DANISH WINDOW VERIFICATION

Technical Requirements for DVV

Association of Danish Window Manufacturers (VinduesIndustrien)

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Content

1 Introduction

These Technical Requirements for the manufacture of windows and exterior doors have been drawn up by The Association of Danish Window Manufacturers (VinduesIndustrien) as an industry standard to ensure consumers get a product which meets a range of minimum requirements regarding good quality as well as consumer warranty.

The Requirements are managed by a Technical Committee set up by the Association of Danish Window Manufacturers.

The use of these Technical Requirements for certification or inspection purposes is only permitted by prior written agreement with the Association of Danish Window Manufacturers.

Product certification
Product certification under the Technical Requirements for DVV serves to ensure that the product leaving the manufacturer complies with the requirements contained in these Technical Requirements for DVV.

The above implies that only units pre-assembled ex factory are covered by the certification.

For practical reasons, such as considerations of transport, installation and working environment, deviations from the above may be allowed at the manufacturer's responsibility for large units, such as folding and sliding doors as well as units where the glazing or casement is delivered uninstalled. When the installation is not handled by the manufacturer, this requires a note on the order confirmation as well as requirements for the installation to be made according to the instructions provided for the assembly of the units.

The DVV product certification covers only units to be installed in vertical wall openings.

It is a prerequisite for maintaining a product certificate based on the Association of Danish Window Manufacturers' Technical Requirements that the compliance of the manufacturer's products, documentation material and quality control with the basis on which the certificate was issued is verified by continuous monitoring (inspection visits).

2 Requirements for the company

2.1 Production basis

A comprehensive production basis must exist for each product type. The production basis may be made in any medium and must provide a sufficient description of the finished unit as well as which key sub-components are included in the finished unit.

Drawings must be available at an appropriate scale, showing the cross-sectional view of each profile. Drawings must show all relevant dimensions.

2.2 Testing

Type testing subject to requirements and Annex ZA of EN 14351-1:2006 + A2:2016 must be performed as accredited testing by a laboratory which has been notified by the EU Commission.

If the results of a test under Annex ZA are used as a claim, the test must have been made as an accredited test and stated in the Declaration of Performance.

Procedures must exist for product controls, including guiding tests.

Similar design
Section 3.4 of EN 14351-1:2006 +A2:2016 may be used for testing and calculations. For actual instructions, please refer to Annex A of the standard.

Micro-enterprises
Enterprises which meet the EU definition of micro-enterprises may use verification level 4 as agreed with the Association of Danish Window Manufacturers.

The definition of micro-enterprises is available at:
https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM:n26026

2.3 Product labelling

The DVV label must be affixed in a place where it remains visible after the unit has been fitted.

In addition to the DVV logo, the label must provide information of the time of manufacture as well as the manufacturer's name, telephone no., and/or web address or the manufacturer's registration number with the certifying body and the text: "For additional information, see www.dvv.dk".

When units produced to order are supplied with IGU's labelled with the production date, these units can be considered to meet the requirement for date of production labelling.

When companies are trading with each other, units may be labelled with the company's (purchaser's) own DVV label if the supplier is certified by DVV, and traceability is secured.

Certified units must be provided only with one label stating consumer warranty, and the label may not include reference to a certificate regarding system certification (e.g. ISO 9000 series).

Separate energy labelling of sub-components is not allowed (glazing units etc.).

Certified companies are allowed to use the logo on writing paper, invoices, delivery notes, brochures etc. with or without the accompanying name.

Dealers of DVV-labelled units may use the logo provided they add "Dealer of DVV-labelled products"

Approved versions of logo/text can be downloaded from www.vinduesindustrien.dk.

2.4 Product liability

Manufacturers must take out a combined commercial and product liability insurance covering a total sum of DKK 10 million (personal injury/property damage). The insurance must be extended to include coverage for damage to items which the insured's products have become part of, have been affixed to, or in any other way have been joined with. The insurance must also provide coverage for damage to items which the insured has undertaken to make ready, install, mount, or to treat or process in some other way, irrespective of whether the damage arises during (commercial liability) or after the performance of the task (product liability).

Requirements for insurance scope appear from Annex 2.

If issued by a third party, a copy of the insurance policy must be submitted to the insurance broker with which the Association of Danish Window Manufacturers have made an agreement.

2.5 Consumer protection in Denmark

The manufacturers must be affiliated to the DVV warranty scheme which provides coverage for consumers as described in Annex 2. As an alternative to the DVV warranty scheme, the obligations may be covered by a recognised insurance company with an office in Denmark. The following applies to the DVV warranty scheme, any additional manufacturer warranty cover notwithstanding.

The following applies to the DVV warranty:

- For each sale, the window manufacturer must, in connection with entering into an agreement for this sale, provide the consumer with DVV warranty documents including the terms and conditions of the warranty or refer in writing to a website where these documents can be found.
  The window manufacturer must be in possession of and under an obligation to present these at any time if requested to do so by the certifying body.
- Claims for defects in a delivery under warranty may be made up to 5 years after the window manufacturer's delivery date, however no later than 3 months after discovery of the defects.
- The warranty scheme must provide cover in case the supplier cannot or will not rectify defects.
- If the company subscribes to a joint warranty scheme, this scheme must provide cover of at least DKK 5,000,000, incl. VAT, per calendar year for 5 years.
- Claims are heard by Byggeriets Ankenævn - the Appeals Board established by the Danish Consumer Council, the National House Owners Association and the Danish Construction Association - or by an equivalent, approved appeals board.
- Under the rules of the DVV warranty scheme, the window manufacturer is liable to reimburse the DVV warranty scheme for any costs it may have incurred.
- The glazing unit supplier must have signed a warranty like Annex 21.

If issued by a third party, a copy of the insurance policy must be submitted to and approved by the Association of Danish Window Manufacturers.

2.6 User manual

For each of the company's product types, there must be a user manual giving information on the storage, handling, installation, use and maintenance of the product as well as safety in use. This manual may be executed in any medium and consist of one or more documents.

The publication date must be stated.

3 Quality control requirements

3.1 General information

Individual companies must have a quality control system adapted to the organisation and demands of the company and described in a quality manual.

By definition, a quality control system comprises all activities carried out by the company to control its quality levels.

A quality control system must comprise the following points:

- A description of the manufacturer's quality aims and the means employed to achieve these aims.
- An organisational plan determining who is responsible for and authorized to make decisions in relation to quality control, including responsibility for corrective action.
- A description detailing the resources, methods and means available for quality control purposes.
- A description of measures (instructions regarding inspection, forms, tables, sampling schedules etc.) to be implemented at each individual stage throughout the company to fulfil the quality objectives.
- A documentation and information system for the registration of quality which also feeds this information to those responsible for quality.
- A set of work instructions for operations of particular importance to the quality of the finished product.

3.2 Quality control system documentation

Manufacturers with an in-house production control system, see EN 14351-1, or a system in compliance with EN ISO 9001 and considering the requirements of EN 14351-1 and 3.2 c, 3.2 m and 3.3 in these provisions are considered to meet the requirements for the in-house production control.

As an alternative, the contents of the quality manual and the quality control system as implemented in practice must at least comprise the following points:

The quality manual and associated material may be executed in any medium.

a) Management's responsibility

Management must describe the policy and aims to be pursued by the manufacturer in relation to quality. It must also ensure that all members of staff understand and pursue these aims. The established policy also serves to ensure continued suitable training of those members of staff who are responsible for and authorised to make decisions which influence the quality of the finished product.

It must appear clearly from an organisational plan who is responsible for and authorised to make decisions which influence the quality of the finished product.

At regular intervals, at least every other year, management must assess the quality control system in its entirety or in part. The assessment must clarify if the system is still suitable and efficient. The outcome of the assessment must be documented.

b) Quality control system

The quality manual must include the written procedures and work instructions required to ensure that a quality is obtained which meets or exceeds the requirements of these Technical Requirements and the manufacturer's own and the component suppliers' description of the products.

c) Order procedure: (Contract procedure)
To ensure agreement between the customer's requirements and the manufacturer's perception of these, a written procedure involving documentation of the following must be established and maintained:

- that the required delivery date can be fitted into the overall production plan;
- that a customer with special requirements is included in a specific dialogue about his requirements and made aware of possible reservations regarding these requirements, including the fact that the product may not be covered by product certification;
- that the customer has approved the basis on which the order for the product is signed.

If the standard products are sold in export markets without being manufactured in accordance with the Association of Danish Window Manufacturers' Technical Requirements, the manufacturer must have in place procedures about how to ensure that these products are not sold as certified products.

d) Document control
For the purpose of complete document and data control, a written procedure must be established and maintained to ensure that:

- only currently valid versions of relevant documents are available in all locations where activities essential to the quality of the finished product are conducted;
- obsolete documents are removed instantly from all locations issuing and using them.

Responsibility for the production of drawings for both new standard products and customer-specified units must rest with a formally appointed member of staff equipped with sufficient resources (person responsible for products).

Drawings which have been released to form the basis for production must be approved by the person responsible for products or by another person delegated to sign on his behalf or similar, if possible in a digital form.
A record must be kept of all drawings and revisions.

In case of revision, the nature of the revision must be clearly apparent, and it must have been approved by the person responsible for products.

e) Purchasing
Suppliers must be selected on the basis of their ability to meet requirements regarding quality and reliability of supply. A list of acceptable suppliers must be established and maintained.
Purchase documents must contain data which clearly describe the type, nature, model, class or other precise identifier of the product ordered.

f) Product identification and traceability
The manufacturer must establish and maintain a written procedure to ensure that all essential supplies which form part of a particular unit or series of units can be traced back to the supplier of the materials and components used. In addition, essential process and time data should be traceable in relation to the production code on the unit or in relation to the agreement entered into with individual buyers.

g) Process control
Written work instructions must be available for all processes and work procedures which are of essential importance to quality.

The instructions may be supplemented with sketches, posters or models.
Forms for recording process results may be employed in monitoring the course of the process.

h) Inspection and testing
Incoming goods must be checked on arrival to ensure that quantities and types are in agreement with the purchase order.

Sampling should be used to document that the quality meets agreed levels. Approved certificates or test reports may constitute documentation of quality.

In the course of the manufacturing process, inspection and monitoring should be employed to ensure that individual components and sub-components meet the prescribed quality requirements. Components found to

diverge from the requirements should be separated out by special marking until a decision has been made about their use in accordance with item j (Managing deviating products).

The finished product shall be subjected to a final inspection. This inspection must be documented to an extent meeting or exceeding the requirements in item 3.3 below (Requirements concerning inspection of finished goods).

i) Inspection, measuring and test equipment
A written procedure must be in place for checking and adjusting, if any, the measuring and test equipment employed in production. As a minimum, the equipment must be checked and have an accuracy as specified in Annex 22.

The procedure must include a plan for the frequency of equipment checks, the tolerances to meet, how to show that a check has been performed and where and how the equipment is stored.

j) Managing deviating products
A written procedure must be drawn up to prevent deviating products from entering production without thorough examination. It must also be determined who is authorised to decide about use, rework or rejection.

k) Corrective actions
A written procedure must be drawn up to ensure that the reasons for deviating products and customer complaints are analysed; a record must be kept of corrective actions taken to prevent recurrence.

l) Handling, packaging and delivery
A written procedure must be drawn up to ensure that both sub-components and finished products are handled cautiously and safely and that finished units are packaged in a way which, with due attention to the transport mode, allows them to reach their destination without suffering damage.

m) Quality records
A procedure must be established to ensure that relevant data concerning production basis, production process and quality records are kept for at least 10 years.

3.3 Requirements concerning inspection of finished goods

In order to ensure that finished goods are subjected to a certain minimum of inspection, a sample of five units ready for dispatch must be taken every week and during a critical review, the questions regarding Timber, Plastics, Metal, Timber/Aluminium and FRP listed in Annexes 4, 5, 6 and 7 must be answered or another type of extended systematic in-house control must be implemented which corresponds at least to the contents of Annexes 4, 5, 6 or 7.

Units must be selected in a manner which ensures that over a period of about 1 month, a representative sample of manufactured unit types is selected.

4 Rules concerning product certification

4.1 General information

The product inspection carried out by the certification body must be conducted ex factory on units ready for dispatch, see Section 4.4.2.

When a company opts for the Association of Danish Window Manufacturers' Technical Requirements as the basis for its product certification, it is obliged to subject to certification all its standard products sold in the Danish market, yet may still manufacture special products to order or products for export markets with products which are not certified.

Standard products mean products manufactured on the basis of profiles developed by or at the request of the manufacturer or purchased as semi-finished standardised profiles.

Prior to performing Cascading ITT (Initial Type Testing), component designer and assembler (manufacturer) must have signed an agreement meeting EN 14351-1, Subclause 7.2.5.

Products which may not be labelled DVV

Products which do not conform with the technical requirements cannot be labelled DVV.

For products not entitled to be labelled, the basis of agreement for such tasks must clearly state that the products have not been certified and not covered by the DVV warranty.

Deviations from this as well as examples of products which companies under DVV may manufacture but not label DVV have been stated in Annex 1.

Product changes

Significant changes in the production basis must be submitted to the certifying body at the next inspection visit. Directions, if any, from the body must be observed.

If the changes give rise to requirements for retesting or new testing, such testing must be completed in accordance with the relevant tests, see these Requirements.

Certificates

When manufacturing windows and exterior doors in different material groups, the minimum requirement is one certificate plus an additional one for each material group with a turnover in excess of DKK 10 million.

Window types in composite profiles are named after the visible materials which must be maintained, from the inside as well as the outside.

4.2 Product quality assessment

Four categories are used for product remarks:

- critical defects;
- significant defects;
- immaterial defects;
- notes (to be considered suggestions for improvement).

Quality limits are established for the first 3 categories; in order for the product in question to be rated as being of sufficiently good quality none of these limits may be exceeded.

- The limit for critical defects is set as a maximum **number of defective units per sample**.
- The limit for significant defects is set as a maximum **average number of defects per unit**.
- The limit for immaterial defects is set as a maximum **average number of defects per unit**.

Control limits

Association of Danish Window Manufacturers' Technical Committee has determined the control limits on the basis of experience gathered:

The limit for critical defects is 0

The limit for significant defects:

- 1.0 for timber and timber/aluminium
- 0.6 for PVCu
- 0.8 for metal and FRP

The limit for immaterial defects:

- 1.2 for timber and timber/aluminium
- 1.0 for PVCu, metal and FRP

If the control limits are changed without a new edition of the Requirements being published, companies must be notified about the change in writing.

4.2.1 Defect category description

When rating items in relation to specific materials situations, may arise where a defect is of such magnitude, scope or considerable significance that the rating is moved up one category.

On the other hand, situations may arise where a defect is of such limited scope or significance that the rating is moved down (improved) by one category.

If the certifying body detects defects which have not been specified in Annex 8, they may send a comment to the company pointing out the defect. The Technical Committee must be informed at the same time.

Critical defects

Will impact the functioning and life of the unit.

Critical defects will in principle render the unit useless. Units with critical defects must either be rejected or repaired. Corrective action must be taken immediately.

Significant defects

May impact the functioning and life of the unit and will probably result in a complaint.

Units with significant defects must either be rejected or repaired. Companies must assess whether to take corrective action to prevent recurrence.

Immaterial defects
Will not noticeably impact the functioning and life of the unit and will probably not result in a complaint.
Companies must assess whether to take corrective action to prevent recurrence.

4.3 Affiliation visits

In order to effectively maintain quality levels, certification must be based on a separate assessment of the suitability of the construction and design principles employed, i.e. the construction quality, see the relevant sections in these Requirements.

Products must be controlled as in the continuous monitoring.

The overall quality control system and documentation material are checked in relation to the existing quality manual and the Association of Danish Window Manufacturers' Technical Requirements.

4.4 Continuous monitoring (inspection visits)

Inspection visits investigate whether the manufacturer's quality control has been implemented, visually checking general material and product properties and manual functional testing conducted on a sample.

4.4.1 Inspection frequency

Under normal circumstances, continuous monitoring comprises 2 inspection visits per year (normal inspection frequency).

The time of the ordinary inspection visits is chosen by the certifying body and planned within the time fixed by the inspection frequency ± 2 months.

The visits may be made without prior notification to the manufacturer.

Reduced inspection frequency
If the following conditions are met, the frequency of inspection visits may be reduced to 1 inspection visit per year:

- For an uninterrupted period comprising 4 inspection visits, there must have been no recorded cases of critical defects.
- During the same period, the number of significant defects at each of the 4 inspection visits must not exceed the control limit minus 0.4 defects per unit.
- The number of immaterial defects at each of the 4 inspection visits must not exceed the control limit.

Within 5 to 7 months of the annual inspection visit, the manufacturers with a reduced inspection frequency must forward electronically and in collected form to the certifying body a copy of the inspection log for the first week of each month.

Loss of right to reduced inspection frequency
If having been given five days' advance notice in writing, the manufacturer does not forward reports or if an inspection visit finds the manufacturer in breach of the above limits for the number of defects, the frequency will be changed to 2 inspection visits per year.

Recovery of right to reduced inspection frequency
The manufacturer may regain the right to only 1 inspection visit per year when the above conditions have been met at two successive visits.

Stricter control:
In stricter control, 2 inspection visits will be made during each period of 6 months.

4.4.2 Control of products

A sample is taken of usually 10 units ready for dispatch comprising different types of units so that the product control will, as far as possible, be representative in relation to the types of units which form part of the

manufacturer's product range. If the number of units ready for dispatch is 10 or less, all the units will be selected for the sample. However, the sample must not comprise less than 6 units.

- In case of details which cannot be examined in the finished product, the inspection moves upstream in the production process to the stage where the relevant operation is conducted. If this is impossible because the operation is not conducted at the time of inspection, the unit may be dismantled.
- At manufacturers that only manufacture complete components or sub-components for service treatment, a number of less than 6 complete components can be taken when this is supplemented by a suitable number of sub-components which as assessed by the certifying body may form part of the overall assessment of the sample.

For the units selected for the sample, record the following data:

All 5 material groups:

- Unit type.
- Size (width x height) is given in mm.
- Order or serial numbers where these appear on the units, otherwise the number given on the DVV-label.

Specifically for timber and timber/aluminium:

- Timber moisture content is measured. 1 measurement on external frame per unit.
- On surface-treatment, paint coat thickness is measured. 2 to 4 measurements per painted unit with at least 16 measurements for the sample. The measurements must be evenly distributed over frame/casement.
- The heartwood proportion of 20 fully finished or partly machined profiles is checked. The profiles are selected with an equal distribution between casement profiles and frame profiles for windows and doors respectively. With the exception of casement heads and frame heads, the proportion of heartwood in the hatched areas shown in Annex 10 is recorded.
- On timber/aluminium units, the thickness on coated and/or anodized faces is measured, maximum 30 measurements. The measurements can be made at other places in production.

Specifically for PVCu:

- Welding mirror temperatures are measured.
- 4 corner samples are taken for testing, see 9.4.1.

Specifically for aluminium:

- Surface treatment coat thickness is measured. Measurements are taken at a maximum of 30 points evenly distributed on frame profiles and casement profiles. The measurements can be made at other places in production.

Specifically for FRP:

- Surface treatment coat thickness is measured. Measurements are taken at a maximum of 30 points evenly distributed on frame profiles and casement profiles. The measurements can be taken at other places in production.

4.4.3 Methods

Individual units are subjected to detailed inspection to reveal faults and defects, if any. These are rated in accordance with Annex 8.

Measurements are made of factors relevant to the product. The measurements are taken using the apparatus and tools mentioned below which must be traceably calibrated in accordance with the national or international standard. Equipment deviation must not exceed the values listed in Annex 22.

- Timber moisture content is measured using an electrical resistance gauge with insulated needles.
- Welding mirror temperatures are measured using an electronic thermometer.
- The coat thickness of painted surfaces on timber is measured using suitable, calibrated equipment.
- The coat thickness of anodized or coated surfaces on metal is measured using an eddy current probe with a set of calibrated foils in the relevant measuring range.
- Differences in the colour and sheen of surface treatments are usually graded by visual inspection under the light conditions described in the Technical Requirements. In case of substantial doubt, ΔE may be determined by measurement, or samples may be selected for testing/measurement at an accredited laboratory.
- Cross-sectional dimensions and similar small dimensions are measured with a calliper gauge.
- Outer measurements of frames/casements and similar measurements are taken with a tape measure.
- The size of cracks and similar fissures are determined using a feeler gauge.

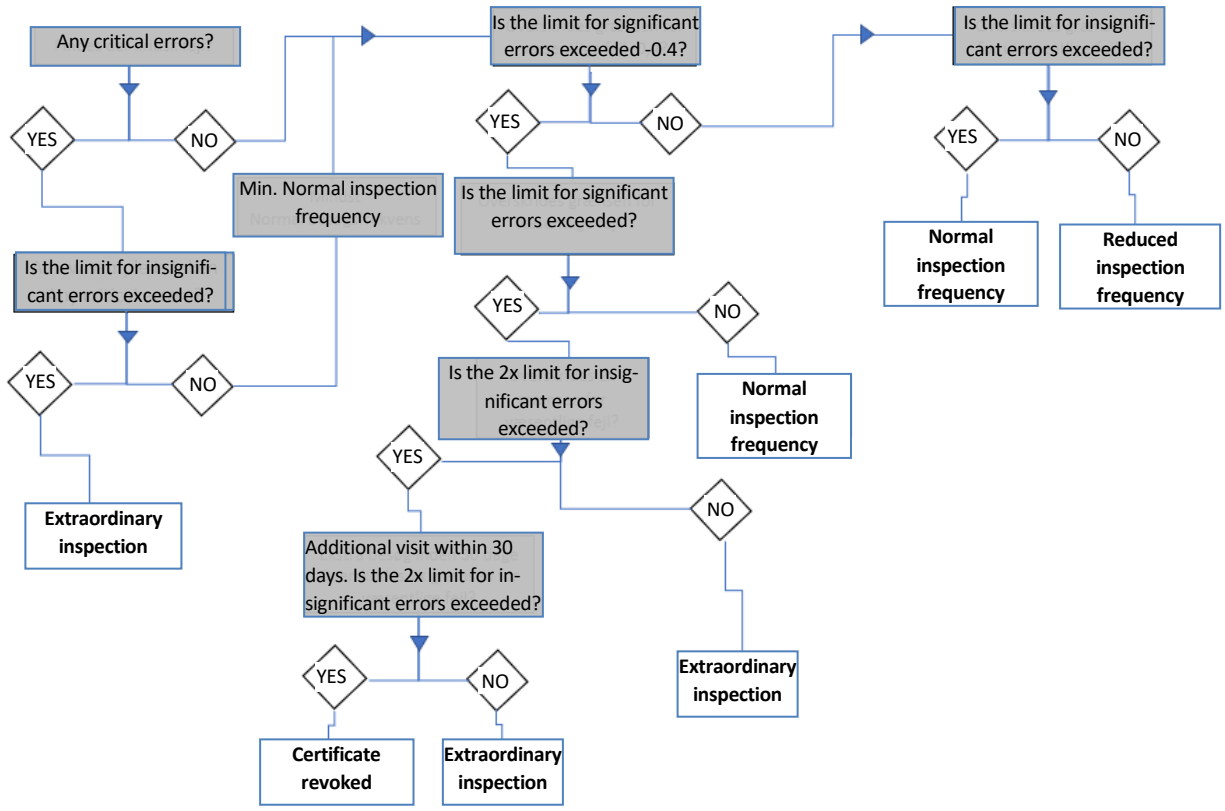
Alternatively, instruments with a similar, documented accuracy are used.

Any other equipment used must be of a commonly recognized quality, be well maintained and operated by trained staff.

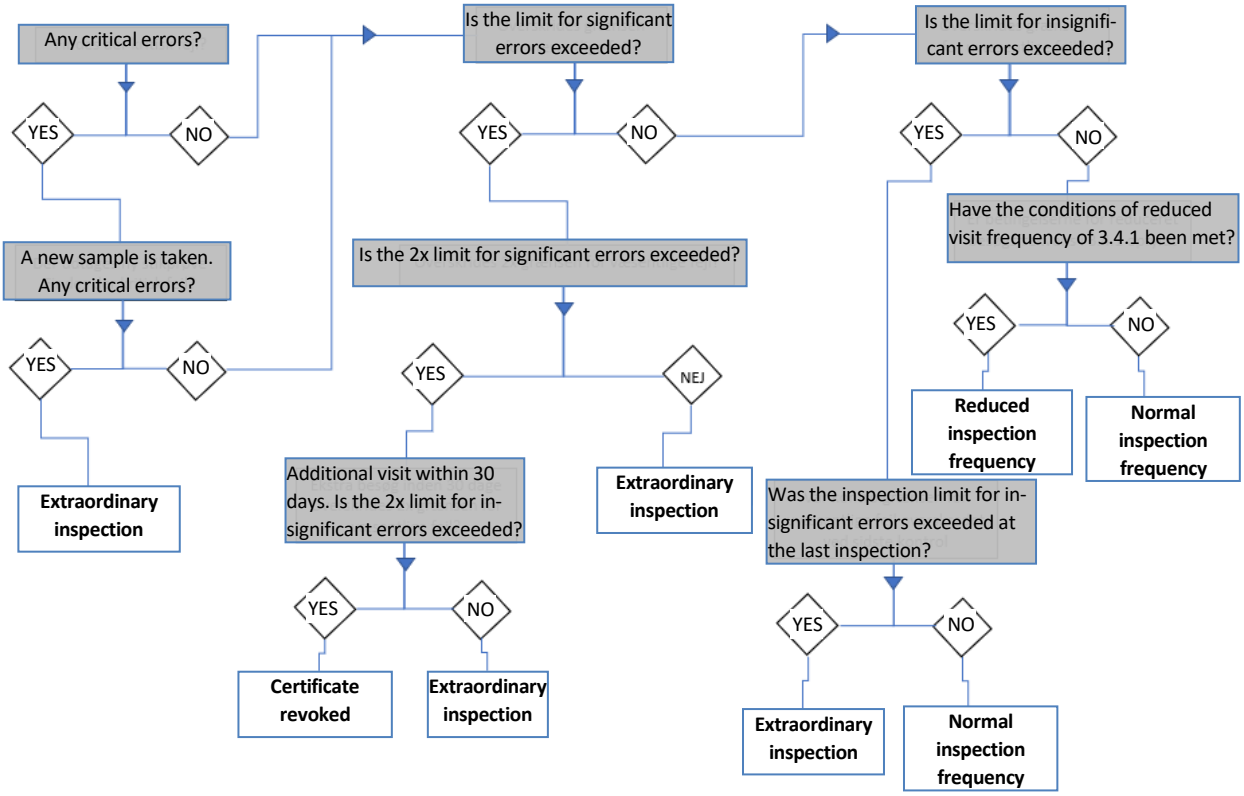
4.4.4 Criteria for approval or rejection

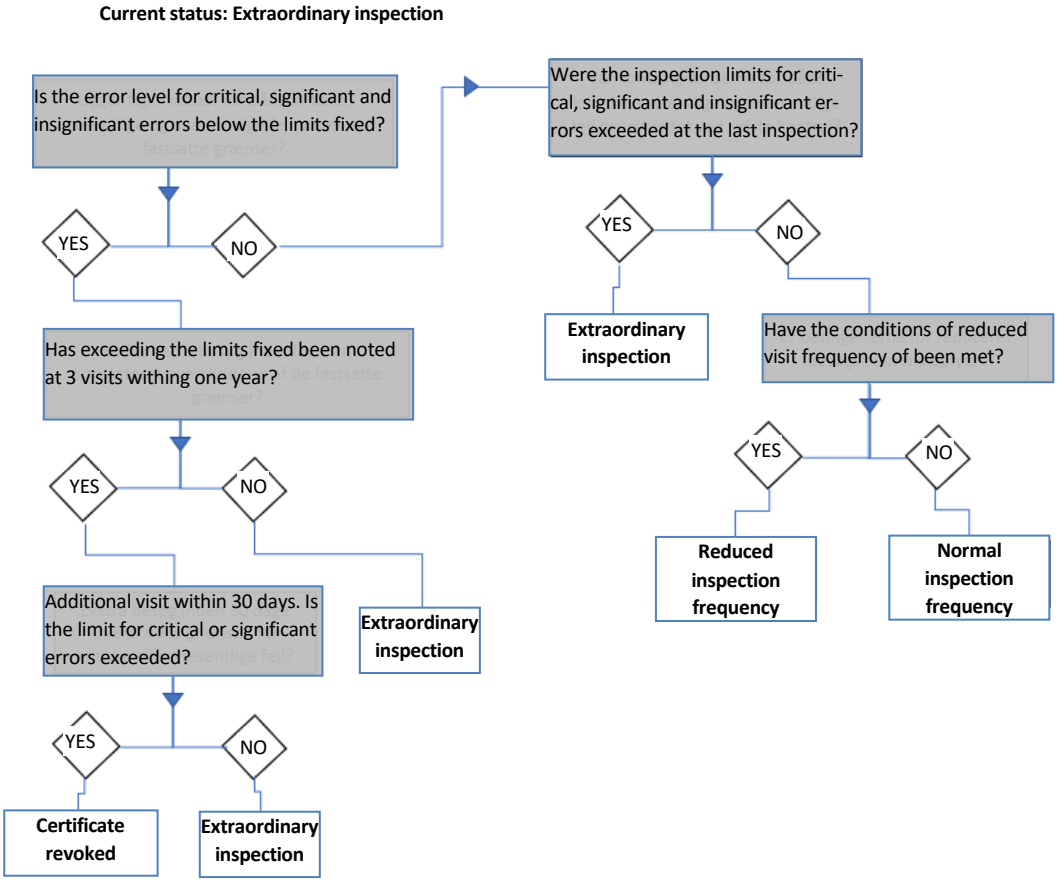
When the control has been completed, the results are assessed acc. to the chart below:

Current status: Reduced inspection frequency



Current status: Normal inspection frequency





4.4.5 Assessment of the quality assurance system

The quality control system is checked by sampling in relation to the existing quality manual and the Association of Danish Window Manufacturers' Technical Requirements. The system is assessed for continued effectiveness and a review of inspection records is conducted to reveal fluctuations in manufacturing quality since the last visit. The assessment should be planned so that the entire quality control system of the company is audited within the certification period of 3 years.

