INTERNATIONAL STANDARD

ISO 11336-3

First edition
2019-06

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

Part 3: Quality assurance, installation and in-service inspection

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

Partie 3: Assurance qualité, installation et inspection en service

Reference number
ISO 11336-3:2019(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 12, *Large yachts*.

A list of all parts in the ISO 11336 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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

Part 3: Quality assurance, installation and in-service inspection

1 Scope

This document specifies

— the content of the product data sheet of glazing materials for use on yachts,

— the evaluation of conformity to the product data sheet of laminated glass and laminated safety glass for use on yachts,

— the product labelling and identification methods for glass supplied for installation on board a yacht, and

— methods for survey of installed glazing.

It does not cover distortion of view or aesthetic aspects.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 527-2, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics*

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

ISO 11336-1:2012, *Large yachts — Strength, weathertightness and watertightness of glazed openings — Part 1: Design criteria, materials, framing and testing of independent glazed openings*

ISO 11963, *Plastics — Polycarbonate sheets — Types, dimensions and characteristics*

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

ISO 12543-2, *Glass in building — Laminated glass and laminated safety glass — Part 2: Laminated safety glass*

ISO 12543-3, *Glass in building — Laminated glass and laminated safety glass — Part 3: Laminated glass*

ISO 12543-4, *Glass in building — Laminated glass and laminated safety glass — Part 4: Test methods for durability*

ISO 12543-5, *Glass in building — Laminated glass and laminated safety glass — Part 5: Dimensions and edge finishing*

ISO 12543-6, *Glass in building — Laminated glass and laminated safety glass — Part 6: Appearance*

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

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

EN 572-1, *Glass in building — Basic soda-lime silicate glass products — Part 1: Definitions and general physical and mechanical properties*

EN 1863-1, *Glass in building — Heat strengthened soda lime silicate glass — Part 1: Definition and description*

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

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

EN 12603, *Glass in building — Procedures for goodness of fit and confidence intervals for Weibull distributed glass strength data*

EN 14449, *Glass in building — Laminated glass and laminated safety glass — Evaluation of conformity*

DIN 2304, *Adhesive bonding technology — Quality requirements for adhesive bonding processes*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12543 (all parts), ISO 11336-1, and the following apply.

3.1
initial examination
initial verification that the properties of the product are as given in the product description

Note 1 to entry: The initial examination can and generally does consist of a combination of actual (physical) testing of representative samples of production or of prototypes and assessment of documentation.

3.2
test report
document that gives the results of an initial examination

3.3
product description
document that details the relevant properties of the glazing product, including the permitted tolerances for the properties, as well as specific reference(s) to characteristics that are modified by the production process and the information required to carry out survey on the manufacturing process

3.4
significant change
variation in performance beyond the permitted tolerance for the relevant parameters

3.5
glazing manufacturer
entity issuing and signing the declaration of conformity

3.6
product data sheet
document giving the properties of the final product, intended to be published to be used for engineering purposes

3.7
recognized organization
institution authorized by the Flag State of the vessel to do load line inspections for the Flag State , typically the Classification Societies

3.8
monolithic glazing
glazing material of which the panes consist of one single ply of one material only

EXAMPLE Single pane thermally toughened safety glass (TTG) and sheets of polycarbonate or polyacrylic material.

3.9
compound glazing material
glazing material of which the panes consist of stacks of plies of similar or different materials that are laminated or otherwise permanently connected to each other

EXAMPLE Laminated glass and laminates of glass plies with polycarbonate or polyacrylic material.

3.10
declaration of conformity
statement by the manufacturer declaring that the properties of the product are as given in the relevant product data sheet

3.11
marine grade TTG
thermally toughened safety glass as assumed in existing maritime standards, typically compliant with ISO 21005, which can be vertically processed, need not to be heat soaked, and accepted by batch testing

3.12
L1
virtual line drawn at a height of 2,5 % of the breadth of the yacht (B), or a height of 500 mm, whichever is greater, above the design waterline

3.13
L2
virtual line drawn at a height of h_{std} + 0,02×L above the design waterline, with 0,02×L not exceeding 3 m

Note 1 to entry: h_{std} (standard superstructure height) and L (load line length) are defined in ISO 11336-1.

3.14
L3
virtual line at a height of 2×h_{std} + 0,02×L above the design waterline, with 0,02×L not exceeding 3 m

Note 1 to entry: h_{std} (standard superstructure height) and L (load line length) are defined in ISO 11336-1.

4 Requirements for glazing material products

4.1 Product data sheet

4.1.1 General

For each glazing material a product data sheet shall be provided.

All glass elements shall meet the characteristics and properties declared in the product data sheet for that element.

The product data sheet is the central document on the basis of which conformity with this standard shall be examined.

The product data sheet gives a specification of the product properties that are relevant for the application on board.

The glazing manufacturer is responsible for the preparation and maintenance of the product data sheet.

The product data sheet can describe a single product or a family of products.

The product data sheet shall be public or available upon request.

The product data sheet shall contain at least the normative information given in 4.1.1 and, as applicable, in 4.1.2 to 4.1.4. The product data sheet may also contain other information.

4.1.2 Data to be provided for all glazing materials

For all products, the product data sheet shall contain the following.

1) How the product can be recognized and global characteristic properties: overall thickness, weight per square meter, characteristic visual features.

2) The specific information on material and build-up as described in 4.1.3 or 4.1.4 for monolithic and compound glazing respectively.

