

---

---

**Large yachts — Strength,  
weathertightness and watertightness of  
glazed openings —**

**Part 1:  
Design criteria, materials, framing and  
testing of independent glazed openings**

*Grands yachts — Résistance, imperméabilité au mauvais temps et  
étanchéité des ouvertures vitrées —*

*Partie 1: Critères de conception, matériaux, armature et essais des  
ouvertures vitrées indépendantes*



This document is a preview generated by EVS



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2012

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

Page

Foreword .....	iv
1 Scope .....	1
2 Normative references .....	1
3 Terms and definitions .....	2
4 Symbols and abbreviated terms .....	6
5 Design criteria .....	8
5.1 General .....	8
5.2 Strength .....	8
5.3 Watertightness .....	9
5.4 Weathertightness .....	9
5.5 Design loads .....	9
5.6 Scantling determination of panes .....	12
6 Framing .....	19
6.1 Framing types .....	19
6.2 Framing dimensions .....	20
6.3 Support pads .....	21
6.4 Material requirements for the framing .....	22
7 Materials .....	23
7.1 Materials selection .....	23
7.2 Testing of materials .....	24
7.3 Testing of appliances .....	26
8 Storm shutters and deadlights .....	30
8.1 Storm shutters .....	31
8.2 Deadlights .....	34
8.3 Owner's manual .....	35
Annex A (normative) Unsupported pane dimensions .....	36
Annex B (normative) Calculation of the stiffness of a pane .....	38
Annex C (informative) Scantling equation .....	39
Annex D (informative) Statistical coefficient $K_n$ and worked example .....	40
Annex E (informative) Worked examples of equivalent thickness calculation for Type A laminates .....	41
Annex F (informative) Worked examples of equivalent thickness calculation for Type B laminates .....	43
Annex G (informative) Design pressure in lieu of storm shutters .....	44
Annex H (normative) Effective width of plating .....	46
Bibliography .....	48

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 11336-1 was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 12, *Ships and marine technology — Large yachts*.

ISO 11336 consists of the following parts, under the general title *Large yachts — Strength, weathertightness and watertightness of glazed openings*:

- *Part 1: Design criteria, materials, framing and testing of independent glazed openings*
- *Part 2: Glazed opening integrated into adjacent structure (directly bonded to the bulkhead or shell), design criteria, structural support, installation and testing*
- *Part 3: Quality assurance, installation and in-service inspection*

# Large yachts — Strength, weathertightness and watertightness of glazed openings —

## Part 1: Design criteria, materials, framing and testing of independent glazed openings

### 1 Scope

This part of ISO 11336 specifies technical requirements for independent glazed openings on large yachts, taking into account navigation conditions, and the location of the opening.

Large yachts are yachts with length of the hull,  $L_H$ , higher or equal to 24 m, in use for sport or pleasure and commercial operations, with a tonnage limitation up to 3 000 gross tonnage, according to the International Tonnage Convention.

The opening and the associated closing appliances considered in this part of ISO 11336 are only those that are above the deepest waterline (dsw) and are critical for the ship integrity related to weathertightness and watertightness, i.e. those that could lead to ingress of water in the hull in case of rupture of the pane.

The scope of this part of ISO 11336 is related to and limited to independent glazed openings.

**NOTE** This part of ISO 11336 is based on the experience of ship window and glass manufacturers, shipbuilders and authorities who apply to ships the regulations of SOLAS, as amended, and of the International Convention of Load Lines, as amended, noting the provisions by the SOLAS Protocol of 1988, Article 8, as agreed by the appropriate Marine Administration.

### 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 178, *Plastics — Determination of flexural properties*

ISO 1751, *Shipbuilding and marine structures — Ships' side scuttles*

ISO 3903, *Shipbuilding and marine structures — Ships' ordinary rectangular windows*

ISO 5797, *Ships and marine technology — Windows and side scuttles for fire-resistant constructions*

ISO 6345, *Shipbuilding and marine structures — Windows and side scuttles — Vocabulary*

ISO 8666, *Small craft — Principal data*

ISO 12543-1, *Glass in building — Laminated glass and laminated safety glass — Part 1: Definitions and description of component parts*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

ISO 21005, *Shipbuilding and marine technology — Thermally toughened safety-glass panes for windows and side scuttles*

EN 1288-3, *Glass in building — Determination of the bending strength of glass — Part 3: Test with specimen supported at two points (four point bending)*

EN 1990:2008, *Eurocode — Basis of structural design*

EN 12150-1:2000, *Glass in building — Thermally toughened soda lime silicate safety glass — Part 1: Definition and description*

EN 12337-1, *Glass in building — Chemically toughened soda lime silicate safety glass — Part 1: Definition and description*

EN 13195-1, *Aluminium and aluminium alloys. Specifications for wrought and cast products for marine applications (shipbuilding, marine and offshore)*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6345 and the following apply.

#### 3.1

##### **glazed opening**

opening in the hull, superstructure or deckhouse of a ship structure to be fitted with a transparent or translucent material

#### 3.2

##### **independent glazed opening**

glazed opening where the mechanical behaviour of the pane can be considered independent from adjacent structure, e.g. framed appliance

#### 3.3

##### **glazed opening integrated into adjacent structure**

glazed opening where the mechanical behaviour of the pane cannot be considered independent from adjacent structure, e.g. pane bonded directly into a seat

#### 3.4

##### **appliance**

device made of a pane and a fixing system, used to cover an opening in the hull, superstructure or deckhouse

#### 3.5

##### **pane**

sheet of material fixed within or to a frame

#### 3.6

##### **glazing**

transparent or translucent pane

#### 3.7

##### **unsupported dimensions of a pane**

clear dimensions between the supports bearing the pane

NOTE See Annex A.

#### 3.8

##### **deadlight**

secondary watertight closure fitted to a glazed opening and which is fitted on the inside of the vessel

#### 3.9

##### **storm shutter**

portable protective closure fitted to a glazed opening and which is fitted on the outside (weatherside) of the vessel

#### 3.10

##### **flag administration**

government of the state whose flag the yacht flies