4.4.6 Deviations

If disagreement with specific requirements is noted during the review of the quality control system and the documentation material, the certifying body may raise deviations.

Deviations are recorded by the certifying body in a deviation report and are raised in relation to a specific requirement in the audit criteria with an accurate identification of the objective evidence which forms the basis of the deviation.

Deviations must be discussed with the certified company in order to ensure that the evidence is accurate and will be understood. The auditor is not allowed to suggest the reason for deviations or solutions to the certified company.

In order to maintain the right of certification, deviations must be closed within a deadline to be fixed by the certifying body. A written reply to the deviation must be submitted to the certifying body, and the reply must comprise:

- Analysis of the cause of the deviation;
- Correction of the deviation (action to close the deviation);
- Corrective action (action to prevent recurrence);
- Documentation that the deviation is closed.

If the deviation is not closed within the deadline fixed, the certifying body may suspend or withdraw the certificate.

4.5 Obligations of the certifying body

4.5.1 General information

Certifying bodies conforming to the edition applying at any time of the standard DS/EN ISO/IEC 17065, Conformity assessment - Requirements for bodies certifying products, processes and services, may enter into a written agreement with the Association of Danish Window Manufacturers on certification according to the edition of the Technical Requirements for DVV applying at any time. Special certification requirements, if any, must be approved by the Association of Danish Window Manufacturers.

Certifying bodies, who have entered into an agreement with the Association of Danish Window Manufacturers on the use of these Technical Requirements for the certification of companies, will be listed on the website www.dvv.dk with their name, address and VAT or CVR registration number.

Certifying bodies must be subject to supervision by an accrediting body.

4.5.2 Certificates

When certifying conformity with the Technical Requirements for DVV with a certificate, the logo of the Technical Requirements must be visible.

Product certificates issued to certify conformity as regards the manufacturing of windows and exterior doors, cf. these Requirements, and the manufacturing of laminated and finger-jointed timber, cf. sections 6.1.6 and 6.1.7, must be reported by the certifying bodies to the Association of Danish Window Manufacturers that will ensure that the certificate numbers will be made visible to the public at www.dvv.dk.

Assigned certificate numbers must include the designation DVV, e.g. DVV-235.

Certificate numbers applied by the individual certifying bodies must be agreed with the Association of Danish Window Manufacturers.

A certification period has been fixed at 3 years.

4.5.3 Implementation of revised Technical Requirements

The Association of Danish Window Manufacturers must grant the certifying bodies appropriate transitional periods for the implementation of revised editions or revisions.

The implementation period is fixed at 18 months from the publication date. During the implementation period, certificates issued according to the previous edition are still valid so that the transition to certification according to this edition happens at the most recent ordinary inspection visit during the implementation period.

For minor changes, which will not have any significant financial consequences for the certified companies, correction instructions taking immediate effect may be issued. A history of the correction instructions shall appear from Annex 27.

4.5.4 Forwarding inspection results to DVV rep. by the Association of Danish Window Manufacturers

If the Technical Committee becomes aware of a problem area in window constructions or in the materials used, the Committee may request that certifying bodies must forward error statistics in specific focus areas to the Committee as previously arranged with the Association of Danish Window Manufacturers.

4.5.5 Shift to a new certifying body

If a company chooses to change to another certifying body, with whom the Association of Danish Window Manufacturers has an agreement, the company may adopt the same visit frequency as it had with the certifying body which the company is leaving. It is up to the company to provide the necessary documentation.

If an agreement has been concluded with a new accredited certifying body, the Association of Danish Window Manufacturers will, during a transitional period, issue provisional certificates so that the company may maintain its right to use the DVV label as agreed with the new certifying body.

5 Design

In general, window and door units must be made to comply with the statutory requirements in force and correspond with excellent Danish quality.

If there is any doubt about fitness, the performance in question can be tested in accordance with EN 14351-1, items 4.1-4.24. Requirements for testing and classification, if any, are evaluated in relation to the actual use of the units, including the geographical location.

5.1 Constructive material protection

Constructions must be designed in a way which prevents damage to or degradation of the materials used. The design of the construction must ensure that the units:

- screen
- divert and
- drain

water impact such as driving rain and condensation to prevent any harmful impact on moisture-sensitive materials.

Compliance with the above is ensured by observing detailed requirements in 5.1.1, Detailed requirements and 5.1.2 Installation of glazing unit and panel.

5.1.1 Detailed requirements

- The sill of external doors must be manufactured in or covered with a hard-wearing material.
- If, in exceptional cases, drilling (machining) through to the glazing rebate or to the wall side of frame profiles, the access of condensation-causing air must be prevented by tape or otherwise.
- Inward opening doors must have a drip sill at the lower edge of door leaves/casements.
- Inward opening units must have an upstand and/or drainage rail to prevent water ingress.
- The overall construction must be implemented in a manner which prevents the retention of rainwater or condensate.
- Water may not be led from an opening field down to a fixed field.
- Sufficient drain must be incorporated into base casements and frames to ensure that any rainwater or condensate is led into the open. Where drains are established at holes, their minimum size must be Ø8 mm or a 5 x 15 mm gap; drains must be located to ensure the removal of all water.

Specifically for timber

- The outermost 40 mm of bottom rebates in frames and transoms, which may be exposed to water ingress, must have an outward slope of minimum 7°.
- The outermost 40 mm of glazing rebates in casements and fixed windows and glazed doors, which may be exposed to water ingress, must be sloping outwards.
- If the cross-sectional dimension allows it, Georgian glazing bars must be sloping outwards.
- The distance between the sill and casement on the outside must be minimum 8 mm.
    - For units with an additional exterior wet line/seal against driving rain, deviations from the requirement of min. 8 mm spacing between bottom rail rebate and casement are accepted provided that ventilation of minimum 100 mm² per running metre bottom rebate is ensured between the wet lines. The ventilation is established with a gap of minimum 2 mm.
- Bottom rails must be established to allow water to drip off at the outermost part of the rail.

- Horizontal posts above opening casements must have a drip sill draining the water at least 5 mm beyond the external plane of the unit. Alternatively, a seal may be fitted between the post and casement. Units with coupled casements are also required to have a drip sill/seal to the head.
- No traces, openings or grooves likely to cause water to collect dangerously are permitted on surfaces and components of organic materials which may be exposed to driving rain.
- When machining the fibreboard material (moulding and profiling), all horizontal traces must have an outward slope of at least 7º.
- In both doors and windows, all joints in frame and casement bottom rail rebates, glazing rebates and glazing bars must be sealed against moisture absorption. This may be achieved by a fully covering application of end grain sealant or an externally applied triangular mastic joint. Inward opening doors with timber sills must be sealed in a similar manner at the external reveal.
- At doors, the end grain surface against the bottom step must be sealed using a suitable sealing system. Alternative methods must be tested.

Specifically for PVCu

- Drainage holes must not be connected to cavities containing (metal) reinforcement anywhere.

Specifically for timber/aluminium

- Normally, external aluminium components may only be fastened to and supported by the timber section at points or on narrow strips, and the cavity between timber and aluminium sections must be vented to the air. Alternative constructions must be tested.
- At the top edge of casements and frames, driving rain must be diverted by a drip sill on the frame or by a sealing tape preventing ingress of driving rain between the timber and aluminium sections. Alternatively, to prevent water collecting on the upwards-facing side of the timer section, the timber section may be implemented according to the same requirements for the proportion of heartwood as for timber.
- In the case of other horizontal timber sections, driving rain must also be diverted from upwards-facing slots by means of drip sills or sealing tape between the timber and aluminium sections. Alternatively, the slot must be designed so as to ensure that any driving rain entering it is drained off immediately. For example, this requirement is deemed to have been met if the slot has a width of at least 2 mm over the entire length of the profile, and that contact between the timber and aluminium sections is limited to a few points. This also applies where the height of the aluminium section is increased in relation to the bottom rail rebate.
- Ventilation of minimum 100 mm² per running meter bottom rail rebate must be ensured between the bottom rail rebate and casement. The ventilation is established with a gap of minimum 2 mm.
- The outermost 40 mm of bottom rebates in frames and transoms, which may be exposed to water ingress, must have an outward slope of minimum 7°.
    - Frame rebates of timber or other organic material, which are in a retracted position from the casement, and where the air slot between frame and casement does not cause any direct water ingress, may have an outward slope of at least 5º.
- The outermost 40 mm of glazing rebates in casements and fixed windows and glazed doors, which may be exposed to water ingress, must be sloping outwards.
- If the cross-sectional dimension allows it, Georgian glazing bars must be sloping outwards.
- No traces, openings or grooves likely to cause water to collect dangerously are permitted on surfaces and components of organic materials which may be exposed to driving rain.

- Bottom rails must be established to allow water to drip off at the very end of the rail.
- In both doors and windows, all joints in frame and casement bottom rail rebates, glazing rebates and glazing bars must be sealed against moisture absorption. This may be achieved by a fully covering application of end grain sealant or an externally applied triangular mastic joint. Inward opening doors with timber sills must be sealed in a similar manner at the external reveal.
- At doors, the end grain surface against the bottom step must be sealed using a suitable sealing system. Alternative methods must be tested.

5.1.2 Installation of glazing unit and panel

Insulated glass units and panels must be fitted in accordance with the below basic principles, Annex 19 or EN 12488, and other construction requirements in the Technical Requirements for DVV.

- Drainage/vent holes must have a total cross-sectional area of not less than 200 mm² per running metre bottom rail rebate.
    - The holes must be made with a minimum size of Ø8 mm or a gap of 5x15 mm.
    - In cases where drainage/vent holes are established by means of raised bottom glazing beads or a distance between the aluminium shell and casement/frame, the gap between glazing bead and free air must not be less than 2 mm.
- Glazing beads or other types of fixing must be dimensioned and fixed so as to ensure a uniform compression against the glazing unit across the entire contact area and so that movements in the unit do not reduce the retention of the glazing unit by the mounting material.
- Panels must be incorporated in the unit in a manner which ensures moisture deformation of the panelling can be absorbed without causing damage.
- Joints in glazing beads and glazing gaskets must be tight unless a gap has been planned.
- Rebates and glazing beads must be dimensioned so as to ensure that the glazing unit spacer profile is covered.
- For glazing beads of organic materials, bottom glazing beads must be through-going.
- Glued glazing units, in addition to spot bonded safety glued units, may be allowed if written instructions exist approved by the supplier of glazing units and adhesives. It must be ensured that the application method does not weaken the glazing unit edge seals or causes other damage.
- To ensure sufficient documentation of compatibility, it must be documented with testing according to the test description stated in Annex 18; alternatively, the adhesive used may be prescribed/recommended by the glazing unit supplier or appear from recognised compatibility lists.

If a fitting method is used that deviates from the above, a type approval must be obtained from the Association of Danish Window Manufacturers. A type approval requires a description of the installation of the glazing unit with enclosed sectional view, a description of materials used with information of manufacture and type, declaration of conformity, if any, blocking, drainage and ventilation, glazing beads and their fastening.
The drawing and description must be signed by the window manufacturer and – on approval – also be signed by the glazing unit supplier and the DVV Technical Committee.

5.2 Dimensioning, size and strength

Window and exterior door units must be constructed so as to meet the general or particular requirements of the delivery regarding the stability, strength and stiffness of the units.

Hinges and hardware must be dimensioned and fitted in a manner whereby the weight of the construction itself and normal operation do not cause deformation which hinders normal easy use and functioning.

Compliance with the above is ensured by observing detailed requirements in 5.2.1 and by meeting either test requirements in 5.2.2 or design requirements in 5.2.3.

5.2.1 Detailed requirements

- For each product system, an outline must exist from which size and weight limitations appear for each opening type. If additional steps are included, such as a fully glued glazing unit, a support hinge or casement lifter, this must appear from the outline. The height/width relation must be assessed for side-hung and side-guided units.
    - For hardware divided into modular sizes, an outline/instruction must be available for the selection of modules.

  The outline must be based on the instructions from the hardware and, if required, the profile supplier or on testing. The detailing level is as defined in the example in Annex 23.

  An example of an outline is given in Annex 23.

- Unless otherwise specified by the supplier, screws must be mounted in all pre-drilled screw holes in hardware, etc.
  Screws must be firmly tightened and fit the holes in the hardware.

- The structure of glazing units is determined according to applicable standards, national industry-approved empirical values or supplier instructions.

- The units must comply with the following requirements regarding bowing, cupping and twisting: (measuring method stated in Annex 25)
    - Bowing must not exceed 2 mm/m.
    - Twisting in frames and casement units may not exceed 2 mm per 10 cm workpiece width measured over 1 m.
    - Twisting of door leaves may not exceed 4 mm above the height and width of the door leaf, cf. EN 1530, Class 3.
      Measurements must be carried out according to EN 952 - General and local flatness, alternatively by using the vertical and parallel casement pieces as the reference plan.

- The distance between frame and casement (air around the casement) must be such as to allow free opening of the casement, and the design must allow for variations in climate conditions.

Specifically for PVCu

- Units manufactured from through-coloured white or light grey profiles must be reinforced in accordance with the profile supplier's instructions as well as where additionally required for the fitting of hardware or the installation of the unit in the building.

- Profiles with a dark external surface must be reinforced in accordance with the manufacturer's instructions.

- Reinforcement profiles must either have a tight fit inside the PVCu profile or be retained using hidden screws at a distance not exceeding 25 cm with a max. distance of 6 cm from the ends. If the profile supplier prescribes different distances, screws must be fitted accordingly.

Specifically for aluminium

- Hardware may be fitted using suitable pop rivets, self-tapping screws, threaded inserts, threaded holes

or squeeze fixing systems.

Specifically for timber/aluminium

- In the following cases, a product control report must be provided, cf. Annex 16:
    - When the frame and/or casement profiles of the unit are in synthetic materials.
    - When hinges and fasteners are anchored in synthetic materials.
    - If synthetic materials contribute to the transfer of load from casement to frame.

Specifically for FRP

- In the following cases, a product control report must be provided, cf. Annex 16:
    - When the frame and/or casement profiles of the unit are in FRP material.
    - When hinges and fasteners are anchored in FRP material.
    - When FRP material contributes to the transfer of load from casement to frame.

- An accredited report for wind load must be available in accordance with EN 12211 with the following classification according to EN 12210:
    - Class 3 for load.
    - The deflection class must be stated.

  The test is completed on the relevant opening type in the most unfavourable size.

5.2.2 Testing requirements

Wind load in accordance with EN 12210:

- Class 3 for load.
- The deflection class must be stated.

Mechanical strength in accordance with EN 14608 for windows:

- Class 2 in accordance with EN 13115.
  A subsequent increase in the load to 600 Newton must not cause failure or rupture in hinges or hardware, their fixing or in door and casement corner joints.

Mechanical strength in accordance with EN 947 for exterior doors:

- The door classification acc. to EN 1192 Table 1 (loads) must be in accordance with the situation of use, cf. Table A1.

5.2.3 Design requirements

Alternatively, the design requirements below may be observed to comply with test requirements in 5.2.2:

- Exterior doors for dwellings or buildings with a similar pattern of use must be equipped with at least 3 hinges.

Specifically for timber

- Conventional side-hung doors with hinges must always be fixed with at least 3 screws per hinge leaf.
    - Fixing to the casement requires at least 3 min. 4.0x40 mm or 4 min. 4.0x30 mm screws threaded all the way to the head.
    - For use with 30 mm frame timber in the fixing area, each hinge must have at least one machine thread screw with a nut at the back. The remaining screws must be threaded all the way to the head and of a length as close as possible to the thickness of the timber.
    - The nut is not required provided each hinge is fixed using at least 4 x 4.0 mm screws and the effective engagement (thread) of the screws in the timber is at least 30 mm.

Specifically for PVCu

- Hinges and similar load-bearing hardware must be fixed with screws engaging with at least 2 layers of material, i.e. two layers of PVCu, thread or one layer of PVCu plus one layer consisting of a metal insert.

Specifically for aluminium

- In places where hinges or similar load-bearing hardware are fixed, the thickness of the aluminium profiles must be at least 1.8 mm unless reinforced.

Specifically for timber/aluminium

- Conventional side-hung doors with hinges must always be fixed with at least 3 screws per hinge leaf where the frame in the fixing area is made of timber.
    - Fixing to the casement requires at least 3 min. 4.0x40 mm or 4 min. 4.0x30 mm screws threaded all the way to the head.
    - For use with 30 mm frame timber in the fixing area, each hinge must have at least one machine thread screw with a nut at the back. The remaining screws must be threaded all the way to the head and of a length as close as possible to the thickness of the timber.
    - The nut is not required provided each hinge is fixed using at least 4 x 4.0 mm screws and the effective engagement (thread) of the screws in the timber is at least 30 mm.

5.3 Density

Window and exterior door units must be constructed so as to meet the general or particular requirements of the delivery regarding the air permeability and watertightness of the units. In cases without any customer-specific requirements, the requirements below apply.

Compliance with the above is ensured by observing detailed requirements in 5.3.1 and by meeting either test requirements in 5.3.2 or design requirements in 5.3.3.

5.3.1 Detailed requirements

- Weather seals between casements and frames must be fitted to the unit in a manner adapted to their design and construction.

- The distance between casements and frame and the construction design and location of hardware must be such as to achieve correct compressing of weather seals without damaging them.
- The weather seal joints must be tight.
- Seals must be fixed in a manner which ensures that their position does not change transversally or laterally during operation.
- The weather seals must be designed for fixing. The design and fixing of the seals must permit replacement.

5.3.2 Testing requirements

Air permeability in accordance with EN 12207.

- Class 3 for air permeability as an average of measurements at a positive and negative pressure of 600 Pa for windows and exterior doors.

  Recommendations for building projects in **low energy classes**:
  Class 4 for air permeability as an average of measurements at a positive and negative pressure of 600 Pa for windows and exterior doors.
  In addition, air passage at 100 Pa should not exceed 1 $m^3/h.m^2$.

Watertightness in accordance with EN 12208.

- Class 8A for watertightness (positive pressure of 450 Pa for both windows and exterior doors).

5.3.3 Design requirements

Alternatively, the design requirements below may be observed to comply with test requirements in 5.3.2. (will likely correspond to Class 3 in accordance with EN 12207 and Class 8A in accordance with EN 12208).

- If the weather seals are not positioned in the same plane, contact between the wet lines must be ensured e.g. by overlapping.
- When installing glazing units, air permeability design must be ensured on the interior side.
- When in the closed position, opening casements or ventilation hatches must be secured at a minimum of 4 points including hinges.
  - The closing side must usually have at least 2 fastening points.
    - If the dimension of the casement at the closing side is less than 0.6 m, one fastening point will suffice.
  - If the hinges are located in the centre of the casement (pivot/turn windows), there must, however, be at least 4 fastening points located near the corners in addition to the hinges.
  - For casement sides in excess of 1.55 m, the system description must specify how to achieve permanent tightness.
- Exterior doors for dwellings or buildings with a similar pattern of use must be equipped with at least 3 fastening points at the locking side. When using a 1-point closing, the tightness and straightness of the door leaf cannot be expected to be similar to that of a 3-point closing.
  This should be made clear to the customer in both quotations and order confirmations.

- Where instructions exist from the profile or hardware supplier, the number and locations of fastening points must be in accordance with the instructions.

Specifically for FRP

The test requirements of Chapter 5.3.2 are completed on the relevant opening type in the most unfavourable size.

5.4 Thermal performance

Test requirements (ITC)

- For each product system, accredited documentation must be provided in accordance with EN ISO 10077 parts 1 and 2 for:
    - a single-light opening casement window, with a reference glazing unit size of 1.23 x 1.48 m.
    - a 1.23 x 2.18 m exterior door.
    - a sliding door or a folding door made on a double or triple light door, respectively, with a reference size of 2.50 x 2.18 m.

  Glazing unit data must apply to the reference glazing unit defined as the most commonly used glazing unit in the product system in question. The reference glazing unit is considered to be the glazing unit construction which forms the basis of the system approval and which is stated in the product description.
  Thermal properties of window materials must comply with current norms i.e. a recognized standard or be listed in the materials list or positive list of the Association of Danish Window Manufacturers and available at www.vinduesindustrien.dk. Acceptance to the positive list is handled via the Association of Danish Window Manufacturers.

In addition, the following applies:

- The edge zone temperature at the middle of casements, in the glazing unit edge down towards the glazing gasket must not be less than 11°C provided there is a room temperature of 20°C and an external temperature of 0°C. Documentation in accordance with EN ISO 10077-2.
    - The above requirements regarding the minimum temperature do not apply to window and door handles, lock cylinders, door sills and the crossing between frame and casement, but the manufacturer must at all times make sure that no condensation is retained in the construction.
- For each delivery of windows and exterior doors, the company must provide information about Uw, Gg, Ff, Lt and, if necessary, Ra for individual units. Uw, Gg and Ff must be given to two decimal places.
- Separate energy labelling of sub-components (glazing units etc.) is not allowed.

5.5 Sustainability

- For each product system with requirements for climate data, documentation must be available in accordance with EN 15804, ISO 14025 and Product Category Rules, cf. EN 17213, for the carbon footprint of the product system. This documentation may be based on industry values (industry EPDs).

    - GWP information (carbon footprint) may be requested per m^2 unit (windows).

From 2023, it is a statutory requirement in BR18 that for a new building covered by the rules regarding energy frames (Section 259 and Section 260) the building's climate impact throughout its life cycle must be calculated. The climate impact is computed in kg carbon dioxide equivalents per m^2 per year.

For materials or building parts, figures can be used from the Building Regulations, Annex 2, Table 7 or figures from environmental product declarations, including industry declarations.

The industry declarations of the Association of Danish Window Manufacturers are available at www.epddanmark.dk and www.vinduesindustrien.dk. They have been prepared for a European reference window in the size of 1.23 x 1.48 m and converted into environmental impacts per m^2 window.

The glazing unit construction is a standard triple-glazed unit with argon gas in cavities and a weight of 2.5 kg/mm/m^2. Thus, deviations in glass constructions and glass types will affect the values.

The industry declarations do not include deviations in relation to the declared product. It is up to the LCA specialist to assess the need for and the handling of deviations between the actual project and the declarations, including for example the selection of glazing unit.

5.6 Burglary prevention

A manufacturer may choose to enter into the voluntary scheme, DVV Resistance, on the following conditions:

- testing according to the current versions of EN 1628, EN 1629, EN 1630 and then classification of the units according to EN 1627. For each tested unit or series of units, a scope must be described.

    - Units can then be labelled ”DVV Resistance”, see Annex 24 stating the class of resistance, according to the current version of EN 1627. The mark must be visible and permanent.

    - The scope and associated accredited test reports must be available for conformity control by the certifying body.

6 Materials and components

Materials must be suitable for the purpose and comply with applicable relevant product standards.

Compatibility between the materials used must be ensured to prevent harmful dimensional changes, decomposition, smudging and other deterioration of the components' function.

Windows and door constructions must not be combined, assembled or fixed if this poses a risk of compatibility problems such as damp and temperature induced movement as well as corrosion without special steps being taking to prevent this.
Various examples are given in Annex 17 of combinations which may be problematic.

Units involving timber must be manufactured and stored under conditions ensuring a timber moisture of 12 ±3%.

Compliance with the above is ensured by observing the material relevant requirements in 6.1 - 6.11.

6.1 Timber profiles

Timber species mentioned in the following paragraphs may be used if meeting the base coat and surface treatment requirements mentioned under the respective timber species. Other - or modified - timber species must be approved separately by the Technical Committee and stated in the positive list, cf. Annex 13.

Declarations must correspond to the materials delivered and are valid only for 3 years from the date of signature.

If using different timber species in the same window/door component, the manufacturer must ensure that changes in dimensions do not impact negatively on function and weathertightness.

6.1.1 Pine

Pine may be used for windows and exterior doors under the following conditions:

- The mean density of the timber must be at least 500 kg/m^3 at a moisture content of 12%. The mean density of finger-jointed timber must be at least 480 kg/m^3 at a moisture content of 12%.
- The average annual ring width of the timber must not exceed 4 mm.
- Heat treated pine, which can be classified as Class 2 (permanent) under EN 350-2, may be used for glazing beads. The heat treatment may count as the base treatment.
- Each supplier/sawmill must provide a declaration giving details of the pine used.
  The declaration must cover at least the points mentioned in Annex 11A.
- The timber must comply with the specifications and performance requirements stated in Annex 12.
- Application of base coat and surface treatment must conform with treatment systems 1, 2 or 2 ØKO. Treatment system 5 may also be used for timber/aluminium.

6.1.1.1 Requirements for the proportion of heartwood in pine

Timber units

- When using treatment systems 1 and 2 – cf. 7.1 – the proportion of heartwood in the hatched areas in Annex 10 must constitute at least 60%. For laminated profiles, the requirement applies to each slat.