3) Characteristic mechanical properties of the product. See 4.2.1.

4) An indication of the failure mode and load bearing capabilities after failure. See 4.2.2.

5) Confirmation that the product does not contain materials not permitted for the application on board. See 4.3.

6) A description of the edge finishing method.

7) Category of durability. See 4.4.

8) Confirmation whether the product is suitable for application in way of control positions. See 4.5.

9) Information about any fire rating in accordance with the FTP Code the material complies with and any particular conditions pertaining to this approval.

10) Instructions or a reference to instructions for mounting the product.

11) Instructions or a reference to instructions for maintaining the product.

12) Instructions or a reference to instructions for inspection of the product.

13) Instructions or a reference to instructions for replacing/disposing the product.

4.1.3 Data to be provided for monolithic glazing materials and monolithic glazing components

For thermally toughened safety glass (TTG) compliant with EN 12150-1 or ISO 21005, the normative part of the product description shall contain a reference to EN 12150-1 or ISO 21005, whichever the manufacturer claims compliance with. In addition the toughening process (horizontal or vertical) shall be specified.

For polycarbonate compliant with ISO 11963, the normative part of the product description shall as a minimum contain a reference to ISO 11963.

For polymethyl methacrylate (PMMA) and other transparent materials of which the properties are not laid down in an ISO standard, the normative part of the product description shall be as for compound glazing materials.

4.1.4 Data to be provided for laminated safety glass and for compound glazing materials

The normative part of the product description shall as a minimum contain the following information.

— For laminates made only of glass and interlayer: a reference to ISO 12543 (all parts) and all other standards with which the manufacturer claims compliance.

— For laminates in which other materials than glass and interlayer material are applied: a reference to any standard with which the manufacturer claims compliance.

— Component parts:

  — glass types and thicknesses applied in the laminates:

    (i) for glazing components of chemically strengthened soda lime silicate glass (CSG) compliant with EN 12337-1, the normative part of the product description shall contain a reference to EN 12337-1,

    (ii) for glazing components of heat strengthened glass (HSG) compliant with EN 1863-1, the normative part of the product description shall contain a reference to EN 1863-1,

    (iii) for glazing components of annealed float (AG) compliant with EN 572-1, the normative part of the product description shall contain a reference to EN 572-1;

  — edge finishing type including e.g. sealing, protection;

  — plastics glazing sheet materials types and thicknesses;

  — interlayer types and thicknesses.

— The order of stacking of the components.

— Lamination process applied, e.g. foil, cast-in-place.

— Coatings if present and their position relative to an interlayer.

The interlayers may be listed either

a) in full, i.e. chemical composition and mechanical properties, or

b) by a manufacturer's code that refers to a material information sheet.

The definition of product families shall be consistent with the normative part of the product data sheet.

The substitution of materials and/or components shall maintain the conformity with the product data sheet.

When there are defined alternative materials for a certain component, these substitutes can be added to the product family and also the product data sheet when compliance has been demonstrated.

When a component is described by a manufacturer’s code, the data of the component shall be available.

4.1.5 Insulated glazing units

The normative part of the description shall as a minimum contain the following information.

— Information as in 4.1.3 or 4.1.4 as applicable for the panes.

— Type/material of spacer.

— Permissible temperature range.

— Load bearing capacity of spacer and of connection between spacer and glass.

— Suitability and limitations for application in situations where the glazing is mounted with free edges.

4.2 Detailed description of the properties

Most properties in 4.1 are straight forward, but some require explanation or specification. This section describes how properties can be determined.

4.2.1 Mechanical properties

The property values shall reflect values as obtained from 4-point bending test according to ISO 1288-3, and to represent the load level at which there is 5 % probability of breakage.

The reference method to assess the results is using the Weibull distribution according to EN 12603. The values given should represent the stress level corresponding to the lower 95 % probability curve at 5 % fractile.

Alternatively this probability can be taken as the lower threshold of the 90 % confidence interval to the t-Student distribution. This is the simplified method.

The product data sheet shall specify whether the statistic analysis of the results is carried out via the standard Weibull method or the simplified t-Student method.

See Annex E for a further explanation of the reference method and the simplified method.

Where properties are derived from results of pressure tests, the results shall be corrected for diaphragm effects and statistically processed to derive the 5 % probability of breakage load level.

4.2.1.1 Mechanical properties to be specified

Mechanical properties of laminates with interlayers causing partial collaboration between plies cannot be expressed well in terms of stress and strain. For reasons of simple application, flexural strength and flexural stiffness are therefore given in terms of thickness of a pane of monolithic TTG giving the same properties:

— $t_{eq,\sigma}$, in mm, the thickness of a pane of marine grade TTG giving the same breaking strength as the product;

— $t_{eq,w}$, in mm, the thickness of a pane of marine grade TTG giving the same bending stiffness as the product.

For ease of reference and to support engineering, the actual bending properties shall be given also:

— M_f, in Nmm, the breaking moment per mm width;

— D, in Nmm^2, the bending stiffness per mm width.

4.2.1.2 Methods to derive mechanical properties of the product

1) For monolithic thermally toughened safety glass (TTG) in compliance with ISO 21005, in the absence of other data, the following nominal mechanical properties can be assumed for a panel with thickness t_{act} in mm:

$t_{eq,\sigma} = t_{act}$

$t_{eq,w} = t_{act}$

$M_f = 20 \times t_{eq,\sigma}^2$

$D = 5\,833 \times t_{eq,w}^3$

