deadlights shall be carried on board for all windows in the hull in accordance with the ICLL regulations as amended or where required from stability point of view.

Windows and side scuttles in direct boundaries to enclosed spaces, shall in general be provided with permanently attached deadlights, unless portable deadlights are permitted by national regulations.

Special constructions with equivalent safety standards may be used on request and after special examination/testing and with the consent of the competent flag state administration.

5.1.4 Window panes

Window panes shall preferably be made of toughened, tempered safety glass, laminated *safety* glass and polymethylmethacrylate (PMMA). Where chemically toughened glass is used it shall be of the laminated type; the exposed surfaces shall have at least $30 \text{ }\mu\text{m}$ toughening depth or the glass is proven by testing according to EN 1288-3.

Machinery space windows panes in the deckhouses shall be of toughened/tempered safety glass, unless an external deadlight is provided, which can be operated in an easy way.

Plastic panes shall be UV-stabilized, in addition scratch resistance is recommended.

Mixed laminates are not allowed in external locations.

5.1.5 Window framing

Panes of PMMA or PC sheet material shall be fixed by frames. They may also be bolted, provided the bolting is capable of resisting the stresses arising and guarantees lasting watertightness. The bearing width of the glass shall be 3% of whichever is the shortest side of the pane, but at least 20 mm.

Designs offering equivalent safety may be permitted. The strength shall be proven by tests and/or calculation.

Note:

If the glazing is installed by bonding, the design will be specially considered. Only type approved elastomeric adhesives by the Society for that purpose will be accepted. The personnel shall be certified for bonding installations, the certification of which shall be presented to the Society for consideration and acceptance. Quality documentation of the bonding process shall be made available for inspection by our attending surveyor upon request. The bonding area shall be UV protected by means of a black border on the glass and UV resistant sealant.

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5.1.6 Glass thickness

The window glass thickness shall be determined in accordance with the respective ISO and DIN standards or with equivalent regulations.

5.2 Skylights

5.2.1 All skylights shall be of efficient weathertight construction and shall be located on or as near to the centreline of the yacht as practicable. If they are of the opening type they shall be provided with efficient means whereby they can be secured in the closed position.

5.2.2 Skylights made of glass material shall be adequately protected, walkable glass panes are to be designed with at least 2 glass panes as load bearing laminate and 1 additional pane on top as protective layer. The minimum thickness for the protective layer is 4 mm. Acceptable glass material for walkable glass panes is chemically toughened glass or annealed glass. For annealed glass, due consideration shall be given to the reduced strength compared to thermally toughened and chemically toughened glass, which shall be accounted for in glass thickness calculations.

5.2.3 Skylights which are provided as a means of escape shall be operable from both sides. An escape skylight shall be readily identified and easy and safe to use, having due regard to its position and access to and from the skylight.

5.2.4 For glass and framing of skylights see [5.1.4], [5.1.5] and [5.1.6]. A minimum of one portable cover for each size of glazed opening should be provided, which can be accessed rapidly and efficiently secured in the event of a breakage of the skylight.

5.2.5 Skylights shall not be fitted in way of the machinery space.

6 Cockpit

Especially for sailing yachts a cockpit may be provided. Its lay-out has to follow the following criteria.

6.1 Structure

The cockpit floor plus longitudinal and transverse walls shall be considered as primary structural members, the scantlings of which shall be in accordance with the requirements of Ch.4.

Cockpits shall be watertight to the inside of the yacht.

6.2 Closure condition

Regarding closures and coaming heights of hatches and doors of adjoining storage and living spaces, see [4]. and [5].

6.3 Cockpit floor

The cockpit floor shall be sufficiently high above the flotation plane so that water that has entered may be drained immediately through drain pipes or clearing ports under all foreseeable states of heel and trim of the yacht.

6.4 Drain pipes

6.4.1 Cross section

Each cockpit shall be provided with at least one drain pipe at each side. The total cross section f of the pipes on both sides shall be determined as follows:

$$f = 15 \cdot V [\text{cm}^2]$$

where:

V = cockpit volume [m^3], measured to top edge of cockpit coaming at its lowest point.

Minimum total cross section for different ranges of service:

- unrestricted and **RO**: 30.0 cm^2
- **R1** and **R3**: 20.5 cm^2

— **RE:** 15.0 cm²

These cross section values are also required in the area of any strainers that may be present.

Cockpits extending all the way across the yacht shall have clearing ports or drain pipe cross sections in accordance with [6.4].

6.4.2 Design details

Cockpit drain pipes shall be equal in strength to the surrounding hull and may only be replaced by hoses with special permission of the Society. Valves in cockpit drain pipes shall be kept permanently open.

7 Deck drainage

7.1 Closure condition

Where bulwarks on exposed portions of freeboard and/or superstructure decks form wells, ample provision shall be made for rapidly freeing the deck of water. Therefore an adequate number of freeing ports or drain pipes of adequate size shall be fitted.

7.2 Freeing ports

7.2.1 The minimum area (A) of openings on one side of the yacht shall be determined in accordance with the following equation:

$$A = 0.07 \cdot \ell$$

where:

ℓ = length of bulwark [m]

$\ell_{max} = 0.7 L$

Note:

For yachts complying with the International Convention on Load Lines 1966, as amended, or respective yacht codes, the requirements for freeing ports given in those regulations shall be observed in addition.

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7.2.2 The opening area for each well in a superstructure deck shall not be less than 50% of A .

If the bulwark is more than 1.2 m in average height, A shall be increased by 0.004 m² per metre of length of well for each 0.1 m difference in height. If the bulwark is less than 0.9 m in average height, A may be decreased accordingly.

For yachts with no sheer, A shall be increased by 50%. Where the sheer is less than the standard, the percentage shall be obtained by linear interpolation.

7.2.3 Two thirds of the freeing port area required shall be provided in the half of the well nearest to the lowest point of the sheer curve.

The lower edges of the freeing ports shall be as near to the deck as practicable.

All openings shall be protected by rails or bars spaced approximately 230 mm apart.

If shutters are fitted, ample clearance shall be provided to prevent jamming.

Hinges shall have pins or bearings of non-corrodible material.

7.3 Scuppers

7.3.1 Scuppers sufficient in number and size to provide effective drainage of water shall be fitted in the weather deck and in the freeboard deck within weathertight closed superstructures and deckhouses. Decks within closed superstructures shall be drained to the bilge. Scuppers from superstructures and deckhouses which are not closed weathertight shall be led overboard.

7.3.2 Scupper draining spaces below the design waterline shall be led to the bilges.

Where scupper pipes are led outside from spaces below the freeboard deck and from weathertight closed superstructures and deckhouses, they shall be fitted with screw-down non-return valves (SDNR), which can be closed from a position always accessible and above the freeboard deck. Means showing whether the valves are open or closed shall be provided at the control position.

7.3.3 Scuppers and other discharges should not be fitted in way of life boat launching positions or means for preventing any discharge of water into the life boats shall be provided for. The location of scuppers and other discharges shall also be taken into account when arranging gangways and pilot lifts.

8 Marking and recording of the design waterline

On application, the Society assign freeboards in accordance with the regulations of the ICLL, as well as with any existing relevant special national regulation, and subsequently is prepared to issue the necessary load line certificates whenever authorized to do so by the flag state administration.



CHANGES – HISTORIC

December 2015 edition

This is a new document.

The rules enter into force 1 July 2016.

DNV GL

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SAFER, SMARTER, GREENER