- When using treatment system 2 ØKO – cf. 7.1.1 – the proportion of heartwood in the hatched areas in Annex 10 must constitute at least 90%. For laminated profiles, the requirement applies to each slat.
- Under treatment system 2 ØKO, all external glazing beads must have a heartwood proportion of at least 90%; alternatively, all glazing beads must be heat-treated or have had separate base coats applied in accordance with treatment system 1.

The requirements above regarding the heartwood proportion (timber and timber/aluminium) do not apply to:

- Internal casements in units with coupled casements.
- Units with laminated curved sections with a slat thickness of less than 6 mm.

Timber/aluminium units

- The proportion of heartwood in the hatched areas in Annex 10 must constitute at least 60%. For laminated profiles, the requirement applies to each slat.

6.1.2 Hardwood

Hardwood with a durability of at least Class 3 acc. to EN 350-2 may be used for windows and exterior doors under the following conditions:

Section	Definition	Performance requirements
1	Timber species	cf. Section 6.1
2	Moisture content	12 ± 3 %
3	Width of annual rings	No requirements
4	Slope of grain	Generally not exceeding 1:10
5	Knots	A few rooted pearl knots are allowed
6	Bowing	EN 1530: Class 3
7	Twisting	Max. 2 mm per 10 cm workpiece width measured over 1 m
8	Radial cracks	Not permitted on visible surfaces
9	Ring shakes	
11	Thunder shakes	
12	Brittle heart	
14	Overgrowth	Not permitted
15	Insect holes > 2 mm	
16	Rot	
21	Sapwood	
23	Pith	
24	Reaction wood	
25	Density	Min. 500 kg/m3

- Application of base coat and surface treatment must conform with treatment systems 3 or 4.
- Each supplier/sawmill must provide a declaration giving details of the hardwood used. The declaration must cover at least the points mentioned in Annex 11b.
- If the declared density of the bought-in timber is below 600 kg/m³, the company must perform a wood density check on 5% of the planks received. The sampling of the planks must be evenly distributed over the entire batch; the density may be determined using sawn timber. The results must be registered in weight charts and stored in accordance with rules for storing documentation in Chapter 3.2.

6.1.3 Spruce

Spruce may be used for windows and exterior doors under the following conditions:

- The mean density of the timber must be at least 450 kg/m^3 at a moisture content of 12%.
- The average annual ring width of the timber must not exceed 4 mm.
- Heat treated spruce, which can be classified as Class 2 (permanent) under EN 350-2, may be used for glazing beads. The heat treatment may count as the base treatment.
- Each supplier/sawmill must provide a declaration giving details of the spruce used. The declaration must cover at least the points mentioned in Annex 11c.
- On receipt of the timber, the company must perform a wood density check on 5% of the planks received. The sampling of the planks must be evenly distributed over the entire batch; the density may be determined using sawn timber. The results must be registered in weight charts and stored.
- The timber must comply with the specifications and performance requirements stated in Annex 12.
- Application of base coat and surface treatment must conform with treatment system 2 ØKO. Treatment system 5 may also be used for timber/aluminium.

6.1.4 Larch

Larch may be used for windows and exterior doors under the following conditions:

- The proportion of heartwood in the hatched areas in Annex 10 must constitute at least 100%. For laminated profiles, the requirement applies to each slat.
- The requirements above regarding the heartwood proportion do not apply to:
    - Internal casements in units with coupled casements.
    - Units with laminated curved sections with a slat thickness of less than 6 mm.
- The mean density of the timber must be at least 500 kg/m^3 at a moisture content of 12%.
- The average annual ring width of the timber must not exceed 4 mm.
- A declaration must be provided from each supplier/sawmill giving details of the larch used. The declaration must cover at least the points mentioned in Annex 11d.
- The timber must comply with the specifications and performance requirements stated in Annex 12.
- Application of base coat and surface treatment must conform with treatment systems 1, 2 or 2 ØKO. Treatment system 5 may also be used for timber/aluminium.

6.1.5 Modified wood

Modified wood stated in Annex 13 may be used for windows and exterior doors under the following conditions:

- Durability of at least Class 3 acc. to EN 350-2.
- The tensile strength must as a minimum be equivalent to a bending stress of 45 MPa in testing acc. to Annex 15.
- The timber supplier must provide a declaration comprising at least:
  - Modification method; the process must be supervised by an external inspection body;
  - Timber species;
  - Density of pre-production timber (documented);
  - Durability class;
  - Flexural strength (documented);
  - Screw firmness at a stated screw depth (documented);
  - Conditions regarding corrosion of hardware;
  - Method of surface treatment.
- Using quotations and order confirmations, the end customers must be made aware of conditions such as odour problems from the modified timber or special requirements for maintenance.

6.1.6 Finger-jointed timber

Suppliers of finger-jointed timber must be subject to an impartial inspection scheme approved by the Association of Danish Window Manufacturers, such as NCS.

Window manufacturers manufacturing finger-jointed timber as well as manufacturers of special components, such as arcs, must conclude an agreement with the certifying body regarding inspection and may then use finger-jointed timber under the following conditions:

Timber material and jointing

- The profile of the joint must have a finger length between 6 mm and 20 mm;
- The adhesive employed must meet all the requirements of Class D4 in EN 204 as well as the requirements regarding resistance and strength at 80°C in accordance with EN 14257;
- The moisture content of the timber must be 12 ±2%;
- The glue line must be unbroken;
- The joint must be watertight at a depth of 2 mm;
- The joint must have moisture stability;
- The tensile strength of the joint must as a minimum be equivalent to a bending stress of 45 Mpa; alternatively, the percentage of wood failure must be at least 90%.

In-house inspections

The manufacturer must conduct continuous in-house inspections comprising at least:

- Inspection of the moisture content of the timber;
- Checking glue line (iodine testing);
- Checking the tightness of the joint (testing with extraction liquid);
- Testing the stability under moisture conditions (water bath and acclimatization);
- Bending strength testing.

Work instructions and forms for the recording of inspection and test data must be available for all the inspection and testing activities mentioned. All data record forms must be kept acc. to the rules for storing documentation in Chapter 2.2 and be accessible to external inspectors.

Inspection and testing methods as well as frequency appear from Annex 15a.

6.1.7 Laminated timber

Suppliers of laminated timber must be subject to an impartial inspection scheme approved by the Association of Danish Window Manufacturers, such as NCS.

Window manufacturers manufacturing laminated timber as well as manufacturers of special components, such as arcs, must conclude an agreement with the certifying body regarding inspection and may then use laminated timber under the following conditions:

Timber material/laminates

- Prior to lamination, the individual laminates must be conditioned to room temperature and a moisture content of 12 ±2%.
- The thickness of the outermost laminate against a visible or exposed surface after profiling must be at least 6 mm.
    - The requirements above do not apply to arches.
- Maximum deviation of individual laminates from mean thickness by +/- 0.1 mm. This applies to the laminate both lengthwise and crosswise.
- As regards visual defects etc., the completed laminated profiles are subject to the same requirements as solid timber profiles.
- Lamination of non-softwood timber or other materials species is permitted, provided it can be demonstrated at both the internal, in-house inspection and the external inspection that the applicable performance requirements have been met. The same applies to laminated profiles constructed from different timber species.
- The basic principles of constructing laminated profiles are listed in EN 13307-1, Annex A.

Adhesive and lamination

- The mean breaking stress value for glue lines must be at least 6 N/mm², alternatively the splitting of glue lines must present at least 90% wood failure.
- When bonding with thermoplastic wood adhesives, the adhesive must be classified as Class D4 in accordance with EN 204 (tested in accordance with EN 205), and the requirements regarding resistance and strength at 80°C in accordance with EN 14257.
- When bonding with thermosetting wood adhesives, the adhesive must be classified as Class C4 in accordance with EN 12765 (tested in accordance with EN 205).
- The lamination process must comply with the instructions which must be provided by the suppliers of adhesives and lamination equipment (if available).
- In laminated profiles where the glue lines of the completed window/door assembly are directly exposed to the weather (water and sun), the use of Class C4 (thermosetting) adhesive is recommended.

In-house inspections and testing

The manufacturer must conduct continuous in-house inspections comprising at least:

- checking the climatic conditions in manufacturing hall and warehouse;
- checking the moisture content of pre-production timber;
- checking the moisture content of laminates ready for bonding;

- checking laminate thickness;
- checking the adhesive dosing;
- checking the lamination process (pressing time, temperature, pressure);
- testing the strength of the glue lines.

Approved work instructions and forms for the recording of inspection and test data must be available for all the inspection and testing activities mentioned. All data record forms must be kept and be accessible to external inspectors.

Inspection and testing methods as well as frequency appear from Annex 15b.

External inspection

The external inspection must comprise at least the following:

- checking and, if required, testing the accuracy of the manufacturer's measuring equipment;
- examining the results of the manufacturer's own in-house inspections;
- examining the results of the manufacturer's own in-house testing;
- inspecting the documentation for the classification of adhesives used;
- sampling for external testing.

External testing:

At the external inspection, 6 laminated profiles are selected per bonding process line in the timber species for which the company is approved to laminate. From each of these profiles, a 600 mm long sample is cut and sent for testing, cf. Annex 15, at an accredited laboratory or at a laboratory approved by the Association of Danish Window Manufacturers.

Requirements for external inspections:

In the case of window manufacturers manufacturing their own laminated profiles, external inspections are conducted along with the biannual or annual inspection visit.

In the case of other manufacturers of laminated profiles, including manufacturers of curved sections, who act as suppliers to window manufacturers affiliated to the DVC scheme, external inspections must be conducted by an impartial body approved by the Association of Danish Window Manufacturers. Manufacturers are paid two annual inspection visits - for companies with a turnover of less than DKK 5 million, however, only one annual inspection visit is paid.

If deemed necessary by this body, the approval must be revoked until compliance with the requirements has been re-established.

Traceability:

Laminated profiles from suppliers must be labelled to ensure traceability.
The labelling may be implemented in parcels.

6.2 PVCu profiles

- PVCu profiles for the manufacture of window and door units must comply with EN 12608-1 and be manufactured in materials which meet the data, Requirements and test requirements of the German RAL Requirements “Kunststoff-Fenster, Gütesicherung (PVCu windows, quality assurance) RAL-GZ 716/1”, current edition.
    - As a minimum documentation of compliance with RAL Requirements, the profile manufacturer's technical specifications for the material must be available.

- The profile material must further comply with EU-Regulation 2023/923 of 3.may 2023 as regards to lead and its compounds in PVC.
- The profile manufacturer must be able to present a valid ISO 9001 certificate covered by accreditation for the company.
- Distortion, dimensional tolerances and errors in profiles must be of a level which will not significantly impact the function of the units and declared values.

6.3 Aluminium window profiles

- The use of type EN AW-6063, EN AW-6060 or similar alloys is permitted. The alloys must be heat treated to T5 or better.
- Distortion, dimensional tolerances and errors in profiles must be of a level which will not significantly impact the function of the units and declared values.
- Aluminium profiles for the manufacture of window and door units in pure aluminium constructions must meet the materials specifications given in Eurocode 9 and EN 1999.
    - The standards given must also be applied in other areas if relevant for the manufacture of window and door units.

6.4 FRP profiles

Basic standards

- The FRP material used must be designated in accordance with EN 13706 - 1, Part 1: Designation.
- Testing of materials and general requirements must have been completed and stated in accordance with EN 13706 – 2, Part 2: Methods of test and general requirements.
- Special requirements must be stated in accordance with EN 13706 – 3, Part 3: Specific requirements.
- Distortion, dimensional tolerances and errors in profiles must be of a level which will not significantly impact the function of the units and declared values.

Materials data

As a minimum, for the FRP material in question the following properties must be documented by data:

- Bending/flexural, tensile and compressive strength f_m.
- E-modulus.
- Thermal conductivity λ.
- Thermal expansion coefficient.
- Thermal field of application.
- UV resistance.

When ready-made profiles are used, the above data must be supplied by the profile supplier. In case of own production, they must be available either on the basis of own testing or testing by a recognised institution.

The above does not apply to door thresholds.

6.5 Hardware and screws

All hardware must be manufactured in materials which meet normal requirements in terms of physical strength, wear and resistance.

- To ensure traceability, hardware must be provided with information to ensure that the manufacturer and date of manufacture can be determined.
    - Initially, the requirement is introduced exclusively for products with safety consequences (arm-balancing systems and espagnolettes/door locks) and labelling may be implemented in parcels.
      As on 1.1.2025, labelling must be implemented on every piece of hardware.

- Hardware and its fixing screws must be sufficiently compatible to prevent the formation of galvanic corrosion, and the materials must be corrosion resistant in accordance with the following:

    - Hardware and screws fitted **outside of the external face of the unit** must have a surface treatment to ensure resistance meeting Corrosion Class 4, cf. EN 1670.
      This can be documented by subjecting to salt spray testing in accordance with EN ISO 9227 for 240 hours. Test results may also be evaluated in accordance with EN ISO 10289, and the rating achieved must be at least 5.
      Alternatively, documentation may be implemented by testing in accordance with ASTM G85 A5 for 240 hours. Test results are evaluated in accordance with EN ISO 10289, and the rating achieved must be at least 5.

      Testing must be completed on the hardware series in question.

    - Hardware and screws **between the wet line and the external face** must be made of a material or be protected by a surface treatment which ensures resistance to Corrosion Class 3, cf. EN 1670. This can be documented by subjecting to salt spray testing in accordance with EN ISO 9227 for 96 hours. Test results may also be evaluated in accordance with EN ISO 10289, and the rating achieved must be at least 5.
      Alternative, documentation may be implemented by testing in accordance with ASTM G85 A5 for 96 hours. Test results are evaluated in accordance with EN ISO 10289, and the rating achieved must be at least 5.

    - Hardware and screws **inside the wet line** must be made of a material or be protected by a surface treatment which ensures resistance to Corrosion Class 2, cf. EN 1670. This can be documented by subjecting to salt spray testing in accordance with EN ISO 9227 for 48 hours. Test results may also be evaluated in accordance with EN ISO 10289, and the rating achieved must be at least 5.
      Alternative, documentation may be implemented by testing in accordance with ASTM G85 A5 for 48 hours. Test results are evaluated in accordance with EN ISO 10289, and the rating achieved must be at least 5.

- If the hardware requires special lubrication and maintenance, this must be stated in user manuals.

Specifically for timber and timber/aluminium

- For use with timber which has been treated against rot and fungi or with a fire-retardant agent, and for modified timber and oak, documentation, including experience, that the hardware and fittings used will not be deteriorated by the timber or the timber treatment.

6.6 Glazing units and glass

- Sealed glazing units must be manufactured and labelled in accordance with the EN 1279 series, and the supplier of the units must be listed with www.dvv.dk.
  The manufacturer of the units must be affiliated to a certification scheme with external inspection

approved by the Association of Danish Window Manufacturers. This scheme may be specific to the company as long as it is subject to third party control.

- The glazing unit manufacturer must be affiliated to the DVV warranty scheme or a similar scheme with the same coverage.
- A warranty declaration must exist which, as a minimum complies with Annex 21 -warranty declaration - Glazing unit manufacturer. The warranty declaration must correspond to the glazing units delivered and be valid only no more than 3 years from the date of signature.
- Spacers in the glazing unit must include the following information:
    - Thermal performance with 2 significant digits (Ug - Gg - LTg).
    - Spacer type (may be a code).
    - Glazing unit design with glass / coating / gas types (may be a code).
    - CE marked (EN 1279-5).
    - Date (minimum year and month of manufacture)
      If traceability of the units can be ensured in another way, date stamping may be omitted.
    - Identification of manufacturer, including place of manufacture.
    - Glazing unit size (W x H)
- Individual panes of glass or edge constructions must not, to a greater extent, contain major defects or impurities in the glass or exceed the tolerances stated in Annex 20 - Visual deviations in quality in insulated glazing units. Tempered and laminated glass must not cause visual distortion according to current EN standards.

6.7 Panels

- Panels require the use of materials which remain stable when exposed to humidity to ensure the panel construction remains permanently flat and tight. As regards performance requirements, including surface finish, please consult the respective sections on materials.
- The following applies to panels constructed from wood fibreboard:
    - The MDF fibreboard material must meet or exceed all “symbol H” requirements (use in humid conditions), cf. EN 316 and EN 622-5.
    - Wood fibreboard panels must always be supplied with a completed surface treatment. The surface treatment performance requirements also apply to surfaces and edges which are not visible after the panelled unit has been assembled.
    - MDF boards must have a density of at least 650 kg/m³ and HDF boards a density of at least 800 kg/m³.

6.8 Weather seals

- The only materials to be used for weather sealing between casements and frames must be assumed to possess such elastic properties that they will continue to provide a satisfactory seal against air and water ingress for a number of years under normally occurring changes in the size of the joint. These

requirements may be met by seals manufactured in rubber or rubber-like plastic shaped as hollow profiles, or as lip seals. In special cases, brush seals can be accepted.

- The weather seals must not disintegrate nor display a tendency to stick in connection with the treatment carried out at the factory.
- Weather seals must be resistant to common solvents and cleaning agents.
- For products which have to be surface treated during their lives, the user manual must contain instructions on the use of particular paints, if any, to prevent disintegration of weather seals.

6.9 Glass sealing strips, joint fillers and adhesives

- Glass sealing strips and joint fillers must be able to absorb movements caused by wind load, moisture, and variations in temperature without subsequent cracking or reductions in the performance of the seal.
- In order to document the compatibility of different materials, own tests can be used as supplements according to the test description as stated in Annex 18.

6.10 Synthetic materials for plugging

- Synthetic filler may be used to the same extent as plugging. However, it should be documented that heating it to 70°C will not cause the filler to turn liquid and that the filler material will absorb and retain ordinary surface treatment.
- It should be documented that the vacuum impregnation solution used, if any, does not cause the synthetic filler to swell or have any other unwanted influence on the filler.

6.11 Wood adhesives

- The only adhesives to be used must be waterproof and comply with Class D4 in EN 204. However, frame and casement joints may be glued using a Class D3 adhesive in accordance with EN 204.
- If the workpieces have been treated with preservative before gluing, it must be apparent from the manufacturer's information that the adhesive is compatible with the timber preservative used.

7 Impregnation and surface treatment

Surface treatment and impregnation, if any, must prevent degradation of the materials and ensure that the units visually appear in the expected quality. The surface treatment must be done with regard to the substrate and to the visibility and exposure of the surface. The impregnation and surface treatment agents used must comply with applicable law and be approved by the Danish Environmental Protection Agency.

Compliance with the above is ensured by observing the requirements relevant for the material in 7.1 - 7.4.

7.1 Timber

The treatment must be made using a treatment system approved by the Association of Danish Window Manufacturers. The list of approved treatment systems is available at www.vinduesindustrien.dk.

If there is more than one timber species in the hatched areas of illustrations in Annex 10, the base coat and surface treatment must apply to the species in question, including the natural durability of the species.

7.1.1 Treatment systems

The treatment systems are divided into the following groups:

- Treatment system 1 – softwood (opaque or semi-transparent).
- Treatment system 2 – softwood (opaque or semi-transparent).
- Treatment system 2 ØKO – softwood (opaque or semi-transparent).
- Treatment system 3 - hardwood (transparent).
- Treatment system 4 - hardwood (opaque).
- Treatment system 5 - softwood for timber/aluminium units (opaque, semi-transparent or transparent).

For penetration criteria for treatment systems, see Annex 9.

7.1.2 Performance requirements

The following requirements for preservative treatment of timber presuppose that the requirements listed under 6.1 have been complied with and that the supplier's instructions, including coat thicknesses for the treatment system, are complied with.
The application instructions must apply to the timber species in question and any modification.

All surfaces must be treated, and the requirements regarding surface treatment coat thickness apply to all surfaces visible when the unit is closed, in sill rebates and behind claddings. In grooves, surfaces against the wall and on end grain, the coat thickness may be thinner; however, the surface must be non-absorbent.

- All units must be supplied ex manufacturer with timber preservative treatment.
- Units in softwood supplied with base coat only must have been treated in accordance with treatment system 1.
- If units are supplied with a base coating only, instructions regarding further surface treatment must be included to ensure that upon installation, the surface receives a final treatment to leave the surface complete.
- Units incorporating finger joints must always be supplied with a completed surface treatment.

- For treatment systems 1, 2, 2 Øko, 4 and 5, the wet film applied must be subject to systematic daily checks and the results recorded.
- The points above do not apply to hardwood thresholds where alternative methods can be used to ensure that the surface is non-absorbent.
- The user manual must contain information about how to clean the surface and which cleaning agents to use. It must also be clearly stated in the user manual that the use of solvents for cleaning the surface is not permitted.

Visual surface requirements (performance requirements)

- Visible faces of closed units must have a covered, closed, smooth and filled surface.
- Visible faces of open units must have a covered and smooth surface.
- As a whole, the surface treatment must match the description in Annex 14.

7.2 PVCu

- The use of painted profiles is permitted, provided the coat is applied in a suitable industrial plant. However, it is an express condition that the buyer be notified in any case about the fact that the profiles are painted.
- The user manual must contain information about how to clean the surface and which cleaning agents to use. It must also be clearly stated in the user manual that the use of solvents for cleaning the surface is not permitted.

Visual surface requirements (performance requirements)

- Visible faces of closed units must have a uniform surface.
- The appearance must not be disturbed by cracks, stripes or other surface defects.

7.3 Aluminium

7.3.1 Coating of aluminium

- Units or individual components in aluminium may be manufactured with or without surface treatment. However, the finished surface must be capable of performing in an environment corresponding to Corrosion Class C 3 (EN ISO 12944-2) for external surfaces and Corrosion Class C 2 (EN ISO 12944-2) for internal surfaces.
- Pre-treatment and coating must meet the requirements of GSB AL 631, including the requirements regarding protection against filiform corrosion. The company must be affiliated to the GSB or another similar inspection or control scheme.
- On visible profile surfaces, the coat thickness after application of wet paint must be at least 40 µm but not exceed 70 µm. For powder coating, the minimum coat thickness is 50 µm while not exceeding 120 µm. On functional surfaces (hardware grooves, glazing beads etc.), coats must not be of a thickness which hinders smooth operation. The coat thickness is measured in accordance with EN ISO 2360.
- When measuring adhesion before and after exposure to accelerated tests, adhesion must meet Class 0, cf. EN ISO 2409. Moreover, the surface film must not contain defects in the form of blisters or

flakes after 2 hours of immersion in boiling distilled water.

- The quotation and order confirmation must contain information about whether surfaces have been treated or not.
- The user manual must contain information about how to clean the surface and which cleaning agents to use. It must also be clearly stated in the user manual that the use of solvents for cleaning the surface is not permitted.

Visual surface requirements (performance requirements)

- Visible faces of closed units must have a uniform, plane, smooth and opaque surface.
    - The appearance must not be disturbed by cracks, stripes or other surface defects.
- Sheen is measured in accordance with EN ISO 2813.
- When compared with a finished profile agreed as the standard, the colour must not deviate to such an extent as to be visible to the naked eye, cf. GSB AL 631, item 9.2 or similar.

The visual quality must be assessed from the inside at a min. distance of 2 m and from the outside at a min. distance of 3 m, and the assessment must be made in diffuse daylight.

7.3.2 Anodising of aluminium

- Overall, anodising is based on EN ISO 7599 "Aluminium and aluminium alloys - Anodizing. General requirements of anodized layers on aluminium" and the references and definitions stated in the same standard.
- In the absence of instructions to the contrary, mechanical pre-treatment must be in the form of grinding.
  The nature of the grinding must have been agreed in accordance with table B.1. cf. EN ISO 7599.
- For outdoor use, the minimum permitted coat thickness is class AA20 (min. 16 µm and mean 20 µm) and for indoor use AA15 (min. 12 µm and mean 15 µm).
- All profiles must receive a finishing treatment to achieve a surface sealing which, when tested according to EN ISO 3210, involves a loss of mass (reduction in weight) of less than 30 mg/dm² of anodised surface.
- The user manual must contain information about how to clean the surface and which cleaning agents to use. It must also be clearly stated in the user manual that the use of solvents for cleaning the surface is not permitted.

Visual surface requirements (performance requirements)

- Visible faces of closed units must have a uniform, plane, smooth and opaque surface.
    - The appearance must not be disturbed by cracks, stripes or other surface defects.
- The colour of profiles in the same order must not deviate so much as to be immediately apparent.
- For contractual, documentational and control purposes, reference sheets showing minimum and maximum colour may be used.

The visual quality must be assessed from the inside at a min. distance of 2 m and from the outside at a min. distance of 3 m, and the assessment must be made in diffuse daylight.

7.4 FRP

- The dry coat thickness of the surface treatment must be at least 60 µm. Painted bottom steps do not have any requirements for coat thickness.
- A thinner coat thickness is allowed in grooves, holes etc. which are not directly exposed to weather, but surfaces in these places must always be covered.
- The coat thickness is measured in accordance with EN ISO 2360.
- Bonding must be classified in accordance with EN ISO 2409.
- Window manufacturer and paint supplier must have a written agreement about a warranty covering the surface treatment. Also, the agreement must include procedures for sampling and checking coat thickness and bonding.
- All test results must be recorded and be available to the certifying body.
- The user manual must contain information about how to clean the surface and which cleaning agents to use. It must also be clearly stated in the user manual that the use of solvents for cleaning the surface is not permitted.

Visual surface requirements (performance requirements)

- Visible faces of closed units must have a uniform, plane, smooth and opaque surface.
    - The appearance must not be disturbed by cracks, stripes or other surface defects.
- Visible faces of open units must have a covered and smooth surface.

8 Function

The design of the units must ensure that they are simple/intuitive to operate, maintain and clean in order to minimise the risk of operating errors and personal injuries. This must include the following:

- Pinch point hazard.
- Operating efforts.
- Durability (resistance to repeated opening and closing).
- The load bearing capacity of safety equipment.

Compliance with the above is ensured by observing detailed requirements in 8.1 and by meeting test requirements in 8.2.

8.1 Detailed requirements

- Operating handles must have a strength and fixing adapted to their function and must be designed to avoid fingers getting caught during operation.
- Door locks and espagnolette systems including strike plate etc. must, if the profile system allows, also be designed so as not to be damaged by or cause damage to surrounding parts even when the unit is being closed with operating handles in the wrong position.
- If the casement area exceeds 1.2 m², tilt/turn hardware must incorporate a device to stop the unit being operated wrongly. The area is calculated on the basis of the width and height of the rebate in the casement.
- Pivot and swing windows must be equipped with a device securing the casement when turned to the cleaning position. In this position, the upper glass edge must not rise above the internal reveal of the head by more than 0.15 m.
- It must not be possible to force units open without causing clearly perceptible traces on or damage to the units.
- It must not be possible to remove a glazing unit in one piece from the outside.
    - For external glazing beads, this can be achieved by spot bonding the glazing unit to the interior side of the glazing rebate.

8.2 Test requirements (load bearing capacity of safety devices)

- The manufacturer must have determined the load bearing capacity of the safety devices of each product system as stipulated in EN 14351-1.

  Examples:
    - Pivot and swing windows must have passed testing in accordance with EN 14609 demonstrating the capability of the casement to support a 350 N load for at least 60 seconds.
    - Factory-mounted childproofing must be tested and declared according to EN 13126-5.

9 Finishing

Finishing must be of a quality ensuring the function and service life of the units, including the tightness and strength of joints. Tolerances must be of a level which will not significantly impact the function and visual quality. The visual quality must correspond to Danish window traditions in terms of machining and surface finish.

Compliance with the above is ensured by observing the material relevant requirements in 9.1 - 9.6.

Alternatively, the manufacturer may specify its own finishing requirement.

9.1 Measurement tolerances

For timber profiles, the tolerances are specified at a moisture content of 12 ± 3%.
For PVCu, aluminium and FRP profiles, the tolerances are specified at a temperature of 15°C.

External frame measurement: ± 2 mm at a nominal size of ≤ 2 m.

± 3 mm at a nominal size > 2 m.

Casement rebate measurement: Frame rebate measurement minus 2 x the profile system's nominal distance between casement and frame ± 2 mm.

Profile cross-section: ± 0.5 mm at a size of ≤ 50 mm.

±1.0 mm at a size > 50 mm.

Overturning of glazing bars: < Δ 2.0 mm.

(end to end, and flush)

The measurements of the individual components of a unit must not deviate to such an extent as to influence the closing and weathertightness of the unit.

Glued glazing bars

- Glazing bars must be fixed using a method which ensures permanent retention of the glazing bar.
- Glazing bars must be adjusted in length and centred to ensure a tight joint, provided that temperature and damp induced movements do not strain the retention method (in practice, 0.5 mm gap at external ends and 0.3 mm at internal ends).

9.2 Fitting

- Viewed from the inside, there must be a uniform gap between frame and casement. Variation in the gap must not exceed 2 mm, and the deviation be no more than 2 mm in relation to the nominal gap.
- When the fitting of hardware is completed:
  - adjustable parts should, as a rule, be in the neutral position.
  - the contact surface between non-adjustable fitting parts must be tight.
- Hardware which is visible when the unit is in its normal position of use must be fitted so that its edges or characteristic design lines are parallel with the edges of the unit.

- Burrs are not allowed on screws. The axis of the screw must not deviate by more than 10º from a plane perpendicular to the surface of the hardware.
- Corners and edges of hardware allowing contact must not be pointed or sharp to cause injury or inconvenience during operation.

9.3 Machining of wood

- All faces must be machined to a smooth finish, and unintentional traces of machining are only allowed to a limited extent.
    - This does not apply to the wall side of frames as well as hidden faces.
- All edges of frames, casements, panels and glazing beads etc. which users may come into contact with when the units is fitted and casements, if any, open must be rounded off to ensure e.g. proper surface treatment of the units.
    - In order to get a uniform coat thickness, the rounding-off radius must not be less than 1.5 mm on external faces.
    - Other roundings must not be less than 0.5 mm.

9.3.1 Joints

- Pressing assemblies together must not cause splits or cracks in the timber.
- Once pressing is completed, all cheeks and corners in tenons and mortises must be completely tight. The joints must be glued and end grain in the joint must be fully covered by adhesive. Excess adhesive is permitted on the hidden face of frames.
    - After gluing of corner joints, adhesive must be applied to all contact faces, and the adhesive must fill the entire gap between the glued parts.
- Parts may be assembled using dowels, paying due attention to dimensioning, gluing and impregnation. Dowels must be made of a dimensionally stable material with at least the same natural durability as the main material.
- Timber or aluminium sills in door frames and transoms and mullions may also be fastened to the frame using corrosion-resistant screws in suitable numbers and lengths when combined with the application of gap-filling adhesive to the contact surfaces.
- After assembly, butting faces on free surfaces and in rebates must have a flush fit, otherwise bevelling is required to disguise minor imprecision. Mortise and tenon end grain may be slightly below flush.
- Casement corner joints must be secured with a transverse pin. The pin must be about 5-10 mm shorter than the thickness of the timber. If the pin is put in from the external face, corrosion resistance must meet the requirements of Class 4 (EN 1670). Alternative retention solutions until the adhesive has achieved sufficient strength must be documented.

9.3.2 Gluing

For all glued joints, the adhesive manufacturer's instruction regarding mixing ratios, open assembly time, temperature, pressure and duration of pressure must be complied with.

Gluing parallel to the slope of grain

- The adhesive must fill the entire gap between the glued parts.

- With softwood, it is usually sufficient to apply adhesive to one side only.
- Hardwoods with low absorption require application of adhesive on two sides.

Gluing in connection with plugging

- The adhesive may be applied to one side but must be applied to both bottom and sides and in sufficient quantity for the gap between the plug and the walls of the hole to be completely filled.

9.4 Plastic machining

- Visible surfaces, edges and corners must not show unintentional marks or other traces from tools nor traces from handling during manufacture and storage.
- If holes for fitting the unit are drilled in the frame during the manufacturing process, the distance between holes must comply with the fitting instructions issued by the Association of Danish Window Manufacturers and available at https://www.vinduesindustrien.dk/professionel/vejledninger.

9.4.1 Joints

- The joints must be tight.
- Frame and casement corner joints must be welded.
  - Welding must be performed according to the guidelines for temperature, time and pressure prescribed by the profile supplier for the material and profile in question.
  - The cleanliness of the mirror must be monitored carefully and continuously.
  - The supplier must also state a (minimum) breaking load for the corner joint (the breaking load must be stated with delimited welds).

  Inspection of welding equipment and tensile strength

  - At each ordinary inspection visit, a documented check must be carried out to ascertain the welding mirror temperature.
  - During inspection visits, 4 samples of ***casement corners*** *with delimited welds* must be manufactured for testing the strength of welded joints. The test must be conducted in accordance with the method (pressure/bending strength testing) stipulated in EN 514.
    - The breaking load (F) must meet the value stipulated by the supplier.
  - If regular documented testing of casement corner joint strength is conducted by the manufacturer itself or somebody appointed by it, an external accredited test must be conducted once a year. If the manufacturer does not conduct tests as stipulated, external testing producing satisfactory results must be conducted at each ordinary inspection visit.
- After assembly, butting faces on free surfaces and in rebates must have a flush fit.
- Transoms and mullions may be scribed together and fixed with hardware developed for the profile system.
- Added profiles such as drip sills etc. may be bonded on using an adhesive recommended by the profile supplier.

9.5 Aluminium machining

- Visible surfaces, edges and corners must not have extrusion stripes or other surface defects.
- Visible surfaces, edges, and corners must not have burrs, unintentional marks or other traces from tools or from handling during manufacture and storage.
- Where precipitation may affect the unit, holes must be sealed.

9.5.1 Joints

- The profiles must be cut so as not to produce burrs. Butting faces must have a flush fit.
- By precise fitting and the addition, if any, of sealant, the joints must be sufficiently tight to prevent harmful water or air ingress.
- Corner or angle plates must be fitted in grooves where required to ensure the joint remains flush and rigid.
- Outward casement corners allowing contact must not be pointed or sharp enough to cause injury or inconvenience during operation or cleaning.

9.6 FRP machining

- The FRP material must be processed with machines and cutting tools which ensure an accurate shaping of saw cuts, grooves, etc.
- Visible surfaces, edges, and corners must not have burrs, unintentional marks or other traces from tools or from handling during manufacture and storage.
- Where precipitation may affect the unit, holes must be sealed.

9.6.1 Joints

- Profiles must be joined by welding suited to the material, by fishplates fixed by upsetting or screws or other forms of screw fastenings combined with bonding. Pop rivets may only be used in exceptional circumstances and only if the material and rivet design are particularly suited for the purpose.
- The profiles must be cut so as not to produce burrs. Butting faces must have a flush fit.
- By precise fitting and the addition of sealant the joints must be sufficiently tight to prevent harmful water or air ingress.
- Corner or angle plates must be fitted in grooves where required to ensure the joint remains flush and rigid.
- Outward casement corners allowing contact must not be pointed or sharp enough to cause injury or inconvenience during operation or cleaning.

10 List of Annexes

1	Definitions and interpretations
2	Control form - Insurance and warranty
3	Complaints guide concerning windows
4	Form for use in in-house inspection of TIMBER windows
5	Form for use in in-house inspection of PVCu windows
6	Form for use in in-house inspection of METAL or FRP windows
7	Form for use in in-house inspection of TIMBER/ALUMINIUM windows
8	Recording and evaluation of samples
9	Treatment systems - penetration requirements
10	Requirements for the minimum proportion of heartwood
11a	Paradigm for the declaration of pine
11b	Paradigm for the declaration of hardwood
11c	Paradigm for the declaration of spruce
11d	Paradigm for the declaration of larch
12	Definitions and measuring rules - wood
13	Positive list – modified wood
14	Expected performance of industrial surface treatment of timber elements
15a	Finger-jointed wood - inspection and testing methods
15b	Laminated wood - inspection and testing methods
16	Structures with synthetic materials/FRP
17	Practical experience - combinations of materials, etc.
18	Compatibility - glazing units
19	Blocks and blocking of glazing units
20	Visual deviations in quality in insulated glass units and glass
21	Warranty declaration - glazing unit manufacturer
22	Inspection, measuring and test equipment
23	System overview - example
24	DVV burglary prevention
25	Bowing, cupping and twisting - measuring principles
26	Standards at a glance
27	Technical Requirements - history

Annex 1: Definitions and interpretations

Windows and curtain walling kits

(Source: EN 12519)

Windows:

The definition from **EN 14351-1** and EN 12519 says: A window is a building component, which is used to close an opening in a wall or a sloping roof; which will allow light to enter the building and which in some cases may contribute to ventilation. A window may have vertical as well as horizontal glazing bars or mullions and may have one or more opening lights.

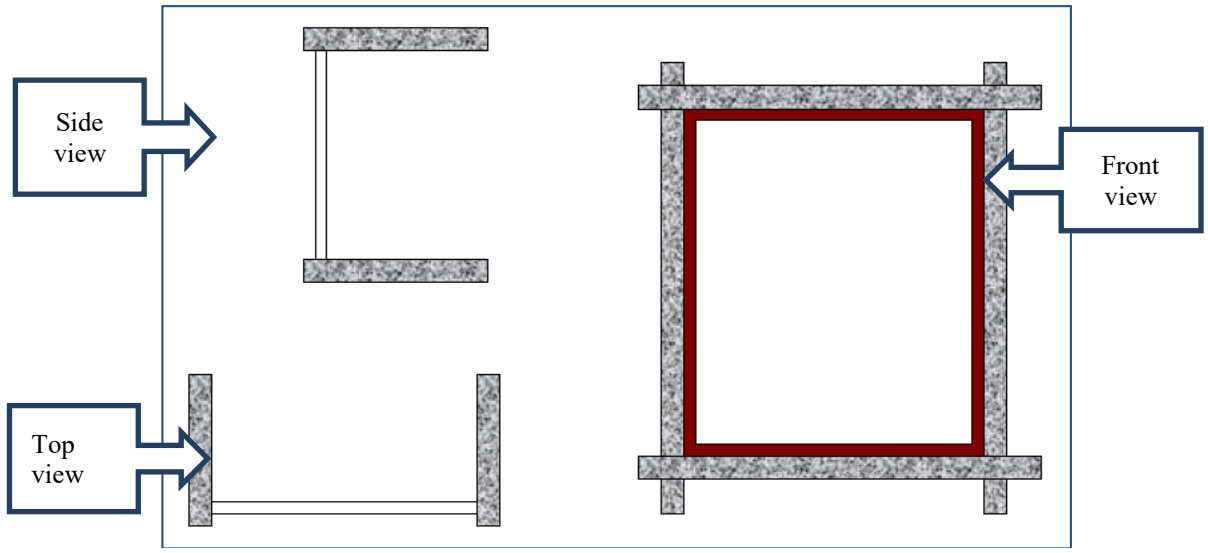


Figure 1: Window

Window band (vertical or horizontal)

The definition says: Two or more windows which are installed either vertically or horizontally in a hole in a wall. The windows may cover floors (vertical band) or partitions (horizontal band), but as a minimum they must be fixed to the construction in the outermost units.

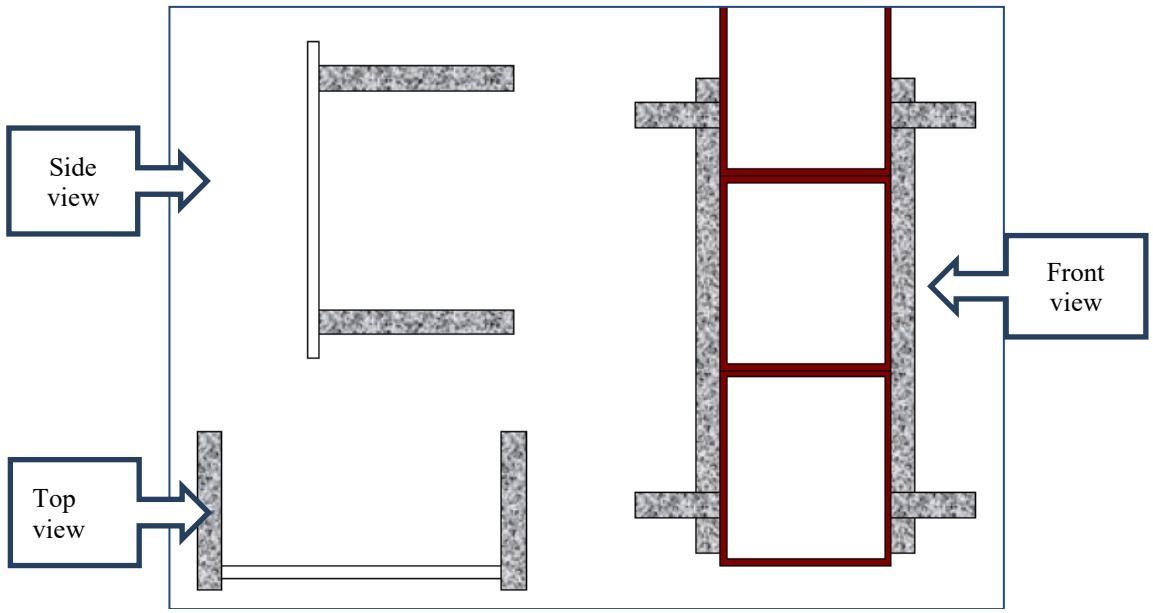


Figure 2: Vertical window band

Annex 1: Definitions and interpretations

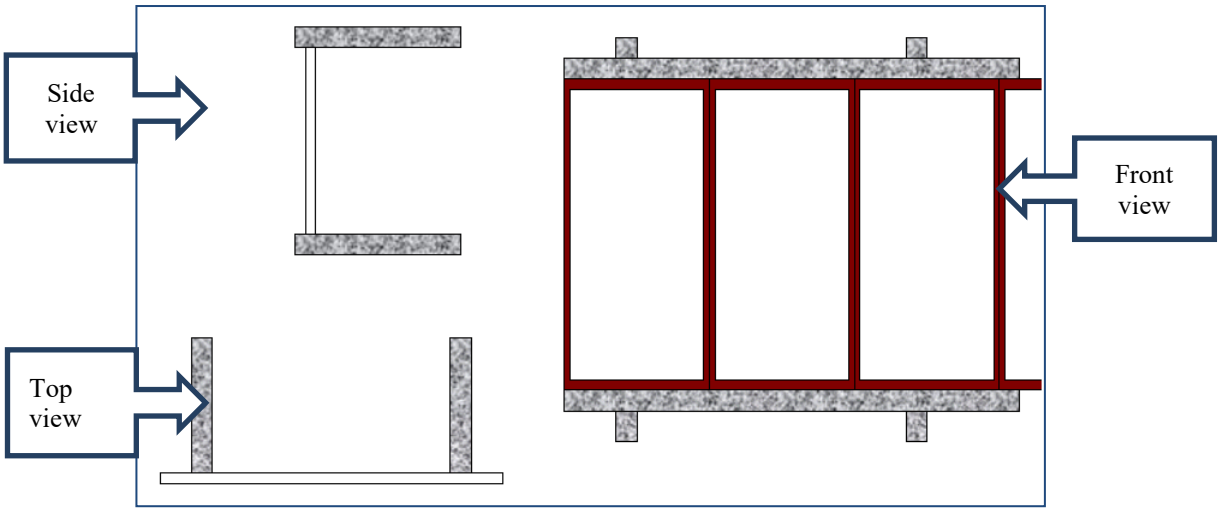


Figure 3: Horizontal window band

Curtain walling

The definition in **EN 13830** says: External building facade made of profiles mainly manufactured from metal, wood or PVC-U, usually consisting of vertical and horizontal construction elements, which are joined together and anchored to the supporting structure of the building. In itself, or in connection with a building, the curtain walling offers all the normal functions of a building envelope, but it does not contribute to the load bearing of the building structure. The curtain walling will often include windows as part of the building envelope.

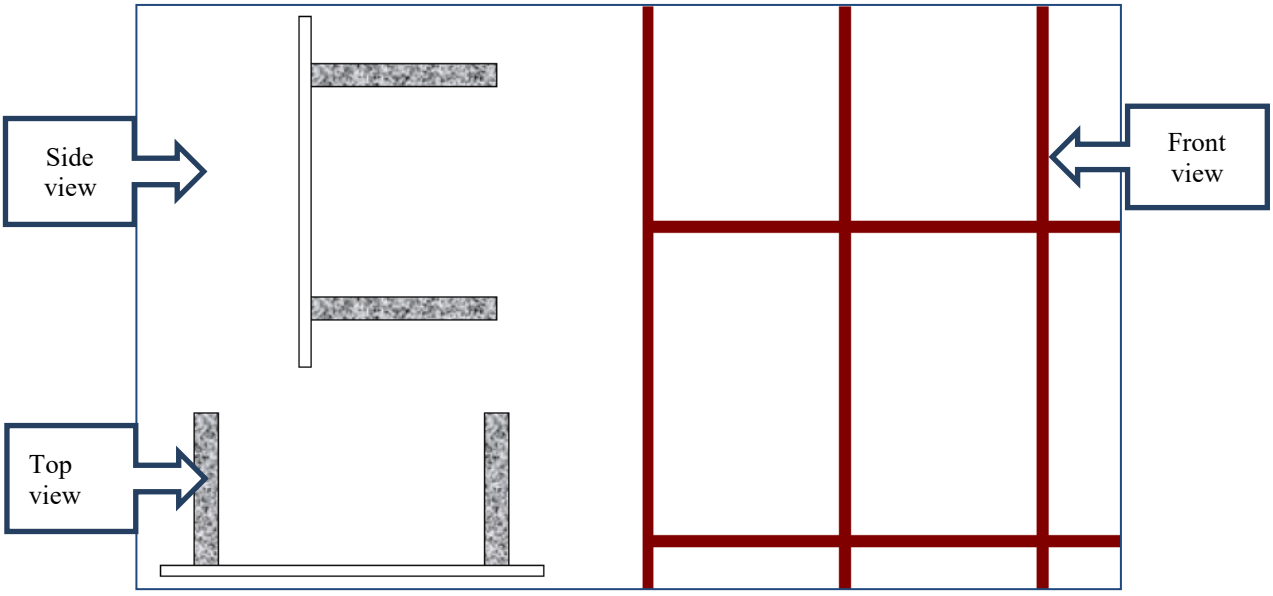


Figure 4: Curtain walling

Annex 1: Definitions and interpretations

Products which may be manufactured without DVV labelling

In special cases, companies under DVV may manufacture units which may not be labelled DVV. This applies to the following (non-exhaustive list)

Application types:
Products for agriculture and food industry.
Products for unheated buildings.

Special products:
Products outside the system boundary in terms of, for example, size and weight.
Considering aesthetics, for example in listed buildings or buildings of special architectural interest, products may be supplied which do not comply with the requirements for DVV labelling.

Products for export markets:
Products and product systems sold in export markets.

Labelling in glazing units

For aesthetic reasons, e.g. in protected or preservation-worthy buildings, the certifying body may in special cases give its permission to omit labelling the glazing unit if traceability can be secured in another way, and it is documented that this is a customer request.

Annex 2: Control form - Insurance and warranty

Certified companies must have commercial and product liability insurance as well as warranty insurance providing at least the following coverage.

The insured	Name Address Zip code and city CVR no.		
Insured risk (it's important that the text corresponds to the activities of the company)	Production, sale and installation of windows, doors and curtain walling sections as well as related products and building activities. Participation at trade fairs and shows.		
Survey of cover (must be included)	Commercial liability, product liability, risk avoidance, sudden pollution, loss/damage caused by ingredients/components, treatment/processing, indirect losses, recall, legal aid, warranty.		
Geographical area	Commercial and product liability – min. Denmark. Product liability – min. Europe. Please confer / note particularly: **Liability.**		
Limit of cover (minimum)	DKK	10,000,000	Per claim and total per year under commercial and product liability
	DKK	10,000,000	Per claim and total per year for property damage caused by ingredients / components
	DKK	5,000,000	Per claim and total per year for pecuniary or financial loss caused by ingredients/components
	DKK	5,000,000	Per claim and total per year for treatment/processing
	DKK	5,000,000	Per claim and total per year for indirect loss, product liability
	DKK	1,000,000	Per claim and total per year for risk avoidance
	DKK	5,000,000	Per claim and total per year for sudden pollution
	DKK	5,000,000	Per claim and total per year for recall
	DKK	250,000	Per claim and total per year for legal aid
	DKK	1,000,000	DVV warranty, subject to a max. of DKK 200,000 per claim and a max. of DKK 10,000 per unit.
Deductible (maximum)	DKK	50,000	Any one claim under commercial liability
	DKK	5,000	Any one claim under differential claims
	DKK	100,000	Any one claim for all other damage
Please note:			
Treatment/ processing	The insurance shall be extended to include cover for damage to items which the insured has undertaken to finish, mount, repair, fit or to treat or process in some other way, irrespective of whether the damage occurs during or after the performance of the task.		
Custody	Notwithstanding article 2, (2) (b) and article 3, (2) (e) of the general insurance terms, this insurance shall cover the liability of the insured for loss of or damage to property for which the insured is liable because these items are in his custody or have been entrusted to the insured in some other way as part of his business.		
Warranty	The DVV Warranty shall cover window/door units delivered over a period of time up to no more than five years retrospectively. The warranty shall cover individual window/door units for five years from the date of delivery. The warranty shall comprise run-off cover with unchanged sums for window/door units which were supplied in the preceding five years.		
Liability	Commercial liability applies solely to companies with sales, production and/or processing in Denmark.		
Inspection date			
Inspected by			

Annex 3: Complaints guide concerning windows

In general, it must be accepted that windows and exterior doors are industrial products intended for use in buildings.

The point of departure for any handling of complaints is that the product is defective and does not meet the quality standards “Technical Requirements for DVV”, and that the window manufacturer is to blame for this.

On delivery, you should immediately check that the windows are in accordance with the order and whether there are any obvious defects, shortcomings or transport damage.

Any transport damage, as e.g. cracked glazing units, scratches or pressure marks, must be stated on the supplier's consignment note.

When the acceptance check has been performed, the liability for correct storage passes to the customer.

Complaints concerning damaged units, which have been installed, will not be accepted.

Other complaints about defects in a delivery under warranty may be made up to five years after the window manufacturer's delivery date, however, not later than three months after discovery of the defects.

The DVV Warranty does not cover claims which are attributable to the following:

- Lack of general maintenance and service such as lubrication, planing, adjustment, etc.
- Hinges, locks, closing devices, weather seals, etc., which are exposed to daily wear and tear, and which must therefore be replaced.
- Defects which are caused by incorrect installation. This matter must be settled with the company that carried out the installation.
- Visual quality of frame/casement and glazing units which meet the quality standard “Technical Requirements for DVV”. Complaints, if any, must be made not later than three months after delivery.

Bowing, cupping and twisting

Bowing, cupping and twisting must be assessed according to their impact when the unit has been installed, and they must be inspected with the unit closed and locked and on the assumption that the appropriate fitting instructions and normal workmanship procedures have been followed.

- However, twisting, bowing or cupping may not occur at a level which affects the declared properties or otherwise claimed properties.
- When bowing and twisting are assessed, particular emphasis must be put on their impact on the weathertightness and other general functional aspects of the unit.

Visual quality of windows and reflection in glazing units

The visual quality of windows must be assessed from the inside at a min. distance of 2 m and from the outside at a min. distance of 3 m, and the assessment must be made in diffuse daylight (e.g. a cloudy sky) with no direct sunlight or artificial light. Irregularities that are not visible are not considered as defects.

When checking reflection in the glazing unit, the distance from the outside must be at least 5 m.

As for basis of assessment, reference is made to:

Glazing units:

- Annex 20 - Visual deviations in quality in insulated glass units and glass

Frame/casements:

- Timber – Annex 14 - Expected performance of industrial surface treatment of timber elements.
- Plastics – Section 6.2 PVCu profiles and 7.2 Surface treatment (Plastics).
- Aluminium - Section 6.3 Aluminium profiles and 7.3.1 Coating of aluminium and 7.3.2 Anodizing of aluminium.
- Composites – Section 6.4 FRP profiles and 7.4 Surface treatment (FRP).

If a damage or cause of damage does not qualify for a complaint according to the guidelines, the company may invoice for the costs in connection with a survey.

Annex 3: Complaints guide concerning windows

Supplier, if any:
Name:
Address:
Postal code:
Telephone:

Installation address:
Name:
Address:
Postal code:
Telephone:

Text on label with DVV certification:	
DVV Certificate no.:	
CE marking, unique product code:	

Text in the spacer of the glazing unit (must be completed)

The reason for the complaint:

☐ Misting between the layers of glass — Date of installation of glazing unit:

Other visible defects: Please note that glazing units must be assessed from the inside at a distance of at least 2 m in diffuse daylight (e.g. a cloudy sky).

☐ Point defects, etc.	☐ Inner zone	☐ Yes	☐ No
☐ Scratches	☐ Inner zone	☐ Yes	☐ No
☐ Impurities between the layers of glass	☐ Inner zone	☐ Yes	☐ No
☐ Other defects*	☐ Inner zone	☐ Yes	☐ No

*Description of other defects:

After installation: Glazing units, which crack, and scratches on the outside are defects which do not qualify for a complaint towards the manufacturer.

Signature customer:

Case no.

Form returned and received — Date:

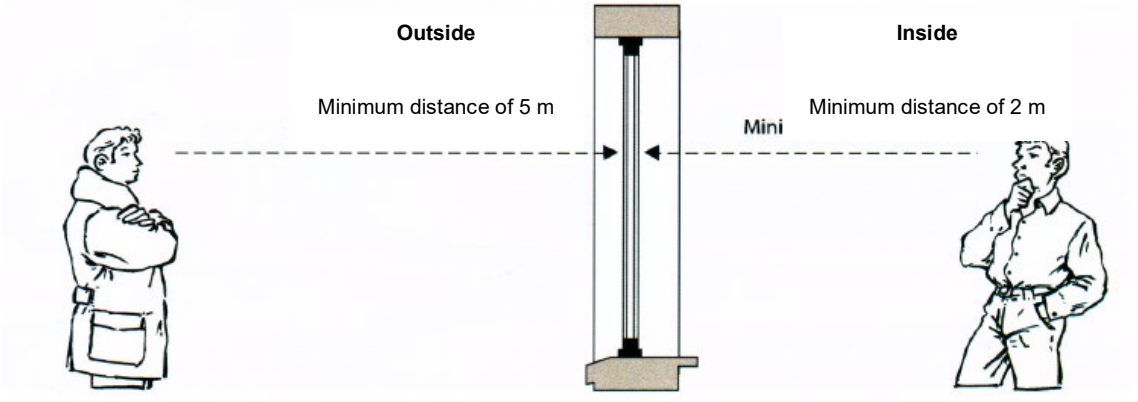
Complaint approved: ☐ Yes ☐ No

Annex 3: Complaints guide concerning windows

Please note:

Assessment criteria for deviations in quality in insulated glass units, prepared by the Association of Danish Window Manufacturers:

Glazing units must be assessed from the inside at a min. distance of 2 m in diffuse daylight (e.g. a cloudy sky) with no direct sunlight or artificial light.



When checking reflection, the distance from the outside must be at least 5 m.

Detailed descriptions of defects and their position on the glazing unit and perhaps also the position in the building (including the names of any contacts):

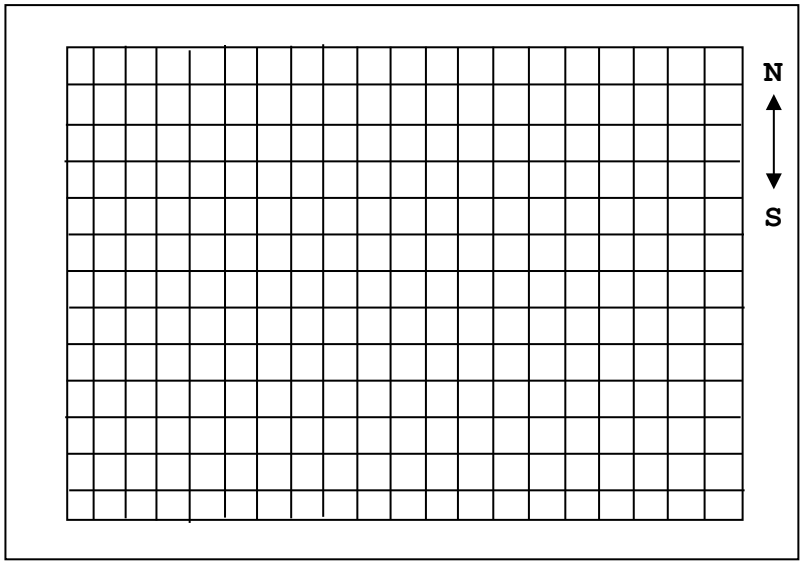
_____

_____

_____

Position of defect on the IGU:

The position of the window in the house – sketch seen from above (to be used in a survey, if any):



Annex 4: Form for use in in-house inspection of TIMBER windows

Unit no.	Unit type	Order no.	Unit no.									
1			1		2		3		4		5	
2												
3												
4												
5												

Inspection point (tick off)		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
A.	Are outer measurements in accordance with the order?										
B.	Are the measurements of frame and casement in agreement?										
C.	Is the joint spacing (distribution of air) between the casement and frame correct?										
D.	Is the surface treatment satisfactory?										
E.	Is the rounding of edges in accordance with the Technical Requirements?										
F.	Is the timber quality in accordance with the Technical Requirements?										
G.	Are all corner joints in casements and edges tight (mastic applied)?										
H.	Have glazing units, if any, been correctly installed and are they free from defects?										
I.	Are the glazing beads of the correct length, and are sealing strips completely tight and correctly compressed?										
J.	Is the ventilation (drainage) below insulated glass units correct?										
K.	Are joints and fixing of weather seals and sealing strips tight and in order?										
L.	Is the number of fastening points and the compression of weather seals according to plans?										
M.	Have screws in hardware components been tightened to the correct torque?										
N.	Is the timber moisture content 12 ±3%?										
O.	Has the unit been labelled acc. to the Technical Requirements?										
P.	Is the surface treatment, if any, in accordance with the Technical Requirements?										

If No is ticked, please state the letter and a description of the remedial measure here or overleaf:

Date:	Signature:

Annex 5: Form for use in in-house inspection of PVCu windows

Unit no.	Unit type	Order no.	Unit no.									
1			1		2		3		4		5	
2												
3												
4												
5												

	Inspection point (tick off)	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
A.	Are outer measurements in accordance with the order?										
B.	Are the measurements of frame and casement in agreement?										
C.	Is the casement placed symmetrically in relation to the frame?										
D.	Are the profile surfaces in order?										
E.	Are the corner alignments satisfactory?										
F.	Have outward opening casement corners been correctly rounded?										
G.	Are the corner joints of the glazing beads and the installation of the beads satisfactory, all things considered?										
H.	Have glazing units, if any, been correctly installed and are they free from defects?										
I.	Are joints of weather seals and sealing strips in order?										
J.	Have holes, if any, for the fixing of the frame been correctly positioned?										
K.	Has the reinforcement been positioned and fixed according to instructions?										
L.	Is the number of fastening points and the compression of weather seals according to plans?										
M.	Have screws in hardware components been tightened to the correct torque?										
N.	Are drains in casements and frames according to plans?										
O.	Has the unit been labelled acc. to the Technical Requirements?										

If No is ticked, please state the letter and a description of the remedial measure here or overleaf:

Date:	Signature:

Annex 6: Form for use in in-house inspection of METAL or FRP windows

Unit no.	Unit type	Order no.	Unit no.									
1			1		2		3		4		5	
2												
3												
4												
5												

	Inspection point (tick off)	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
A.	Are outer measurements in accordance with the order?										
B.	Are the measurements of frame and casement in agreement?										
C.	Is the casement placed symmetrically in relation to the frame?										
D.	Are the profile surfaces of uniform colour and without any scratches?										
E.	Are mitre and butt joints tight and plane on the surface?										
F.	Have outward opening casement corners been correctly rounded?										
G.	Are the corner joints of the glazing beads and the installation of the beads satisfactory, all things considered?										
H.	Have glazing units, if any, been correctly installed and are they free from defects?										
I.	Are joints of weather seals and sealing strips in order?										
J.	Have holes, if any, for the fixing of the frame been correctly positioned?										
K.	Is the power consumption in operating the closing function reasonably low?										
L.	Is the number of fastening points and the compression of weather seals according to plans?										
M.	Have screws in hardware components been tightened to the correct torque?										
N.	Are drains in casements and frames as well as sealing of inside corners according to plans?										
O.	Has the unit been labelled acc. to the Technical Requirements?										

If No is ticked, please state the letter and a description of the remedial measure here or overleaf:

Date:	Signature:

Annex 7: Form for use in in-house inspection of TIMBER/AL-UMINIUM windows

Unit no.	Unit type	Order no.	Unit no.									
1			1		2		3		4		5	
2												
3												
4												
5												

	Inspection point (tick off)	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
A.	Are outer measurements in accordance with the order?										
B.	Are the measurements of frame and casement in agreement?										
C.	Is the casement placed symmetrically in relation to the frame?										
D.	Are the profile surfaces of uniform colour and without any scratches?										
E.	Are mitre and butt joints tight and plane on the surface?										
F.	Are outward opening casement corners without any sharp edges?										
G.	Are the corner joints of the glazing beads and the installation of the beads satisfactory?										
H.	Have glazing units, if any, been correctly installed and are they free from defects?										
I.	Are the glazing beads of the correct length, and are sealing strips, if any, completely tight and correctly installed?										
J.	Have drains in the frame/post been completed?										
K.	Are the joints and fixing of sealing tapes and glazing gaskets tight and in order?										
L.	Is the number of fastening points and the compression of weather seals according to plans?										
M.	Have screws in hardware components been tightened to the correct torque?										
N.	Is the timber moisture content 12% ±3%?										
O.	Has the unit been labelled acc. to the Technical Requirements?										
P.	Is the surface treatment, if any, in accordance with the Technical Requirements?										

If No is ticked, please state the letter and a description of the remedial measure here or overleaf:

Date:	Signature:

Annex 8: Recording and evaluation of samples

Description of errors	MAT	Error category				Ref. Tech. Require-ments, sect.
		K	V	U	B	

in connection with product inspection visits

Specific defects:

Defect categories: K = critical, V = significant, U = immaterial, B = comment

5.0 Constructive design						
5.1 Constructive material protection						
Mastic application around bottom rail rebate:						5.1.1
Missing triangle joint/leaky joint (frame and casement)	**T/TA**		V			
Somewhat sloppy	**T/TA**				B	
Very sloppy	**T/TA**			U		
No seal of end grain against bottom step	**T/TA**		V			5.1.1
No taping of drilled-through lock case	**T/TA**			U		5.1.1
No taping of frame machined or drilled-through to wall side	**T/TA**		V			5.1.1
Holes and cracks behind drip sills, kick plates, etc. which may result in inappropriate water accumulation (pivot sections and V-grooves in doors and panels).	**T/TA**		V			5.1.1
Ventilation between sill and casement						5.1.1
compliance with between 100% and 70% of the requirement	**T/TA**				B	
compliance with between 70% and 30% of the requirement	**T/TA**			U		
missing completely or <30% of the requirement	**T/TA**		V			
individual drainage holes too small	**T/TA**			U		
Insufficient ventilation behind cladding	**TA**		V			5.1.1
No sealing between timber and aluminium at casement head/frames	**TA**		V			5.1.1
Drainage holes with connection to cavities containing reinforcement.	**P**		V			5.1.1
5.1.1 Installation of glazing unit and panel						
Blocking of insulated glazing units:						5.1.2
block insufficiently thick	**All**			U		(Annex 19)
block not fixed	**All**			U		
incorrect blocking (setting block)	**All**		V			
Drainage area:						5.1.2
compliance with between 100% and 70% of the requirement	**All**			U		
compliance with between 70% and 30% of the requirement	**All**		V			
missing completely or <30% of the requirement	**All**	K				
Individual drainage holes too small	**All**			U		
No sealing of grooves etc. whereby water may be channelled from an opening section to one below it with a glazing unit or panel	**All**		V			5.1.2
Bottom glazing beads and glazing beads made with butt/abutting						5.1.2
gap at individual ends 0.5 mm – 1 mm	**All**			U		
gap at individual ends >1 mm	**All**		V			
joint not flush >0.5 mm	**All**			U		9.3.1 – 9.6.1
Mitre joints in glazing bead:						5.1.2
gap between 0.3 mm and 0.6 mm	**All**			U		

Annex 8: Recording and evaluation of samples

Description of errors	MAT	Error category				Ref. Tech. Require-ments, sect.
		K	V	U	B	
gap in excess of 0.6 mm	All		V			
joint not flush >0.5 mm	All			U		9.3.1 – 9.6.1
Length of vertical glazing beads:						
If designed for clearance in relation to bottom glazing bead:						5.1.2
no sealing of end grain	All		V			5.1
clearance up to 1.5 mm too large or small in relation to stated tolerance	All			U		5.1.2
clearance more than 1.5 mm too large or small in relation to stated tolerance	All		V			5.1.2
no sealing towards the back at the end of the bead	All			U		
If designed for tight joint with bottom glazing bead:						5.1.2
gap at end of bead <0.6 mm	All			U		
gap at end of bead >0.6 mm	All		V			
Covering of glazing unit spacer bar:						5.1.2
spacer bar visible by up to 2 mm	All			U		
spacer bar visible by more than 2 mm	All		V			
Defects in fixing of glazing bead:	All					5.1.2
Uneven compression against the glazing unit	All			U		
Very uneven compression against the glazing unit	All		V			
Nailing of glazing beads:						5.1.2
nails/screws too short	T		V			
bead split by nailing	T			U		
bead split at ends	T		V			
nail spacing 15 - 20 cm	T			U		
nail spacing >20 cm	T		V			
Nails above/below surface:	T					5.1.1
<0.5 mm	T				B	
0.5 mm - 1.0 mm	T			U		
>1.0 mm	T		V			
Glazing gaskets:						
set too low by up to 1 mm	All				B	5.1.1
set too low by more than 1 mm	All		V			5.1.1
missing completely	All	K				5.1.1
weak compression	All			U		5.1.2
lack of contact	All		V			5.1.2
up to 1 mm too short	All				B	5.1.2
more than 1 mm too short	All			U		5.1.2

Annex 8: Recording and evaluation of samples

Description of errors	MAT	Error category				Ref. Tech. Require-ments, sect.
		K	V	U	B	
5.2 Dimensioning, size and strength						
Non-compliance with size and weight limitations	**All**		V			5.2.1
DVV labelling of units not entitled for labelling	**All**		V			3.1
Bowing ≥ 2 mm per m (max 4 mm)	**All**		V			5.2.1
Twisting of frame and casement ≥ 2 mm per 10 cm per m	**All**		V			5.2.1
Twisting of door leaves ≥ 4 mm above the height and width of the door leaf	**All**		V			5.2.1
Severe defect in fitting or fixing of hinges	**All**	K				5.2.1
Missing or overtightened screws in hardware (one third or more)	**All**		V			5.2.1
Missing or overtightened screws in hardware (less than one third)	**All**			U		5.2.1
Insufficient tightening of screws in hardware	**All**			U		9.2
Defects in operating handles or their fixing	**All**			U		8.1/9.2
Incorrect dimensioning and number of screws in door hinges	**All**		V			5.2.3
Screw and size of hole incompatible	**All**			U		5.2.1
Insufficient thickness of profile where load-bearing hardware is to be fitted	**Alumin-ium**		V			5.2.3
No reinforcement inserts, where required	**P**		V			5.2.1
No double skin or reinforcement for anchoring screws for hardware	**P**		V			5.2.3
More than 1 screw missing or spacing between screws for fixing of reinforcement deviates more than 5 cm from the calculated spacing	**P**			U		5.2.1
5.3 Tightness						
Compression of seal:	**All**					
Measured using a 10 cm wide paper strip	**All**					5.3.1
none	**All**		V			
too weak or hard	**All**			U		
Incorrect use/fitting of seals	**All**		V			5.3.1
Very leaky seal joint or defects in seal	**All**		V			5.3.1
Somewhat leaky seal joint or minor defects in seal	**All**			U		5.3.1
Insufficient number of fastening points	**All**		V			5.3.3

Description of errors	MAT	Error category				Ref. Tech. Require-ments, sect.
		K	V	U	B	
6.0 Materials and components						
6.1 Wooden profiles (softwood)						
Moisture content up to 1% above/below permitted limit (12% ± 3)	**T/TA**				B	6
Moisture content between 1 and 2% above/below permitted limit (12% ± 3)	**T/TA**			U		6
Moisture content deviating by more than 2% from permitted limit (12% ± 3)	**T/TA**		V			6
The measured average width of annual ring >4 mm	**T/TA**		V			6.1.1-4
Non-compliance with heartwood proportion 60% requirement:						6.1.1.1
Each profile in excess of 4 profiles between 40 and 60%	**T/TA**		V			
Each profile below 40%	**T/TA**		V			
More than 10 profiles out of 20 profiles are below 60%	**T/TA**	K				
Non-compliance with heartwood proportion 90% requirement:						6.1.1.1
Each profile in excess of 4 profiles between 80 and 90%	**T/TA**		V			
Each profile below 80%	**T/TA**		V			
More than 10 profiles out of 20 profiles are below 90%	**T/TA**	K				
Non-compliance with heartwood proportion requirement - larch						6.1.4
Each profile in excess of 4 profiles between 90 and 100%	**T/TA**		V			
Each profile below 90%	**T/TA**		V			
More than 10 profiles out of 20 profiles are below 100%	**T/TA**	K				
Exceeding requirements for specifications in Annex 12						6.1.1 – 6.1.4
Significant	**T/TA**		V			
Immaterial	**T/TA**			U		
Insignificant	**T/TA**				B	
6.1.2 Hardwood						
Deviation from the points listed in the table in 6.1.2						6.1.2
Significant	**T/TA**		V			
Immaterial	**T/TA**			U		
Insignificant	**T/TA**				B	
6.1.6 Finger-jointed timber						6.1.6
Checking profiles, proportion of heartwood, annual ring width and density, see 6.1	**FST**					
The profile of the joint - finger not between 6 and 20 mm	**TST**		V			
6.1.7 Laminated timber						6.1.7
Checking pre-production timber, heartwood and density, see 6.1	**LT**					
6.2 PVCu profiles						6.2
Distorted profile	**P**			U		
Extrusion stripes in profiles; traces from contraction during cooling	**P**			U		
Scored profile surface and similar defects arising before cutting	**P**			U		
6.3 Aluminium window profiles						6.3
Distorted profile	**Alumin-ium**			U		
Dents, scratches or similar defects in profile surface	**Alumin-ium**			U		
Extrusion stripes in profiles; traces from contraction during cooling	**Alumin-ium**			U		

Description of errors	MAT	Error category				Ref. Tech. Require-ments, sect.
		K	V	U	B	
Concave or convex surface	**Alumin-ium**			U		
Visible defects at insulator	**Alumin-ium**			U		
Assembly incorporates materials which pose a risk of corrosion	**Alumin-ium**		V			7.3.1
6.4 FRP profiles						6.4
Distorted profile	**FRP**			U		
Dents, scratches or similar defects in profile surface	**FRP**			U		
Extrusion stripes in profiles; traces from contraction during cooling	**FRP**			U		
Concave or convex surface	**FRP**			U		
6.6 Glazing units and glass						6.6
Distortion, defects in glass or impurities exceeding Annex 20: Visual deviations in quality in insulated glazing units.	**All**		V			
Non-approval cf. section on installation of glazing unit if it deviates from the description	**All**		V			
Cracked glazing unit	**All**		V			
Glazing unit not cleaned	**All**				B	
Labelling absent from order confirmation where glazing units have not been installed	**All**			U		0
6.8 Weather seals						6.8
Seals sticking to surface treatment	**All**			U		

Description of errors	MAT	Error category				Ref. Tech. Require-ments, sect.
		K	V	U	B	
7.0 Impregnation and surface treatment						
7.1 Timber						
No base coat (impregnation) applied	**T/TA**	K				7.1.2
Paint coat thickness on visible surfaces:						
Measured as an average on individual frames/casement sections						
Deviation of less than 10 µm below requirement	**T/TA**			U		
Deviation of in excess of 10 µm below requirement	**T/TA**		V			
Absorbing surface in areas with no requirement for coat thickness	**T/TA**					
Entirely untreated			V			
Slightly absorbing				U		
Insufficient adhesion (requirement: MBK Class 4 after 4 days of drying)	**T/TA**		V			7.1
Paint runs on visible surfaces:						7.1.2
Considerable occurrence of large droplets	**T/TA**		V			
Limited occurrence of large droplets	**T/TA**			U		
Small droplets	**T/TA**				B	
Paint wrinkles:						7.1.2
Severe wrinkling	**T/TA**			U		
Moderate wrinkling	**T/TA**				B	
Impurities in paint:						7.1.2
Extensive (> Ø2 mm and more than 2 per m/4 per m²)	**T/TA**		V			
Moderate	**T/TA**			U		
Insignificant	**T/TA**				B	
Difference in colour: (may be determined by Δ E measurement, if this is specified in the quality control system of the company).						7.1.2
considerable	**T/TA**		V			
moderate	**T/TA**			U		
insignificant	**T/TA**				B	
Scratches from handling:						7.1.2
large	**T/TA**		V			
moderate	**T/TA**			U		
insignificant	**T/TA**				B	
Pressure marks:						7.1.2
large	**T/TA**		V			
minor	**T/TA**			U		
insignificant	**T/TA**				B	
Torn (raised) fibre:						7.1.2
in excess of 0.1 mm	**T/TA**		V			
between 0.1 mm and 0.05 mm	**T/TA**			U		
up to 0.05 mm	**T/TA**				B	
Soiling:						7.1.2
severe	**T/TA**		V			
moderate	**T/TA**				B	
Surface treatment of door sill:						7.1.2
missing	**T/TA**		V			

Description of errors	MAT	Error category				Ref. Tech. Require-ments, sect.
		K	V	U	B	
7.2 Aluminium						
Coat thickness	**Alumin-ium**					
Average of the individual item is below 40 µm for wet application of paint and 50 µm for powder coating	**Alumin-ium**		V			7.3.1
Average of the entire sample falls outside of 50 - 120 µm for powder coating and 40 - 70 µm for wet application of paint (recorded as 1 defect for the entire sample)	**Alumin-ium**				B	7.3.1
Average of anodized surface is below 20 µm on the outside or 15 µm on the inside (recorded as 1 defect for the entire sample)	**Alumin-ium**		V			7.3.2
Insufficient adhesion	**Alumin-ium**		V			7.3.1
Paint runs on visible surfaces:						7.3.1
considerable occurrence of large droplets	**Alumin-ium**		V			
limited occurrence of large droplets	**Alumin-ium**			U		
small droplets	**Alumin-ium**				B	
Longitudinal paint runs on profile edges:						7.3.1
extensive	**Alumin-ium**		V			
moderate	**Alumin-ium**			U		
insignificant	**Alumin-ium**				B	
Paint wrinkles:						7.3.1
severe wrinkling	**Alumin-ium**		V			
moderate wrinkling	**Alumin-ium**				B	
Impurities and blisters in paint:						7.3.1
Up to 2 per m / 4 per m²						
Defects exceeding Ø 2.0 mm	**Alumin-ium**			U		
In excess of 2 per m / 4 per m²						
Defects exceeding Ø 2.0 mm	**Alumin-ium**		V			
Defects in the range Ø 0.5 mm – 2.0 mm:	**Alumin-ium**			U		
Irrespective of their number, defects of less than Ø 0.5 mm do not count as defects **unless** they appear in clusters which make them visible from a distance of 1.5 m	**Alumin-ium**					
As above but in clusters	**Alumin-ium**			U		
Differences in colour or sheen:						7.3.1/7.3.2
considerable (higher than stated in GSB AL 9.20 or by a Δ E measurement, if the tolerance is specified in the quality control system of the company)	**Alumin-ium**		V			
moderate	**Alumin-ium**			U		
insignificant	**Alumin-ium**				B	
Scratches from handling:						7.3.1/7.3.2

Description of errors	MAT	Error category				Ref. Tech. Require-ments, sect.
		K	V	U	B	
penetrating through to the base	**Alumin-ium**		V			
in the paint coat	**Alumin-ium**			U		
removable by polishing	**Alumin-ium**				B	
Soiling:						7.3.1/7.3.2
severe	**Alumin-ium**			U		
Moderate	**Alumin-ium**				B	

Description of errors	MAT	Error category				Ref. Tech. Require-ments, sect.
		K	V	U	B	
7.3 Plastics						7.2
Smudging by printing ink from protective foil	**P**			U		
Differences in colour or sheen				U		
considerable	**P**		V			
Moderate	**P**			U		
insignificant	**P**				B	
7.4 FRP						7.4
Pinholes:						
Diameter 0.5 - 1.00 mm, exceeding 1 per running metre					B	
exceeding 2 per running metre	**FRP**			U		
exceeding 3 per running metre	**FRP**		V			
Diameter 1.0– 1.5 mm, exceeding 1 per running metre				U		
exceeding 2 per running metre	**FRP**		V			
Paint runs on visible surfaces:						7.4
Small droplets	**FRP**				B	
Limited occurrence of large droplets	**FRP**			U		
Considerable occurrence of large droplets	**FRP**		V			
Foreign bodies:						7.4
Diameter < 0.5 mm, exceeding 2 per running metre					B	
exceeding 3 per running metre	**FRP**			U		
exceeding 4 per running metre	**FRP**		V			
Diameter 0.5 - 1.00 mm, exceeding 1 per running metre					B	
exceeding 2 per running metre	**FRP**			U		
exceeding 3 per running metre	**FRP**		V			
Diameter 1.0– 1.5 mm, exceeding 1 per running metre				U		
exceeding 2 per running metre	**FRP**		V			
Volcanoes / shrinkage cavities:						7.4
Diameter < 0.5 mm, exceeding 2 per running metre					B	
exceeding 3 per running metre	**FRP**			U		
exceeding 4 per running metre	**FRP**		V			
Diameter 0.5 - 1.00 mm, exceeding 1 per running metre					B	
exceeding 2 per running metre	**FRP**			U		
exceeding 3 per running metre	**FRP**		V			
Diameter 1.0– 1.5 mm, exceeding 1 per running metre				U		
exceeding 2 per running metre	**FRP**		V			
Raised fibres:						7.4
Diameter < 0.5 mm, exceeding 2 per running metre					B	
exceeding 3 per running metre	**FRP**			U		
exceeding 4 per running metre	**FRP**		V			
Diameter 0.5 - 1.00 mm, exceeding 1 per running metre					B	
exceeding 2 per running metre	**FRP**			U		
exceeding 3 per running metre	**FRP**		V			
Diameter 1.0– 1.5 mm, exceeding 1 per running metre				U		
exceeding 2 per running metre	**FRP**		V			

Description of errors	MAT	Error category				Ref. Tech. Require-ments, sect.
		K	V	U	B	
Paint coat thickness of surface treatment on visible surfaces:						7.4
Deviation in excess of 10% from the stated coat thickness	**FRP**			U		
Deviation in excess of 20% from the stated coat thickness	**FRP**		V			
(Coat thickness deficiency counts as 1 defect for the entire sample)	**FRP**					
Differences in colour or sheen				U		7.4
considerable	**FRP**		V			
moderate	**FRP**			U		
insignificant	**FRP**				B	
8.0 Function						
Tilt/turn hardware has no mal-operation stop	**All**		V			8.1
No device securing casement in cleaning position in reversible windows	**All**		V			
Wrong size of turn hardware (casement turns too high)	**All**		V			
Striker plate not protecting frame edges	**All**		V			
Other substantial defects in overall closing function	**All**		V			
Other insignificant defects in overall closing function	**All**			U		
8.1 Burglary prevention						
Insufficient burglary-resistant installation of insulated glazing units	**All**		V			8.1

Description of errors	MAT	Error category				Ref. Tech. Require-ments, sect.
		K	V	U	B	
9.0 Finishing						
9.1 Measurement tolerances						9.1
External frame measurement:						
Deviations >2 mm than permitted	**All**		V			
Profile cross-section:						
Deviations >0.5 mm than permitted	**All**			U		
Deviations >1.0 mm than permitted	**All**		V			
Overturning of glazing bars:	**All**					
> Δ 2.0 mm (end to end, and flush)	**All**		V			
Glued glazing bars	**All**					
Max. deviation from planned gap at ends - inside	**All**					
>0.2 mm	**All**			U		
>0.4 mm	**All**		V			
Uneven gap at ends >0.2 mm	**All**			U		
Max. deviation from planned gap at ends - outside	**All**					
>0.2 mm	**All**			U		
>0.4 mm	**All**		V			
Uneven gap at ends >0.3 mm	**All**			U		
No bonding to outside	**All**		V			
No bonding to inside	**All**			U		
9.2 Fitting						9.2
Clearance between casement and frame seen from the inside deviates more than 2 mm from the nominal value	**All**		V			
Hardware placed incorrectly in relation to the edges of the unit; defects in the recess for the hardware, including fibre strands around recess	**All**			U		
Screw screwed in deviates more than 10 degrees from intended				U		
Uneven gap between hinge parts (casement/frame hinge):	**All**					
gap between 0.5 mm and 1 mm	**All**				B	
gap in excess of 1 mm	**All**			U		
Adjustable hardware parts not in the central position	**All**			U		
9.3 Machining of wood						9.3
Rough surface/rough wood structure						9.3
On visible surfaces	**T/TA**			U		
Very rough on visible surfaces	**T/TA**		V			
Open end grain in casements	**T/TA**		V			
Cutting edge depth in excess of 0.5 mm	**T/TA**				B	
Reduced thickness at profile ends						9.3
in excess of 0.1 mm	**T/TA**		V			
between 0.1 mm and 0.05 mm	**T/TA**			U		
up to 0.05 mm	**T/TA**				B	
Torn surface around knots/other cross grain with a depth above 0.5 mm	**T/TA**			U		9.3
Shavings marks in excess of 0.3 mm	**T/TA**			U		
Cutter marks in excess of 2 mm	**T/TA**			U		
Stripes caused by chipped cutter	**T/TA**			U		
Roller mark	**T/TA**			U		
Stripes/marks by shavings stuck in the machine	**T/TA**			U		

Description of errors	MAT	Error category				Ref. Tech. Require-ments, sect.
		K	V	U	B	
Torn-off splinters						9.3
>35 mm²	**T/TA**		V			
Rounding of edges						9.3
Missing completely	**T/TA**		V			
Less than required R <1.5 mm against exterior sides and R <0.5 mm on others				U		
Lacking alignment and joint not flush in corner rebate joints:						9.3.1
up to 0.5 mm	**T/TA**				B	
between 0.5 mm and 1 mm	**T/TA**			U		
in excess of 1 mm	**T/TA**		V			
Corner joints and exterior dovetail joints not tight:						9.3.1
up to 0.3 mm	**T/TA**				B	
between 0.3 mm and 0.6 mm	**T/TA**			U		
in excess of 0.6 mm	**T/TA**		V			
No glue joint (<2/3 filled per pin)	**T/TA**		V			
No glue joint (>2/3 filled per pin)	**T/TA**			U		
Splits caused by jointing:	**T/TA**		V			
9.4 Plastic machining						
Cuts and scratches from machining and handling	**P**			U		9.4
Loose plastic or metal shavings in rebates or on weather seals	**P**			U		9.4
Faulty alignment of weld	**P**			U		9.4
Fibre strands where item has been machined or at profile ends	**P**			U		9.4
Joints not tight	**P**		V			9.4.1
Joint not flush	**P**			U		9.4.1
Anchoring defects in connection with jointing	**P**		V			9.4.1
9.5 Aluminium machining						
Cuts and scratches from machining and handling	**ALU/TA**			U		9.5
No sealing of holes in upwards facing profiles exposed to water ingress	**ALU/TA**			U		9.5
No corner and angle plates	**ALU/TA**			U		9.5.1
No sealing of sill rebate of countercut-assembled door frame	**ALU/TA**		V			9.5.1
Joints not tight						
Gap of up to 0.3 mm	**ALU/TA**				B	9.5.1
Gap between 0.3 mm and 0.6 mm	**ALU/TA**			U		
Gap in excess of 0.6 mm	**ALU/TA**		V			
Joint not flush (mitre cuts)						9.5.1
Offset of up to 0.3 mm	**ALU/TA**				B	
Offset between 0.3 mm and 0.6 mm	**ALU/TA**			U		
Offset in excess of 0.6 mm	**ALU/TA**		V			
Joint not flush (butt/abutting)						9.5.1
Adjoining profile >0.5 mm over through-going profile	**ALU/TA**			U		
Adjoining profile >1.0 mm over through-going profile	**ALU/TA**		V			
Fibre strands/burrs where item has been machined/shortened	**ALU/TA**			U		
Loose shavings in rebates or on weather seals	**ALU/TA**			U		9.5.1
Pointed/sharp edges	**ALU/TA**		V			

Description of errors	MAT	Error category				Ref. Tech. Require-ments, sect.
		K	V	U	B	
9.6 FRP machining						
Cuts and scratches from machining and handling	**FRP**			U		9.6
No sealing of holes in upwards facing profiles exposed to water ingress	**FRP**			U		9.6
No corner and angle plates	**FRP**			U		9.6.1
No sealing of sill rebate of countercut-assembled door frame	**FRP**		V			9.6.1
Joints not tight						9.6.1
Gap of up to 0.3 mm	**FRP**				B	
Gap between 0.3 mm and 0.6 mm	**FRP**			U		
Gap in excess of 0.6 mm	**FRP**		V			
Joint not flush (mitre cuts)						9.6.1
Offset of up to 0.3 mm	**FRP**				B	
Offset between 0.3 mm and 0.6 mm	**FRP**			U		
Offset in excess of 0.6 mm	**FRP**		V			
Joint not flush (butt/abutting)						9.6.1
Adjoining profile >0.5 mm over through-going profile	**FRP**			U		
Adjoining profile >1.0 mm over through-going profile	**FRP**		V			
Fibre strands/burrs where item has been machined or short-ened	**FRP**			U		
Loose shavings in rebates or on weather seals	**FRP**			U		9.6.1
Pointed/sharp edges	**FRP**		V			

Annex 9: Treatment systems - penetration requirements

Treatment systems may be entered in the list of approved treatment systems subject to the following conditions:

Treatment systems for softwood

Treatment system 1:
The **base coat** may consist of a solvent- or CO_2-based preservative with the application method employing vacuum or super critical impregnation.

Absorption must meet the requirements regarding critical value in accordance with EN 599-1.

Penetration must meet the requirements for Class NP3 in EN 351-1 (i.e. at least 6 mm lateral penetration in sapwood).

The impregnation solution used must provide effective protection against fungal attack and meet the performance requirements when testing in accordance with risk Class 3, cf. 6.3 paragraph b) and Table 3 of EN 599-1, including blue stain testing.

The preservative used must further be approved by the Danish Environmental Protection Agency.

The impregnation process must be performed in an impregnation plant subject to in-house and external inspection procedures in accordance with current EN standards or as agreed with the Technical Committee.

Surface treatment must be performed using products and methods resulting in a treatment meeting the following requirements including performance requirements in accordance with EN 927-1:

- The use classification must be ***stable*** - cf. 4.1 and Table 1 (suitable for use on a stable base such as windows and doors).
- A range must be stated for the coat thickness approved by the supplier.
- The treatment must be opaque or semi-transparent - cf. 4.3.3 a) and b).

It must be possible to trace the product used back to the tests on which the supplier's product classification is based.

Treatment system 2:
The **base coat** may consist of a solvent- or CO_2-based preservative with the application method employing vacuum or supercritical impregnation.

Absorption must meet the requirements regarding critical value in accordance with EN 599-1.

Penetration must meet the requirements for Class NP2 in accordance with EN 351-1 (i.e. at least 3 mm lateral penetration in sapwood).

The impregnation solution used must provide effective protection against fungal attack and meet the performance requirements when testing in accordance with risk Class 3, cf. 6.3 paragraph b) and Table 3 of EN 599-1, including blue stain testing.

The preservative used must further be approved by the Danish Environmental Protection

Agency.

The impregnation process must be performed in an impregnation plant subject to in-house and external inspection procedures in accordance with current EN standards or as agreed with the Technical Committee.

Surface treatment must be performed using products and methods resulting in a treatment meeting the following requirements including performance requirements in accordance with EN 927-1:

- The use classification must be ***stable*** - cf. 4.1 and Table 1 (suitable for use on a stable base such as windows and doors).
- A range must be stated for the coat thickness approved by the supplier.
- The treatment must be opaque or semi-transparent - cf. 4.3.3 a) and b).

It must be possible to trace the product used back to the tests on which the supplier's product classification is based.

Treatment system 2 ØKO:
Application of **base coat** with a fungicide, usually applied by dipping, flow-coat or similar.

Surface treatment must be performed using products and methods resulting in a treatment meeting the following requirements including performance requirements in accordance with EN 927-1:

- The use classification must be ***stable*** - cf. 4.1 and Table 1 (suitable for use on a stable base such as windows and doors).
- A range must be stated for the coat thickness approved by the supplier.
- The treatment must be opaque or semi-transparent - cf. 4.3.3 a) and b).

The combined base coat and surface treatment system must contain fungicides of a type and in a quantity so that when tested in accordance with EN 152 it achieves Grade 1.

Alternatively, surface mould resistance for the entire system may be documented by testing in accordance with EN 927-3 and subsequent evaluation in accordance with EN 16492, Annex A, Table A.3. The sum of the surface mould assessments for the three single units 'after exposure and washing' must be below or equal to 3.

The blue-stain free zone inside the tested profiles must be at least 1 mm with a mean value for the test series of at least 1.5 mm.
Changing the intermediate coat(s) between base and top coat will not require renewed testing.

It must be possible to trace the products used back to the tests on which the supplier's product and system classifications are based.

The profiles/units may be aged either by 6 months of natural exposure, cf. EN 152-1 or by 4 weeks in a QUV Accelerated Weathering Tester, cf. proposal for revised edition of EN 152-1.

Treatment systems for hardwood

Treatment system 3: (transparent)
Application of **base coat** consisting of a timber preservative, usually applied by dipping or flow-coat.

The preservative used must meet the performance requirements regarding testing in accordance with Risk Class 2, cf. 6.2 and Table 2 of EN 599-1.

Surface treatment may be semi-transparent or transparent, including oil treatment, cf. 4.3.3 of EN 927-1.

Treatment system 4: (opaque)
Application of **base coat** as in treatment system 3.

Surface treatment must be performed using products and methods resulting in a treatment meeting the following requirements including performance requirements in accordance with EN 927-1:

- The use classification must be ***stable*** - cf. 4.2 and Table 1 (suitable for use on a stable base such as windows and doors).
- A range must be stated for the coat thickness approved by the supplier.
- The treatment must be opaque - cf. 4.3.3 a).

It must be possible to trace the product used back to the tests on which the supplier's product classification is based.

Treatment system for timber/aluminium units

Treatment system 5:
This treatment system applies to timber units with an external cladding of aluminium or another resistant inorganic material ensuring that unwanted moisture absorption in the timber is only possible for limited periods of time and to a limited extent.

Application of **base coat** with a fungicide, usually applied by dipping, flow-coat or similar.

Surface treatment must be performed using products and methods resulting in a treatment meeting the following requirements including performance requirements in accordance with EN 927-1:

- The use classification must be ***stable*** - cf. 4.1 and Table 1 (suitable for use on a stable base such as windows and doors).
- A range must be stated for the coat thickness approved by the supplier.
- The treatment must be opaque semi-transparent or transparent - cf. 4.2.2. a), b) and c).

The combined base coat and surface treatment system must contain fungicides of a type and in a quantity so that when tested in accordance with EN 152 - Part 1 it achieves Grade 1.

The blue-stain free zone inside the tested profiles must be at least 1 mm with a mean value for the test series of at least 1.5 mm. Alternatively, surface mould resistance for the entire system may be documented by testing in accordance with EN 927-3 and subsequent evaluation in accordance with EN 16492, Annex A, Table A.3. The sum of the surface mould assessments for the three single units 'after exposure and washing' must be below or equal to 3.

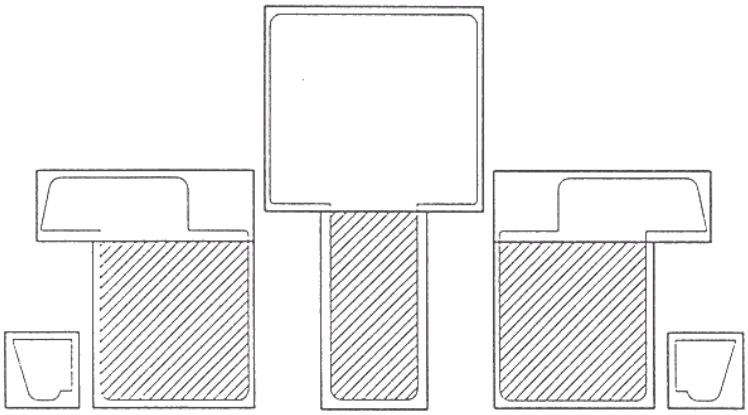
Changing the intermediate coat(s) between base and top coat will not require renewed testing.

It must be possible to trace the products used back to the tests on which the supplier's product and system classifications are based.

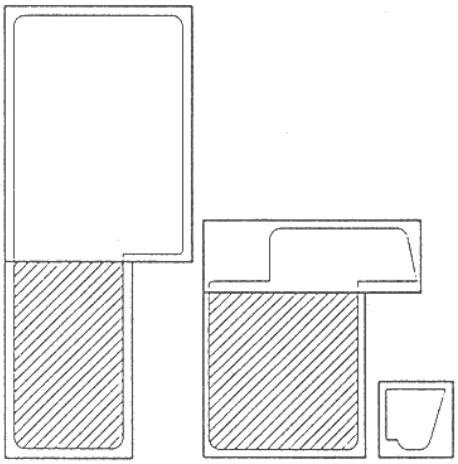
The profiles/units may be aged either by 6 months of natural exposure, cf. EN 152, or by 4 weeks in an accelerated weathering tester, cf. EN 152 - Annex F.

Annex 10: Requirements for the minimum proportion of heartwood

Schematic diagram - outward opening windows:



Cross-sectional view of mullion with casements



Cross-sectional view of side/top frame with casement

For laminated profiles, the requirement applies to each slat.

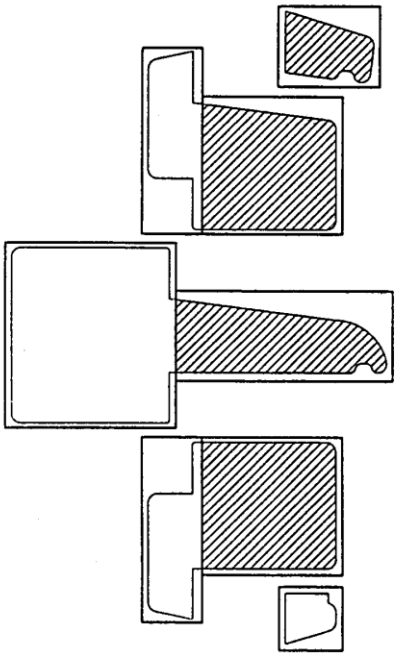
Rabbets and similar seals can be made without requirements for heartwood proportion

Requirement for heartwood proportion

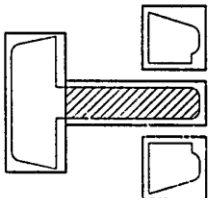
No requirement for heartwood proportion

Annex 10: Requirements for the minimum proportion of heartwood

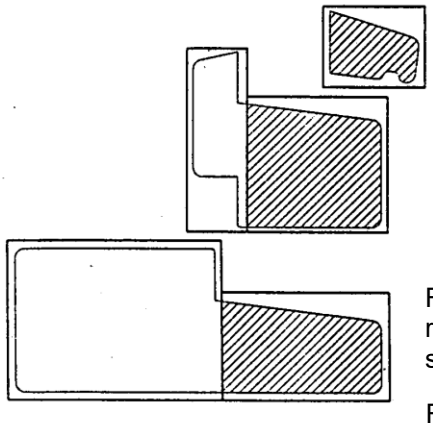
Schematic diagram - outward opening windows:



Cross-sectional view of transion and casements



Cross-sectional view of horizontal glazing bar



Cross-sectional view of sill and casement

For laminated profiles, the requirement applies to each slat.

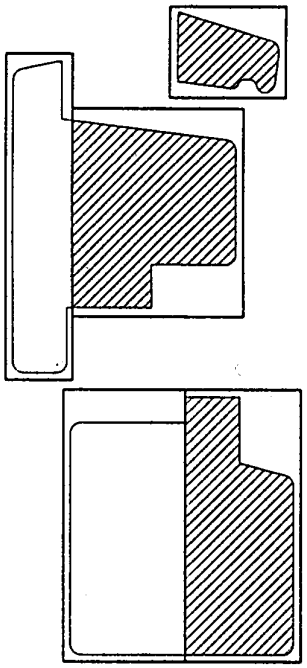
Rabbets and similar seals can be made without requirements for heartwood proportion

Requirement for heartwood proportion

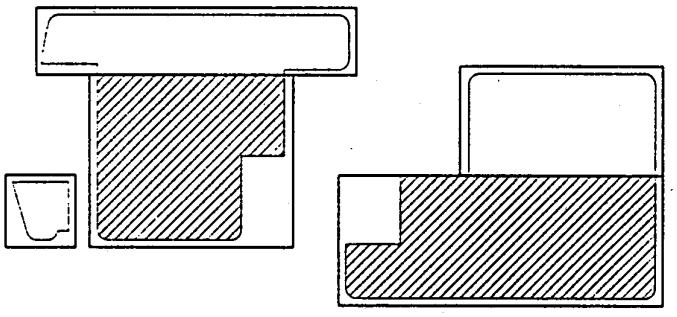
No requirement for heartwood proportion

Annex 10: Requirements for the minimum proportion of heartwood

Schematic diagram - inward opening windows:



Cross-sectional view of sill and casement



Cross-sectional view of side/top frame with casement

For laminated profiles, the requirement applies to each slat.

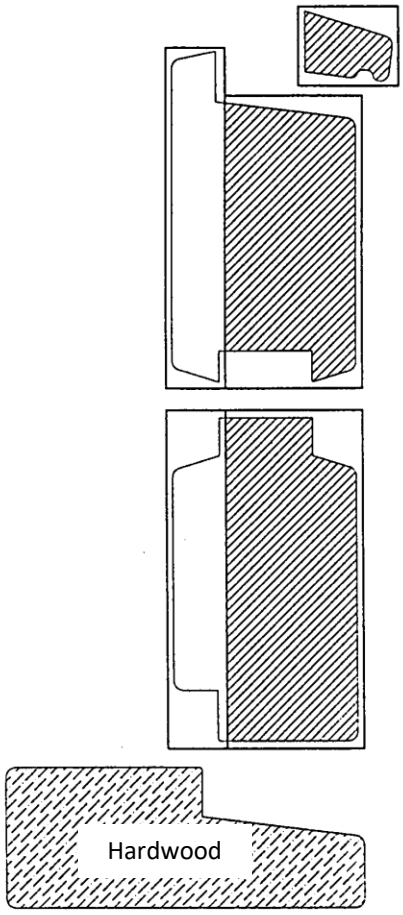
Rabbets and similar seals can be made without requirements for heartwood proportion

Requirement for heartwood proportion

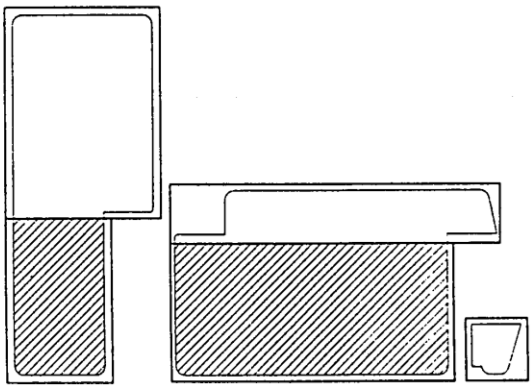
No requirement for heartwood proportion

Annex 10: Requirements for the minimum proportion of heartwood

Schematic diagram - outward opening doors:



Cross-sectional view of sill and casement



Cross-sectional view of side/top frame and casement

For laminated profiles, the requirement applies to each slat.

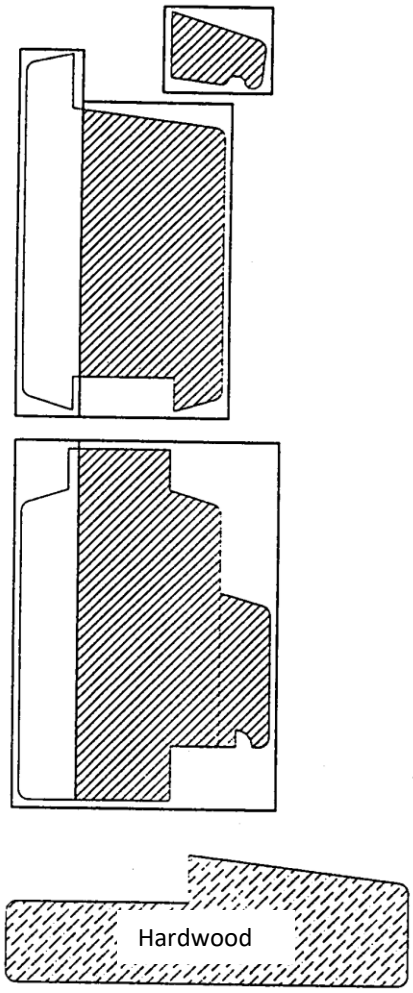
Rabbets and similar seals can be made without requirements for heartwood proportion

Requirement for heartwood proportion

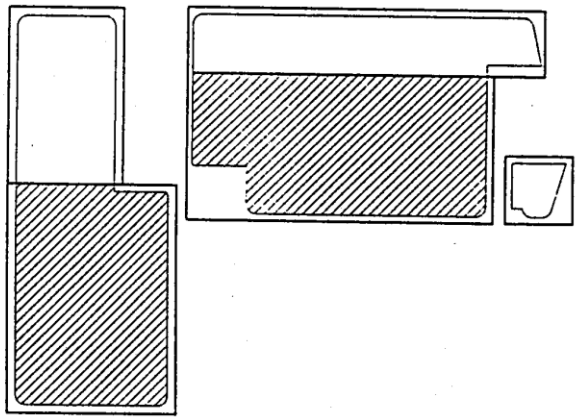
No requirement for heartwood proportion

Annex 10: Requirements for the minimum proportion of heartwood

Schematic diagram - inward opening doors:



Cross-sectional view of sill and casement



Cross-sectional view of side/top frame and casement

For laminated profiles, the requirement applies to each slat.

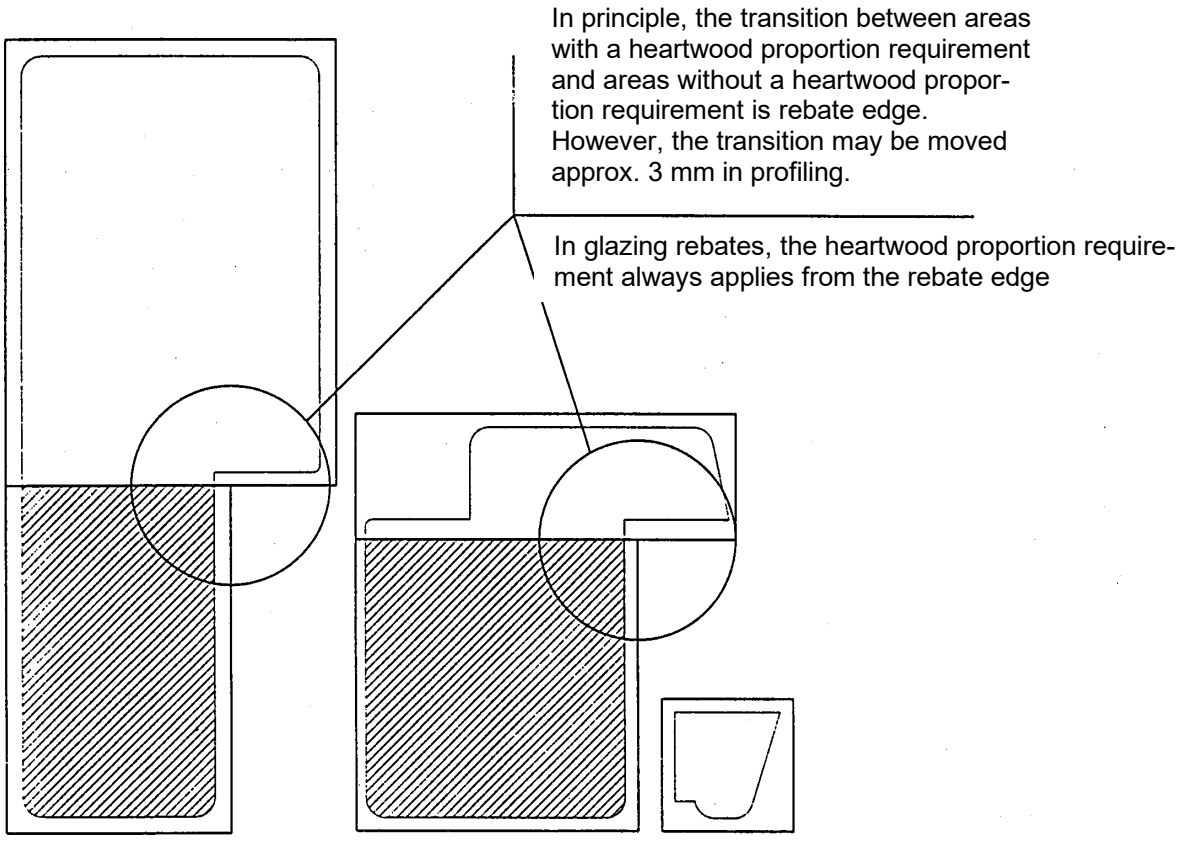
Rabbets and similar seals can be made without requirements for heartwood proportion

Requirement for heartwood proportion

No requirement for heartwood proportion

Annex 10: Requirements for the minimum proportion of heartwood

Schematic diagram:



For laminated profiles, the requirement applies to each slat.

Rabbets and similar seals can be made without requirements for heartwood proportion.

Requirement for heartwood proportion

No requirement for heartwood proportion

Annex 11a: Paradigm for the declaration of pine

Sawmill name and address:	
Association membership mark(s)/logo(s)	
As suppliers of pine for window and door manufacture, we declare:	
That the timber has not been felled illegally, and that it conforms to EU regulation no. 995/2010	
That the heartwood diameter of the log at the top end exceeded 50% of the top diameter	
That planks * and boards have been sawn from a butt log with a top diameter in excess of 200 mm or the following log (log no. 2) with a top diameter in excess of 170 mm	*
That the log has been handled and stored in a way so as not to incur risk of bacterial attack	
That the moisture content is 12 ± 2% for joinery and 18 ± 4% when dry for dispatching	**
That, as a mean value, the width of the annual rings is less than 4 mm	**
That, as a mean value, the density is above 500 kg/m³ (12 ±2% moisture) - (for finger-jointed timber a density above 480 kg/m³)	***
That the wood has not been treated with a chemical preservative	
In finger-jointed wood, the tensile strength of the joint must as a minimum be equivalent to a bending stress of 45 Mpa	
For treatment system 2 ØKO	
That 80% of the planks have a heartwood proportion in excess of 90% cf. Annex 10 and Section 6.1.1.1	**
That the heartwood proportion in the remaining planks is in excess of 80%	**
For treatment systems 1 and 2	
That 60% of the planks have a heartwood proportion in excess of 60% cf. Annex 10 and Section 6.1.1.1	**
That the heartwood proportion in the remaining planks is in excess of 40%	**

*) Planks are defined as all dimensions with a thickness in excess of 48 mm.
**) Sampling (sample size) in accordance with Svensk Standard (Swedish Standard) SS 232740.
***) When documenting density, it is recommended to indicate the weight and volume on each pack.

Company stamp:	Place and date:	Valid until: (3 years)	Signature:

Annex 11b: Paradigm for the declaration of hardwood

Sawmill name and address:	
Association membership mark(s)/logo(s)	
As suppliers of hardwood for window and door manufacture, we declare:	
Type of wood:	
That the timber has not been felled illegally, and that it conforms to EU regulation no. 995/2010	
That the moisture content is 12 ± 2% for joinery and 18 ± 4% when dry for dispatching	*
The slope of grain generally does not exceed 1:10	
No knots apart from a few rooted pearl knots	
Bowing acc. to EN1530 Class 3	
Max. twisting 2 mm per 10 cm workpiece width measured over 1 m	
No visible radial cracks	
Absence of: Ring shakes, thunder shakes, brittle heart, overgrowth, insect holes >2 mm, rot, sapwood, pith, reaction wood	
Minimum density at (12 ± 2% moisture)** must be stated	
In finger-jointed wood, the tensile strength of the joint must as a minimum be equivalent to a bending stress of 45 Mpa	

*) Sampling (sample size) in accordance with Svensk Standard (Swedish Standard) SS 232740.
**) When documenting density, it is recommended to indicate the weight and volume on each pack.

Company stamp:	**Place and date:**	**Valid until: (3 years)**	**Signature:**

Annex 11c: Paradigm for the declaration of spruce

Sawmill name and address:	
Association membership mark(s)/logo(s)	
As suppliers of spruce for window and door manufacture we declare:	
That the timber has not been felled illegally, and that it conforms to EU regulation no. 995/2010	
That planks * and boards have been sawn from a butt log	*
That the log has been handled and stored in a way so as not to incur risk of bacterial attack	
That the moisture content is 12 ± 2% for joinery and 18 ± 4% when dry for dispatching	
That, as a mean value, the width of the annual rings is less than 4 mm	
That , as a mean value, the density is above 450 kg/m³ at 12% moisture content)	
That the wood has not been treated with a chemical preservative	
In finger-jointed wood, the tensile strength of the joint must as a minimum be equivalent to a bending stress of 45 Mpa	

*) Planks are defined as all dimensions with a thickness in excess of 48 mm.

Company stamp:	**Place and date:**	**Valid until: (3 years)**	**Signature:**

Annex 11d: Paradigm for the declaration of larch

Sawmill name and address:	
Association membership mark(s)/logo(s)	
As suppliers of larch for window and door manufacture we declare:	
That the timber has not been felled illegally, and that it conforms to EU regulation no. 995/2010.	
That the heartwood diameter of the log at the top end exceeded 50% of the top diameter	
That planks * and boards have been sawn from a butt log with a top diameter in excess of 200 mm or the following log (log no. 2) with a top diameter in excess of 170 mm	*
That the log has been handled and stored in a way so as not to incur risk of bacterial attack	
That the moisture content is 12 ± 2% for joinery and 18 ± 4% when dry for dispatching	**
That, as a mean value, the width of the annual rings is less than 4 mm	**
That, as a mean value, the density is above 500 kg/m³ (12 ± 2% moisture)	***
That the wood has not been treated with a chemical preservative	
In finger-jointed wood, the tensile strength of the joint must as a minimum be equivalent to a bending stress of 45 Mpa	
That 80% of the planks have a heartwood proportion of 100% cf. Annex 10 and Section 6.1.4	**
That the heartwood proportion in the remaining planks is in excess of 90%	**

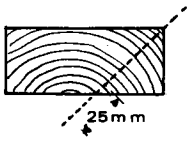
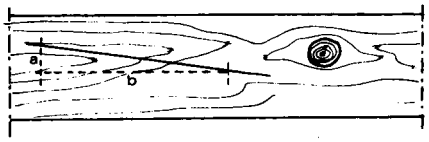
*) Planks are defined as all dimensions with a thickness in excess of 48 mm.
**) Sampling (sample size) in accordance with Svensk Standard (Swedish Standard) SS 232740.
***) When documenting density, it is recommended to indicate the weight and volume on each pack.

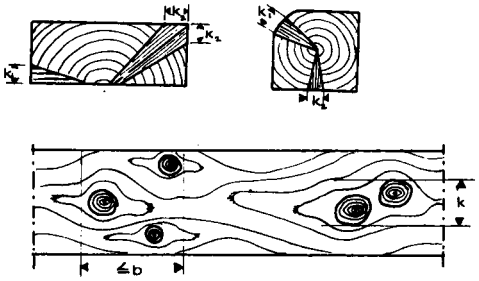
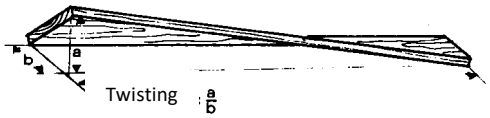
Company stamp:	**Place and date:**	**Valid until: (3 years)**	**Signature:**

Annex 12 Definitions and measuring rules - wood

Definitions and measuring rules

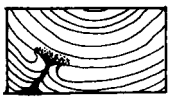
Please refer to the manual “Nordisk kvalitetssprog for træbranchen – nåletræ” ('The Nordic language of quality for the timber industry - softwood') ISBN 87-7756-568-1, published by Markaryds Grafiska, May 2000, extracts of which can be found in the following 6 pages.

Definitions	Measuring rules
1. ***Wood species*** *Wood species refers to a woody plant growing to a height in excess of 2 metres and unambiguously determined by its Latin double name followed by the name, often in abbreviated form, of the botanist who described and named the tree species.*	*A wood species cut into timber or planks is often determined empirically on the basis of the colour, annual ring pattern and knots of the wood. In case of doubt, it is possible to determine accurately the wood species using a magnifying glass or microscope.*
2. ***Moisture content*** *Timber moisture content refers to the amount of water in the timber expressed as a percentage of the weight of the dry timber. Timber may be classed in one of four moisture categories:* *1. 20 ± 5 % air-dried* *2. max. 20% structural timber* *3. 12 ± 3% joinery dry* *4. 8 ± 2% furniture dry*	*The moisture content of the timber can be measured using the weigh-and-dry method, drying the timber to a constant weight at 103°C ± 2°C and calculating the moisture content as a percentage of the dry weight of the timber. In the region of approx. 7% to approx. 28% moisture, the moisture content can be measured using an electrical timber moisture meter calibrated for measuring the wood species in question.*
3. ***Annual ring*** *Annual ring or growth ring refers to the diameter increment marking appearing in a cross-section as a more or less circular ring around the pith.*	*The width of the annual rings is measured along a radius and is the mean width of the annual rings appearing in a cross-section along the longest radius and measured outwards starting 25 mm from the pith.*  Ex: 68 annual rings: 95 mm Annual ring width: 1.4 mm
4. ***Slope of grain*** *The term slope of grain denotes the deviation of the workpiece fibre direction from the longitudinal direction of the workpiece. Smaller local slope of grain deviations e.g. around knots do not count toward the workpiece slope of grain.*	*Slope of grain is measured on the sapwood side of the timber, both the wide and narrow sides, using a scriber as stipulated in EN 1995-1-1. Often, the slope of grain can be seen along shrinkage splits.*  Slope of grain

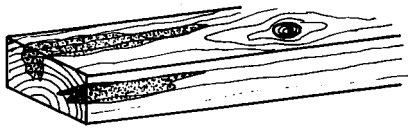
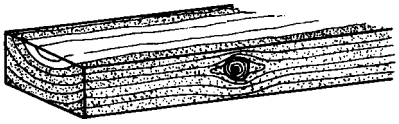
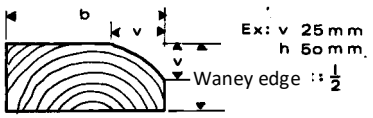
Definitions	Measuring rules
5. ***Knot*** *A knot is part of a branch which has been encased by the trunk. A collection of two or more knots in an area the width of which equals the width of the side of the workpiece and the length of which equals the width of the side of the workpiece or a max. of 150 mm is called a group of knots. You may further distinguish between loose knots, bark ring knots, decayed knots and knotholes.*	*A knot is measured on each of the workpiece sides as the distance between the tangents to the circumference of the knot running parallel to the workpiece edges. Edge knots are measured on both sides of the edge. A group of knots is measured as the sum of the size of each knot in the group. Where knots overlap, the overlap is only measured once.* 
6. ***Bowing and cupping*** *Bowing refers to the workpiece being bent in a longitudinal and cupping in a transverse direction.*	*Bowing is measured as the bending of the workpiece in a longitudinal direction in relation to its length; cupping is measured as the bending in a transverse direction in relation to its width. A 1 mm bowing may be indicated as e.g. 1:1000 (when the length/width is 1000 mm).*
7. ***Twisting*** *Twisting or warping refers to a workpiece cut at right angles being twisted round its longitudinal axis, making a corner on one side deviate from the common plane of the corners.*	*Twisting is measured over a certain length and is given as the difference in angle between two lines extending at right angles to the longitudinal axis of the workpiece at the same broad side.* 

Annex 12 Definitions and measuring rules - wood

Definitions	Measuring rules
8. ***Checks (radial cracks)*** *Checks refer to the wood fibres having separated in the direction of the fibre and along the pith rays. Checks with openings at the face of the workpiece of less than 0.4 mm are called scratches.* *Surface checks: Max. 1/10 of the workpiece thickness.* *Deep checks: More than 1/10 of the workpiece thickness.*	*Checks are measured in terms of length, width and depth. Depth is measured using a rounded depth gauge, e.g. 0.4 x 6 mm, cf. EN 1995-1-1. The size of the check is given as the ratio between the depth and the transverse measurement of the unit in the measuring direction.* 
9. ***Ring shakes*** *Ring shakes refer to the wood fibres having separated in the direction of the fibre and along the annual rings.*	*Measuring ring shakes usually consists of determining whether they are present or not.* 
10. ***Top shoot breach*** *Top shoot breach refers to an acute change in the fibre direction following damage to the top shoot of the growing tree.*	*Top shoot breach is measured as the ratio between the size of the fibre breach in the transverse direction and the width of the workpiece.* 
11. ***Thunder shakes*** *Thunder shakes refer to irregular folding lines transversely to the fibre direction and are particularly visible on the cut face of wood still full of sap.*	*Measuring thunder shakes usually consists of determining whether they are present or not.* 

Definitions	Measuring rules
12. ***Brittle heart*** *Brittle heart refers to the wood around the pith appearing loose, stringy and abnormally brittle. Brittle heart occurs most frequently in over-mature wood of tropical origin.*	*Measuring brittle heart usually consists of determining whether it is present or not.* 
13. ***Pitch pocket*** *Pitch pocket refers to an opening in or between the annual growth rings which is completely or partly filled with resin. Pitch pockets may therefore be considered a type of ring shake.*	*Measuring pitch pockets often consists of determining whether they are present or not.* 
14. ***Overgrowth*** *An overgrowth is a distortion of the annual ring pattern following overgrowth of branch stubs, bark etc. Overgrowth wood will often contain pieces of bark, resin and dry discoloured sections of wood.*	*The length and width of an overgrowth is measured in relation to the width of the workpiece while its depth is measured in relation to the thickness of the workpiece.* 
15. ***Damage caused by insects*** *Insect damage refers to traces of wood-destroying insects in the form of larval burrows in the wood or between bark and wood.*	*Measuring insect damage often consists of determining whether it is present or not.* 

Annex 12 Definitions and measuring rules - wood

Definitions	Measuring rules
16. ***Rot*** *Rot in wood refers to wood which has been attacked and discoloured by wood-destroying fungi. Several different fungi cause rot in wood.*	*The presence of rot is mostly determined by visual inspection. A more specific determination of fungi species and extent requires microscopical and/or mycological examination in a laboratory.* 
17. ***Blue stain*** *Blue stain refers to the attack and discoloration of sapwood by certain fungi which do not destroy the wood.*	*Blue stain is measured visually and its presence indicated as sporadic, uniform, superficial or deep.* 
18. ***Weathering-induced grey discoloration*** *Weathering-induced grey discoloration of exterior wood surfaces is caused e.g. by exposure to light, air and dust particles.*	*Measuring weathering-induced grey discoloration most commonly consists of determining whether it is present or not.*
19. ***Waney edge*** *Waney edge refers to a non-square edge or surface which may be present in timber from quarter-sawn logs.*	*The width of the waney edge ("vankant") is measured as the ratio between the size of the sides of the waney edge and the overall size of the sides. The length of the waney edge is measured in relation to the length of the workpiece.* 

Annex 12 Definitions and measuring rules - wood

Definitions	Measuring rules
20. ***Bark*** *Bark is the outer protective layer on the stem, branches and roots of the tree.*	*Measuring bark often consists of determining whether it is present or not.* 
21. ***Sapwood*** *Sapwood is the outer part of the wood which in a living tree contains active cells. Sapwood is paler than heartwood.*	*The presence of sapwood is usually determined visually, particularly if the workpiece also contains heartwood.*
22. ***Heartwood*** *Heartwood is the inner coloured part of the wood which in a living tree contains inactive cells. If the inner part of the wood does not differ from sapwood in terms of colour, the wood is designated duramen.*	*The presence of heartwood is often determined visually, particularly if the workpiece also contains sapwood. In certain softwood species, its presence may be determined using a heartwood reagent. A more specific determination requires microscopical examination.*
23. ***Pith*** *Pith is the central part of the trunk. In most tree species, it has a diameter of 2-4 mm. In connection with pith, the terms pith free and pith split are used.*	*Measuring pith will often consist of determining whether it is present or not.*
24. ***Reaction wood*** *Reaction wood shows changes in its structure caused by a one-sided force on the growing tree, e.g. wind pressure. Reaction wood has considerably greater longitudinal shrinkage than normally developed wood, for which reason it often causes bowing.*	*As a rule, reaction wood is measured on a cross-section, where it appears as thickened annual rings of somewhat darker colour than the surrounding wood. Reaction wood may be expressed as a percentage of the area of the cross-section.* 
25. ***Density*** *The density of a material expresses the ratio between mass (weight) and volume. Density was previously termed specific weight.*	*The density of wood for windows manufacture is determined at a moisture content of 12% and normally given as kg/m^3.*

Annex 12 Definitions and measuring rules - wood

Table 12.1

No. of knots:	Max. 1+(10 x L)/3 L= workpiece length
Frames and posts:	Max. 2/3 x side measurement, however max. 40 mm
Casements:	Max. ½ x side measurement, however max. 30 mm
Plug measure-ments:	As knot + 25%
Synthetic ma-terials:	As plugging

Workpiece designation		Lived rooted	Dead, partly rooted	Small, firm	Large porous	Decayed	Loose	Hole	Group	Plugging	Synthetic materials	Scratch extending over edge	Max. 0.4 x approx. 150 mm/running metre	Max. 0.4 x approx. 250 mm/running metre	Max. 0.6 x approx. 300 mm/running metre	More than 0.6 x approx. 300 mm/running metre	Pitch pockets	Blue stain - weak, max. 25% of each workpiece	Porous	Narrow - firm
		Knots		Bark ring		Knots						Scratches			Checks				Pith	
Frames	Side facing wall																			
	Reveal, jamb and head																			
	Reveal and rebate, sill																			
	External edge																			
	Internal edge																			
Posts	Sides																			
	External edge																			
	Internal edge																			
Casements	Reveal: casement jamb and head rail																			
	Reveal: casement bottom rail																			
	Edge against rebate																			
	External side: casement jamb and																			
	External side: casement bottom rail																			
	Internal casement side																			
Glazing bars	Heavy: knots, max. 1/3 x side meas.																			
	Thin: Small firm knots permitted																			
Glazing beads	Small firm knots permitted																			

Also not allowed: Ring shakes, top shoot breach, brittle heart, overgrowth, insect damage, rot, waney edge and bark.
Signature: Allowed ☐ Not allowed ▒

Additional definitions and requirements for workpieces in softwood

Knots:
Knots are measured and named after the shape appearing in the sawn/machined surface.

- Long oval-shaped:
  A knot where the length exceeds 2 x its width is measured as length + width divided by 3.0.
- Short oval-shaped and circular knots
  are measured by their largest width or diameter, respectively.

The side measurement of a workpiece is defined on the basis of the nominal dimensions of the workpiece without rebates or profiles.

In individual workpieces, the number of knots per side must not exceed an integer larger than 1 + (10 x L) divided by 3, where L equals the length of the workpiece measured in metres. A group of knots where the distance between the individual knots is less than the width of the workpiece counts as one knot only in this respect. Plugging and other fillings are counted as a knot. Pearl knots do not count in this respect.

Edge knots visible on two sides are measured and graded by what is visible on each side.

Dead and partly rooted knots such as bark ring knots are graded on the basis of visual impression and their impact on the functioning of the unit when inspected fitted and closed.

Outward facing casement sides and frame edges and upwards-facing surfaces on casement bottom rails and sills including sill rebates are graded on the basis of being exposed to water and sun to a greater extent than other surfaces. Knots in these surfaces must be plugged or filled if there is a risk of them coming loose or protruding.

In all other visible surfaces with dead and bark ring knots which appear porous or disfiguring must be plugged or filled.

Plugging:
Plug size is measured as a single knot.

In plugging where the plug does not cover the entire knot, resulting in a rooted part-knot + plug, the size is calculated as a single knot + 25%.

On visible, less exposed surfaces double plugging is permitted when the visual impression is considered less disfiguring than knots.

Plugs must be made from the same timber species as the workpiece. The plug must have the same slope of grain as the surrounding wood.

The plug must be fixed using water-resistant adhesive meeting the requirements of Class D4 under EN 204.

Synthetic materials:
Synthetic filler may be used to the same extent as plugging. However, it should be documented that heating it to 70ºC will not cause the filler to turn liquid and that the filler material will absorb and retain ordinary surface treatment. It should also be documented that the vacuum impregnation solution used does not cause the synthetic filler to swell or have any other unwanted influence on the filler.

Cracks and checks:

On upwards-facing visible surfaces and edges on casements and frames, the sum of the length of cracks must not exceed 150 mm per running metre of workpiece.

On other visible surfaces and edges of casements and frames, cracks and checks must be filled if their total combined length exceeds 300 mm per running metre of workpiece.

Performance requirements for cracks and checks are specified in detail in Table 12.1.

Cracks and checks may never extend over an edge.

Cracks and checks must be graded in a manner where, in addition to the functional, the visual impression of each workpiece is also taken into account.

Pith:

Visible, narrow and firm pith may only be present in timber for frames in the following lengths:

Length of pith in sills:	approx. 20% of workpiece length
Length of pith in jambs:	approx. 30% of workpiece length
Length of pith in heads:	approx. 40% of workpiece length

Pith in wood for casements must not be present on visible surfaces when a unit is closed.

Annex 13: Positive list – modified wood

Approval number: 13.1

Trade name: Accoya®

Materials: Pinus Radiata from plantations, acetylation modification process using acetic anhydride.

Density: 512 kg/m³ ± 80 kg/m³

Durability class: EN 350 / Class 1

Performance requirements: See Technical Requirements/Table 6.1.2 - Hardwood

Thermal performance: EN 12664/EN 10456 = 0.12 W/mK

Surface treatment: As treatment systems 2-ØKO, - 3 or 4

Compatibility of the wood with other window components:
An approved list of suppliers must be provided together with technical documentation that the compatibility between the 'Accoya' wood and sub-components, e.g. hardware, screws, joint sealants, etc., has been tested. It must be documented that the 'Accoya' wood is compatible with the specified minimum performance requirements in the Technical Requirements, e.g. as regards corrosion.

For further guidance, please see: (Verband Fenster + Fassade) - VFF Guidance HO.06-4.

Instructions from the supplier to the window manufacturer:
The supplier of the 'Accoya' wood must provide instructions in Danish on any special measures to be taken regarding transport, storage, manufacturing processes and installation conditions.

Instructions from window manufacturer to end-users:
If there is any odour nuisance from the wood, or if there are special conditions/limitations in connection with the daily use, the end-customers must be made aware of this.

Approved by the Association of Danish Window Manufacturers' Technical Committee on 15 June 2018.

Annex 13: Positive list – modified wood

Approval number: 13.2

Trade name: Kebony®Radiata

Materials: Pinus Radiata from plantations, modification process using furfuryl alcohol.

Density: 634 kg/m³ (570-760)

Durability class: EN 350 / Class 1

Performance requirements: See Technical Requirements/Table 6.1.2 - Hardwood

Thermal performance: EN 12667 = 0.16 W/mK

Surface treatment: As treatment systems 2-ØKO, - 3 or 4

Compatibility of the wood with other window components:
An approved list of suppliers must be provided together with technical documentation that the compatibility between the 'Kebony' wood and sub-components, e.g. hardware, screws, glass coverings, joint sealants, etc., has been tested. It must be documented that the 'Kebony' wood is compatible with the specified minimum performance requirements in the Technical Requirements, e.g. as regards corrosion.

For further guidance, please see: (Verband Fenster + Fassade) - VFF Guidance HO.06-4. and Addendum 3 HO.06-4/-B3: Kebony®Radiata.

Instructions from the supplier to the window manufacturer:
The supplier of the 'Kebony' wood must provide instructions in Danish on any special measures to be taken regarding transport, storage, manufacturing processes and installation conditions.

Instructions from window manufacturer to end-users:
If there is any odour nuisance from the wood, or if there are special conditions/limitations in connection with the daily use, the end-customers must be made aware of this.

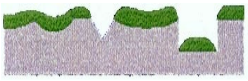
Approved by the Association of Danish Window Manufacturers' Technical Committee on 1 February 2019.

Annex 14: Expected performance of industrial surface treatment of timber units

Companies certified in accordance with The Technical Requirements for DVV must complete a surface treatment of timber elements which meets or exceeds the following performance requirements:
(Based on Danish terminology used in the publication Malerfagligt Behandlings-Katalog, Danish Technological Institute)
All surfaces have been treated but uniform layer thickness cannot be expected everywhere.

	Expected result	Function Class*	Comments
Visible faces of closed unit	DLGU**	III	Mean value of layer thickness > 60 µm (80 µm)
Visible faces of open unit	DG***	III	The surface must be non-absorbing
Hidden faces (against wall)			No requirement

References:

*	Function Class III	***Examples:*** South and west facing building parts with changing moisture conditions ***or*** traffic pollution or other aggressive influence. See also supplementary description of results.
**	Opaque, sealed, smooth and filled surface (DLGU) 	Faces, edges and rebates have a uniform colour and sheen and feel smooth. Pores have been sealed. Holes, fissures and joints have been sealed and filled. Unevenness arising from the base may occur. Hardwood is exempt from the requirement of surfaces being filled.
***	Opaque and smooth surface (DG) 	Faces, edges and rebates have a uniform colour and sheen and feel smooth. Unevenness, open pores, holes, fissures and joints arising from the base may occur.

Supplementary description of outcome

It must generally be accepted that timber is a natural material which is often very inhomogeneous. Therefore, there will be variations in structure and sheen, star shakes and other normal timber variations, e.g. irregularities around knots, where partial flaking, blistering and wrinkling may occur. Particularly in the case of light colours, there may be colour penetration from knots and finger joints. Knots may have been plugged or filled with a suitable material but will remain visible. Similar colour variations may occur in the form of profiles/areas with yellow discolouration.

Another irregularity in the surface treatment may appear as (resin) buds. The buds may be distributed randomly across the surface or follow the pattern of the grain.

Resin may also penetrate the paint film and form droplets on the surface. When the droplets have been on the surface for long enough to have crystallized, they may be removed by brushing or light scraping without deterioration in the surface treatment.

Timber units with high resin content do occur. In such circumstances, resin may cause extensive bleeding.

When knots are removed from resinous timber, and the timber is finger-jointed, this may also cause resin bleeding.

Manufacturing is at an industrial level with all the advantages this means in terms of uniform high quality and treatment of all faces.

If nothing to the contrary has been agreed, it must be assumed that glazing beads have been fitted using nail guns with ensuing penetration of the surface treatment. The surface treatment of timber bottom glazing beads may not be expected to be as durable as that of other surfaces.

On south-facing facades with particularly strong sunlight and sea air or where there is substantial moisture impact from the room, maintenance intervals should be adapted to the circumstances.

For maintenance in general, please consult ”Malerfagligt Behandlings-Katalog” (MBK) or the paint manufacturers.

Annex 15a: Finger-jointed wood - inspection and testing methods

In-house inspections

Inspection frequency:

- Checks on timber moisture content must be conducted at least every two hours during production hours.
- Glue lines and tightness of the joints must be checked twice per shift and once every time workpiece dimensions are changed.
- Moisture stability testing must be conducted once a week.
- Tensile strength testing must be conducted once a week.

Inspection and testing methods

Timber moisture content – as for timber.

When viewed through a magnifying glass, the **glue line** must appear as a continuous (dark brown) line with all apexes filled with adhesive.

Tightness of the joint
In the joint at a depth of max. 2 mm from the surface of the workpiece, there must be no coloration from the extraction liquid applied.

Moisture stability
Moisture stability testing must be conducted on 3 sets of blocks of 4, each containing a finger joint.

Testing must be conducted in accordance with the following cycle:

Immersion in water:

- at a water temperature of 20°C for 3 hours
- at a water temperature of 60°C for 3 hours
- at a water temperature of 20°C for 18 hours
- acclimatization for 3 days at 20°C ± 3°C and 50% ± 5% relative humidity.

Once the above test cycle has been completed, a visual inspection of the glued joint must show no openings in the glue line.

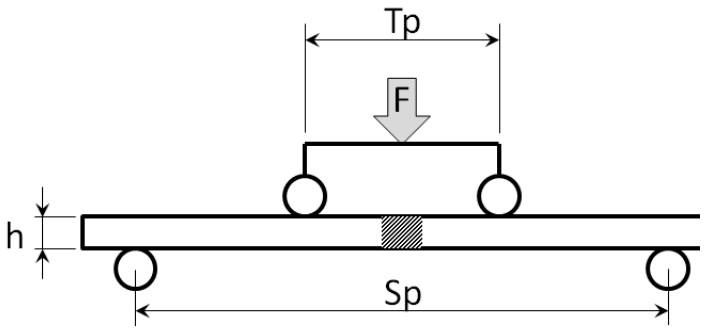
Tensile strength of the joint
Tensile strength testing must be conducted on 5 test pieces of an approx. length of 60 cm with a finger joint in the middle. The test piece must be subjected to bending testing until breakage of the finger joint. The finger-joint profile must face the direction of the force.

Annex 15a: Finger-jointed wood - inspection and testing methods

Requirements:
For requirements see EN/CEN/TS 13307-2 and EN 408 +A1 (sect. 19).

The test sample has a height "h" and a width "w", which must both be measured within 0.1 mm accuracy.

The supports "Sp" have a spacing of 16 - 18 x the height, and the pressure points "Tp" have a spacing of 6 x the height.



The rolls at "Sp" and "Tp" have a diameter of Ø30 mm and must be wider than the width "w" of the sample. The finger joint (the hatching) must be located within the middle 100 mm of the test sample with the finger-joint profile perpendicular to the force "F". The test sample finger joint must show no shoulders. The force "F" is applied at a rate which must not exceed 0.18 · h mm/min.

It is recommended to choose a height and a width of 25 mm yielding Tp = 150 mm and Sp = 450 mm, and a max. rate of 4.5 mm/min.

Requirements to tensile strength:
As a minimum, the tensile strength must be equivalent to a bending stress of "f_m" at 45 N/mm² (45 MPa).

If it is impossible to measure the strength because of lacking equipment, the requirement for bending stress may be replaced by a requirement for a wood failure percentage of at least 90%.

Calculation of tensile strength:

The distance for load transmission is calculated using the formula:	$a = \frac{Sp - Tp}{2}$
The bending stress can then be calculated on the basis of:	$f_m = \frac{3 \cdot F \cdot a}{b \cdot h^2}$
To determine the required minimum force to be applied to meet the requirement to bending stress, the pressure P_{min} is calculated as:	$P_{min} = F = \frac{f_m \cdot b \cdot h^2}{3 \cdot a}$

Example: For a test sample with the recommended cross-sectional dimension w x h = 25 x 25 mm:

$$P_{min} = \frac{45 \cdot 25 \cdot 25^2}{3 \cdot (450 - 150)/2} = 1562.5 \text{ N} \sim 160 \text{ kg}$$

Registration:
The weekly test results are entered in a table which may look like the below example:

Test date: Week/year	**Sample width** mm	**Sample height** mm	**Requirements for P_{min}** N (kg)	**Registered failure load** N (kg)	**Wood failure** %

Annex 15b: Laminated wood - inspection and testing methods

In-house inspections

Inspection and testing frequency

- Climatic conditions must be recorded twice per working day/shift.
- The moisture content of pre-production timber must be recorded on taking delivery and again prior to further processing.
- The moisture content of laminates ready for bonding must be recorded twice per working day/shift.
- Laminate thickness must be checked at least twice per working day/shift. Additional checks must be performed after each tool change and resetting for different dimensions.
- Adhesive dosing must be checked at least once per working day/shift.
- The lamination process must be checked at least twice per working day/shift.
- Glue line strength must be tested at least twice per working day/shift, each time selecting at least 3 samples per bonding process line.

Inspection and testing methods

Inspection and registration of individual sub-processes must follow the instructions which must be provided by the suppliers of adhesive and lamination equipment.

Testing of glue line strength may take the form of shear testing or splitting of glue lines.

- Shear testing must be conducted in accordance with EN 392 and the breaking stress recorded.
- The splitting of glue lines is conducted on 40 mm long test samples using a chisel or wood chisel and the percentage of wood failure recorded.

Both test methods are subject to the stipulation that dated tests from the previous five days' production must be kept and be accessible to external inspectors.

External testing

From each of these samples, the laboratory will cut 3 test samples, each 75 mm in length, for delamination testing in accordance with EN 14080:2013, annex C.

- If **thermoplastic adhesive D4** has been used in the lamination, the cut-out test samples are put through a test cycle in accordance with EN 14080:2013, Annex C, method C.

  Performance requirements:
  max. 10% delamination as an average for the test samples from the same 600 mm sample length.
- If **thermosetting adhesive C4** has been used in the lamination, the cut-out test samples are put through a test cycle in accordance with EN 14080:2013, Annex C, Method A.

  Performance requirements:
  max. 5% delamination after 2 initial cycles or max. 10% delamination after 1 extra cycle as an average for the test samples from the same 600 mm sample length.

Annex 15b: Laminated wood - inspection and testing methods

To assess whether the failure is a glue or wood failure, the workpieces must be opened and assessed acc. to criteria laid down in EN 14080 C.4.2.

For both adhesive types, the delamination percentage is calculated on the basis of the total delamination length in relation to the total glue line length on the two end grain surfaces.

If the requirements are not met, fresh samples are collected by the inspection body for testing. If these samples also fail to meet requirements, the inspection body will decide on what action to take.

Annex 16: Structures with synthetic materials/FRP

Purposes

The testing serves the following purposes:

- to demonstrate sufficient strength and stiffness in the frame profile, primarily in terms of the connection between timber and synthetic materials;
- to ensure stability and retention of hinges;
- to demonstrate the overall stability and functioning of the unit.

The testing is conducted on a side hung, outward opening window with a casement width x casement height = 700x700 mm.

Door units are tested using an outward opening door with a casement width and height of 950 x 2100 mm.

Verification of product inspection

The inspection is performed by an external testing institution accredited acc. to EN 14608 or in the alternative, as in-house testing monitored by the certifying body.

Test rig and setup

The test rig is constructed as a stable and rigid casement construction with a "wall hole", the width and height of which exceeds the outer frame dimensions of the unit by 10 mm.

The unit to be tested is installed in the wall hole with a tight fit to the test rig at the sill and at the hinge side jamb.

The entire rebate construction must be corbelled in relation to the casement construction of the test rig.

At the hinge side, the unit to be tested is secured to the test rig with frame screws at the level of each hinge. Frame screws are thus inserted within the frame rebate (into the timber section of the frame).

At the handle side, the frame is blocked at fastening points and at the same points, frame screws are used to ensure fixing.

If fitting instructions are available for the type of unit in question, and these instructions prescribe that units must be fixed using a rebate construction whatever the installation circumstances, type testing must also adhere to these instructions (i.e. the unit is fitted to the test rig without corbelling the rebate construction).

Preload

A 400 N preload is applied vertically to the casement head 50 mm from the outer casement corner.

The preload is applied at a 90° opening or, if desired, at a lower max. opening angle and again at 30°. The load is applied for one minute at both opening angles.

Initial recording

It is checked that when closed, the frame and casement construction is completely flush (warping is not allowed).

The basis of each of the four sub-tests to be conducted is the below recordings.

The joint clearance (space) between casement and frame is recorded for each corner of the unit in both directions (a total of 8 measurements).

The geometry at the junction of the synthetic/aluminium frame rebate and the internal timber frame section is recorded.

Test procedure - 90° opening

The window casement/door casement is turned to 90° or to max. opening angle if this is less than 90°; the window casement/door casement is secured in this position by means of a lateral guide.

A load is applied vertically to the casement/door casement head 50 mm from the outer corner of the casement.
The load is applied in steps of 200 N with a three-minute interval between each step. During the application of the 400 N load, the recordings listed under ***Recording of test results*** are made.

Once recordings for the 400 N load (for doors: load step 600 N) have been made, the load is relieved and subsequent measurements are taken.

Test procedure - 30° opening

The casement/door frame is turned to 30° opening angle and secured in this position by means of a lateral guide.
Then the test cycle is completed in accordance with the procedure described under the sections ***Test procedure - 90° opening*** and ***Recording of test results*** below

Safety testing

The casement/door frame is turned to 90° or to max. opening angle if this is less than 90°; the casement/door frame is secured in this position by means of a lateral guide.
A total load of 600 N (for doors: load step 800 N) is applied vertically to the casement/door frame head 50 mm from the outer corner of the casement/frame.

After three minutes, the load is relieved and the same test conducted at an opening angle of 30°.

Climatic conditions

The test procedures and recording of test results listed above must be conducted under two different climatic conditions for both opening angles.

1. Testing under laboratory conditions.
2. Testing when the hinge side has been heated to 65°C.

Heating to 65°C is considered complete 15 minutes after recording a temperature of 65°C of the synthetic material where it faces the hinge.

Test sequence

The test sequence comprises a total of 4 sub-tests and a final safety test.

The sub-tests are conducted in the following order:
90° opening – climatic conditions 1
30° opening – climatic conditions 1
90° opening – climatic conditions 2
30° opening – climatic conditions 2
The final safety test is conducted at:
90° opening – climatic conditions 1
30° opening – climatic conditions 1

Recording of test results

In load step 400 N (for doors: load step 600 N), any measurable movement/deformation at the junction of the frame rebate and internal frame section is measured and recorded. This recording must

concentrate on the areas where hinges are fitted.

After relieving load step 400 N (for doors: load step 600 N), any lasting deformation between the frame rebate and internal frame section is measured and recorded after 3-5 minutes.

This is followed by measuring the gap between casement and frame and comparing the result with the initial recording of values. This procedure applies to both 90° and 30° opening.

After load step 400 N, (for doors: load step 600 N), 30° opening, climatic conditions 2, a moment load of 200 Ncm is applied to the screws in hinges which are anchored in synthetic materials. This moment load is maintained for 15 seconds per screw.

During the application of the 600 N load (for doors: load step 800 N), any failure or breakage is recorded.

Under climatic conditions 2, the above measurements are only taken after allowing the synthetic material at the hinge side to acclimatize for 10 minutes.

Approval criteria
Materials and construction are approved if the following criteria have been met in records after load step 400 N (for doors: load step 600):

- any lasting deformation between the timber and synthetic materials of the frame is less than 1.0 mm.
- a permanent change in the gap width between casement and frame must be less than 1.5 mm at all measuring points.

During the application of the 200 Ncm moment load and after a potential initial turning, the screw is not allowed to turn at an angle within the following 15 seconds.
This criterion is a normative requirement.
Alternatively, special screws or other fixing methods may be used, each of which must be documented and approved by the Technical Committee.

During safety testing, the 600 N load step (for doors: 800 N) must not cause failure or breakage where the frame rebate is joined to the timber section, in hinges, their fixing or in casement corner joints.

Annex 17: Practical experience - combinations of materials, etc.

No compatibility between materials may cause problems in some cases.
The list below of material combinations which in some cases have proved to be problematic is not an exhaustive list. In these cases, the compatibility and any measures in this connection should be considered.

The list of examples below is based on practical experience.
This list is not exhaustive.

- **Corrosion/etching**
  - Galvanic corrosion:
    galvanic corrosion happens when metals cause other metals to corrode (position in the electro-potential series). If aluminium is in contact with a more noble metal such as copper or zinc, the aluminium will decompose. Contact may also be rainwater led from the nobler metal onto the less noble metal.
  - Aluminium in an acidic or alkaline environment:
    contact with alkaline materials such as concrete or mortar may decompose aluminium.

- **Migration**
  - Migration between joint fillers (plasticisers) may result in a change in the properties of the materials - disintegration and thus reduced life. See Annex 18 for additional information.

- **Discolorations**
  - Oak is acidic and will corrode iron/steel which may darken/blacken the wood.

- **Dimensional changes**

  - **Moisture and temperature**
    Different wood species have different moisture-conditional dimensional changes which must be considered when combining wood species.
    Many materials have quite significant temperature-conditional dimensional changes. This must be considered, especially when dark colours are used.

- **Positioning window sections in facade**
  As it appears from craftsman manuals and user manuals (installation), a recessed position (4-5 cm) will offer some protection from the weather.
  A canopy or the like will increase this protection while adding some counter-effect from external condensation.

Annex 18: Compatibility - glazing units

This method can be used by manufacturers or laboratories to test the compatibility of adhesives and secondary edge seals of glazing units. This method measures the changes in mass and hardness in the secondary edge seal in contact with adhesive.

Necessary equipment and materials

- **Analytical balance** accurate to **0,001 g**
- **Durometer**, Shore A durometer accurate to 0.1
- **Oven** (70°C)
- **2 metal or glass plates**, e.g. 40x40++ – must fit in an oven
- **Weight**, 1 kg
- **Callipers**
- **Utility knife**, clean
- **Secondary edge seal** from suppliers, coat thickness as expected in the glazing unit (3-6 mm) - size to allow it to be cut into the desired number of pieces of 30x30 mm.
- **Adhesive**, non-hardened, e.g. in cartridge or adhesive device

Preparation of samples
A: The secondary edge seal: (samples)
Cut out at least 3 pieces of 30x30 mm.

B: The adhesive:
On a piece of tinfoil, spray out at least 3 pieces of approx. 40x40 mm in the same thickness as the secondary edge seal. The adhesive cures for 7 days at room temperature. Then trim the pieces to 30x30 mm.

Procedure
Perform at least 3 tests.

1. Switch on the oven and set it to 70°C.

2. Weigh the samples (the edge seal) and measure the Shore A hardness - enter the weight and hardness in the spreadsheet under start weight/hardness.

3. Place the samples on the plate - without touching - see Figure 1.
   Place units of the adhesive on top of the samples - apply a weight to ensure contact.
   See Figure 2.

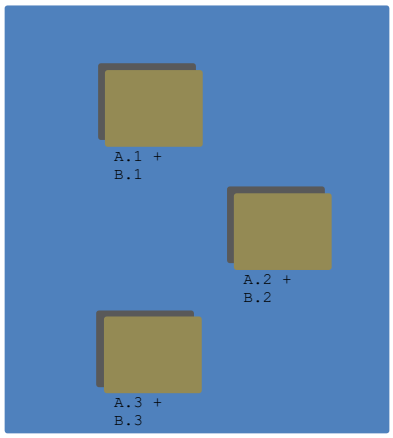


Figure 6 - placing samples on the plate

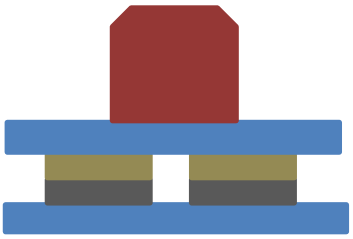


Figure 5 - apply a weight on the samples to ensure contact

4. Place the plate with the trial installation in the oven for a total of 14 days.
5. After 14 days, remove the trial installation from the oven and carefully separate the samples, using a clean utility knife, if necessary.
6. Weigh the samples (the edge seal) and measure the Shore A hardness - enter the weight and hardness in the spreadsheet under final weight/hardness.
7. When all measurements have been completed, check the brittleness of the samples by bending the sides towards each other as shown in Figure 3. If any type of rupture occurs, enter it in the spreadsheet.

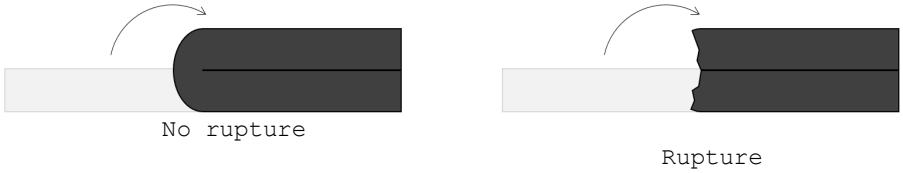


Figure 7 – brittle test (bending test)

Results

When both start and end recordings have been entered in the spreadsheet, values are automatically calculated for:

- Change in mass
- Change in hardness
- No. of broken edge seals

Guiding acceptance criteria are stated in Table 1, and it will appear from the spreadsheet whether the guiding acceptance criteria have been observed.

Table 1. Guiding acceptable values for compatibility between the adhesive and the secondary edge seal.

Change in mass	≤ 3.5%
Change in hardness	≤ 12
No. of broken edge seals	0

The assessment is based on a percentage change in mass, a change in the edge seal hardness and the number of broken samples in the folding test. However, hardness is not allowed to exceed 72 Shore A as the brittleness for most edge seals will be too serious.
In addition to the acceptance criteria above, the workpieces must also be examined visually. If this examination causes any doubts, additional examinations must be carried out, possibly with an extended measuring period.

Annex 19: Blocks and blocking of glazing units

Insulated glass units must be mounted with glazing blocks the purpose of which is to support and fixate the glazing unit, to adjust the gap to the rebate, and to brace the casement. Glazing blocks must not obstruct drainage and ventilation.

Blocks must be made of a form resistant, non-moisture absorbing material. Blocks made of a synthetic material must have a hardness of 70-95 IRHD or Shore A.

The width of the blocks must be equivalent to the thickness of the glazing unit + the guiding length, if any **.**
The length must be at least 50 mm for glazing units less than 2 m^2 and otherwise 100 mm.

There are three types of glazing blocks each having their separate function:

▲	**Setting block** Setting blocks must always be used. Setting blocks transfer loads between glazing unit and rebate while also contributing to the overall stability of the unit. The gap to a glazing unit corner must always exceed 50 mm. The gap may be reduced to a minimum of 20 mm, if the design allows it.
○	**Guide block** Guide blocks ensure the gap between glazing unit edge and rebate. Measured from the corner of the glazing unit edge the gap must exceed 50 mm.
✕	**Riser block** If necessary, a riser block may be used to ensure the functioning of the hardware and the centring of the glazing unit during transport and operation.

The min. gap between glazing unit and rebate is 4 mm.

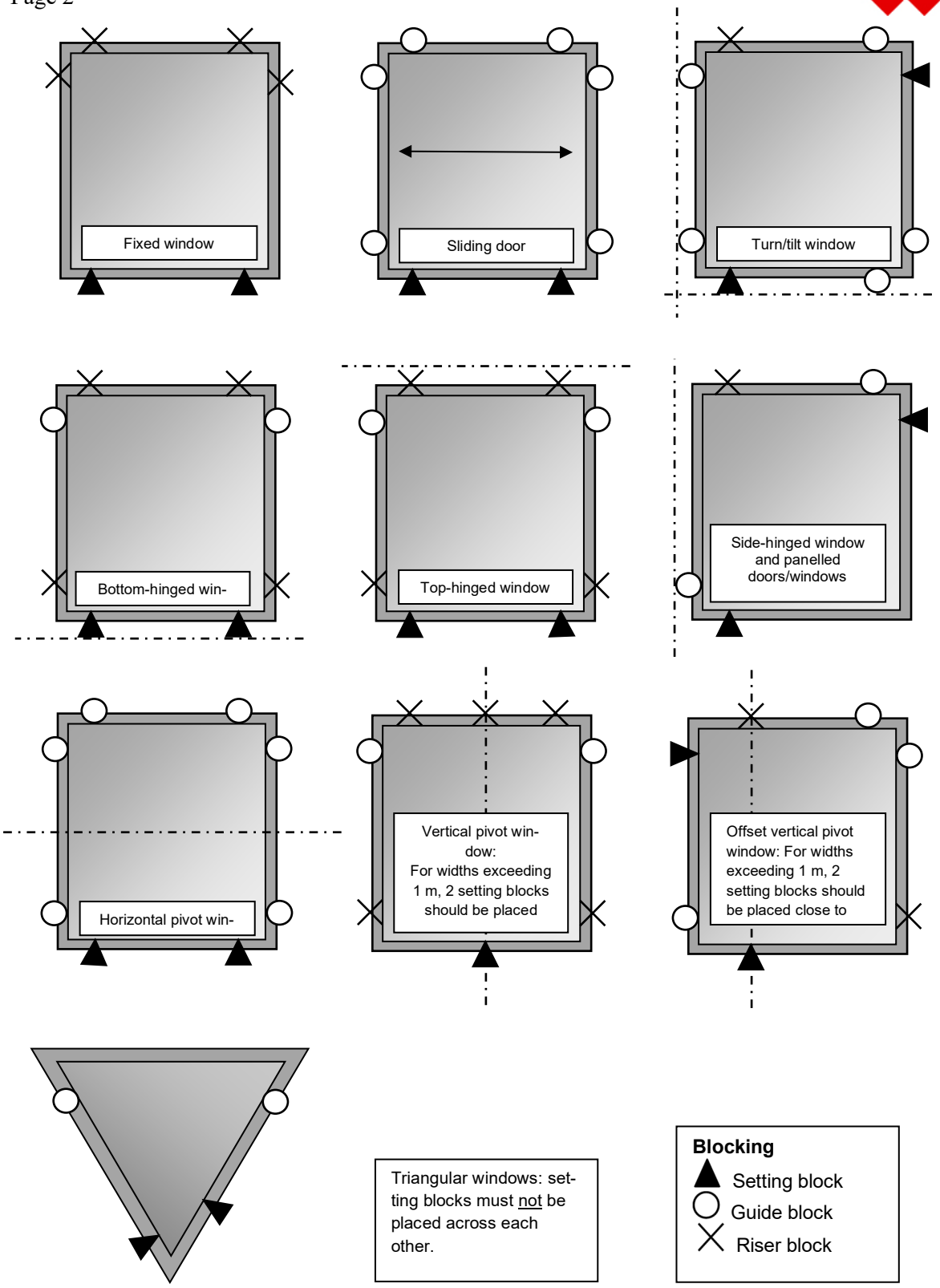
Bevelled bottom rebates require a block design that allows all glazing unit panes to rest on a horizontal base.

Setting blocks must be capable of transferring load to bottom rebates with no ensuing risk of overturning or deformation.

For the blocks to function properly they must be fixed in the prescribed positions. Nails, pins etc. must not be used to fix blocks in a manner that may damage the insulated glass unit. The position of the blocks must not impede the compression or the sealing properties of the glazing bead against the glazing unit.

Annex 19: Blocks and blocking of glazing units

Page 2



Annex 20: Visual deviations in quality in insulated glass units and glass

Quality assessment
The rules below for evaluating deviations in the quality of insulated glass units and the following requirements and exemptions apply to glazing unit manufacturers supplying glazing units to DVV-certified window manufacturers.

Requirements to purity and quality of glass
Glass is an industrial product which, among other things, consists of lime, silica, and soda.
Despite careful purification of the raw materials, minor impurities and scratches will - in rare cases - occur in the glass on the inside of the glazing unit (cf. Table, page 4).
Complaints concerning impurities in glass will be evaluated according to the below procedure on the basis of which it will be decided if they are immaterial i.e. inherent in the material and as such not covered under the warranty – or if they are so material as to qualify for a replacement of the glazing unit.

Assessment criteria
Glazing units, cf. Annex 21, must be assessed from the inside at a min. distance of 2 m in diffuse daylight (e.g. a cloudy sky) with no direct sunlight or artificial light.
Irregularities that are not visible from a distance of 2 m are not considered as defects.
When checking reflection, the distance from the outside must be at least 5 m.

Edge constructions of glazing units
The maximum allowed deviation of spacers from horizontal (parallelism) with the glass edge is:

Edge length of the glazing unit:

< 2.5 m	2 mm
2.5 - 3.5 m	3 mm
> 3.5 m	4 mm

The values may not exceed 2 mm per 0.3 m edge length.

The maximum allowed profile displacement between spacers for 3 layer glass is 2 mm.

The maximum allowed butyl displacement between spacers for 3 layer glass is 2 mm. Butyl from double sealing is permitted max. 2 mm into the unit.

The values stated above apply to factory conditions. For installed glazing units, climatic conditions, including extraordinary heat stresses, may affect the edge construction. An assessment according to EN 1279-1/F.7 will be applicable.

Glazing units with coated glass
Coated glass may contain pinholes (small round spot with no coating) which are a phenomenon that may occur from manufacturing.
The assessment criteria for pinholes are shown in the table on p. 4.
Assessment criteria in connection with reflection: shades, differences in nuances, and distortion of reflection are accepted.

Patterned and wire glass
Distortions in the pattern are considered acceptable deviations. Deviations in wire parallelism may appear in wire glass.

Annex 20: Visual deviations in quality in insulated glass units and glass

Colour shades in glass

Standard window glass as used in glazing units is commonly perceived as being completely clear, but it is actually green. The very own colour of the glass reduces the light transmittance.
Two pieces of glass of the same type but of different thickness may therefore be perceived as having different shades of colour.
With coated or body-tinted glass this becomes even more clear.
The fast development in new types of glass may, however, make it difficult to obtain glass of a quality similar to that of existing glazing units.
Even with coated or body-tinted glass produced by the same manufacturer and to the same specifications but at different plants, there may be minor differences in nuances.

The below do not qualify for a complaint:

- interference phenomena (Brewster Stripes)
- double glazing effect
- anisotropies
- condensation on external glass pane areas
- formation of marks on glass surfaces
- misting

Interference phenomena (Brewster Stripes)

Appear as irregular rainbow-coloured stripes. Usually, they are visible only when looking out the window at an oblique angle. Another characteristic feature is that the stripes may “wander” when a slight pressure is applied to the glass pane.
Daylight is composed of a large number of colours, which may be shown by transmitting a beam of light through a prism which will cause the light to split into the spectral colours.
When beams of light pass through glass, irregularities in the glass will result in either a shorter or a longer time of passage of the light. The phenomenon is seen only in insulated glass units with floatglass and can be ascribed to the extreme flatness of the glass, which is on a scale of the wavelength of light and that daylight is “split” into the spectral colours of blue, red, and green.

Double glazing effect

Because of the edge seal, insulated glass units hold an amount of contained air/gas the state of which is essentially determined by the barometric air pressure and the air temperature at the production site.
Installation of insulated glass units at other altitudes and at changes in temperature and variations in the barometric air pressure (high and low pressure) will inevitably cause concave or convex deflections in individual glazing panes and with that also optical distortions.
Multi-glass reflections may appear at different strengths on the surfaces of insulated glass units.
These reflections may be intensified e.g. with a dark background of the glazing unit or in coated glass panes.
This phenomenon is a physical law which applies to all insulated glass units.

Anisotropies

Anisotropies are a physical effect in heat-treated glasses caused by the internal stress distribution. Depending on the visual angle, it is perceived as dark, coloured rings and stripes at polarizing light and/or viewing through polarizing glass. Polarized light is present at normal daylight. The extent of the polarization depends on the weather and the solar altitude/angle.
The phenomenon is visible primarily at a low visual angle or at glass facades forming an angle with each other.

Annex 20: Visual deviations in quality in insulated glass units and glass

Condensation on glazing areas

Inside: Occasionally, formation of mist on insulated glass units is seen on the side facing the room. This may be due to excessive humidity, a poorly insulating glazing unit, or an unheated room. Energy-efficient glazing units offer a higher internal surface temperature and minimized misting.
Outside: Due to their good insulating properties, energy-efficient glazing units have a lower temperature on the external glass surface. At special weather conditions, this may cause mist on the external side of this type of glazing unit.

Formation of marks on glazing surfaces

The moisturization on the exterior glazing surface of insulated glass units may be uneven due to different sources leaving their imprints such as rollers, fingers, labels, vacuum suction apparatus, sealants, glazing materials, gliding materials, or environmental impacts.

Misting

Misting is seen as a greyish surface resulting from chemical influence arising from incorrect storage in a damp environment.
In concrete buildings, chemical influence may occur as a result of alkaline washout of substances which get in contact with the glass surface.

Annex 20: Visual deviations in quality in insulated glass units and glass

Definitions of rebate, edge, and inner zone for glazing units and glass
When assessing optical quality, the entire visible glass surface must be viewed.
The edge zone is the outermost 10% of the edge length on all sides, and the inner zone is the remaining area.
The rebate zone is the edges of the glazing unit including the glass edges and sealing/bonding.

Assessment of visual quality must be made on the basis of the above division in zones.

Permissible visible irregularities in glass
How to interpret the below table:
As practically all insulated glass units are basically constructed from clear glass, they are rated on the basis of the criteria in the marked boxes along with the criteria mentioned for other types of glass which may have been used for constructing the unit.

	CLEAR INSULATED GLAZING	**WITH COATED GLASS**
REBATE ZONE	Outer crushed edges or chippings. Inner chippings filled with joint sealant. Residue and numerous scratches.	
EDGE ZONE	**Pores, spots, discolouration etc.:** Pane area: < 1 m² max. 4 @ < 3 mm Ø. Pane area: > 1 m² max. 1 @ < 3 mm Ø per running metre edge length.	**Pinholes:** Ø 1 mm - 1.5 mm 5/200 mm Ø > 1.5 mm not permitted.
	Scratches: Max. 30 mm x 2 mm per single length. The sum of single lengths, max. 90 mm.	
	Hairline scratches: No limit, however not piled up.	
INNER ZONE	**Pores, spots, discolouration etc.:** Pane area: < 1 m² max. 2 @ < 2 mm Ø. Pane area: > 1 m² and < 2 m² max. 3 @ < 2 mm Ø. Pane area: > 2 m² max 5 @ < 2 mm Ø. **Scratches and hairline scratches:** As for edge zone.	**Pinholes:** Ø 1 mm - 1.5 mm 2 pinholes/m² Ø > 1.5 mm not permitted.
	LAMINATED GLASS	**COATED LAMINATED GLASS**
EDGE ZONE AND INNER ZONE	1. The frequency of permissible visible defects in edge zone and inner zone is increased by 50% per additional layer of glass. 2. Cast laminated glass units may show waves resulting from the production.	Cf. box for coated glass.
	TOUGHENED GLASS	**COATED TOUGHENED GLASS**
EDGE ZONE AND INNER ZONE	Cf. EN 12150.	Cf. box for coated glass.

Annex 21: Warranty declaration - glazing unit manufacturer

This warranty is issued by a glazing unit manufacturer to a window manufacturer as part of the certification basis for the window manufacturer as, in 2.5 of the Technical Requirements for DVV (Danish Window Verification), it is prescribed that the window manufacturer must issue a warranty to the consumer. In the Technical Requirements for DVV this present warranty is referred to as Annex 21.

Thus, the glazing unit manufacturer issues the following warranty covering all glazing units supplied to the window manufacturer for the manufacture of windows and doors by the window manufacturer:

- The glazing unit manufacturer warrants that within the DVV manufacturer's five-year warranty, glazing units fitted in doors/windows will remain free of mist and dirt inside the glazing unit.
- In case of the appearance of mist inside the glazing unit within the warranty period or other defects which justify complaints, cf. Annex 20, the replacement table with compensation prices for the Association of Danish Window Manufacturers in force at the time in question shall apply as a minimum.
- Furthermore, the glazing unit manufacturer guarantees affiliation to the DVV Warranty Scheme or a similar scheme for new windows and exterior doors and compliance with the rules of the scheme.

The warranty is conditional on the following:

- That the glazing unit has been fitted in compliance with the DVV requirements.
- That the glazing unit spacer bar is labelled with the time of production (month and year).
- That the glazing unit has been cleaned and protected correctly during the building period.
- That the glazing unit has not been damaged by outside impacts e.g. shocks, blows, movements in adjoining constructions or similar.
- That the glazing unit has not been subjected to processing after delivery e.g. grinding, sand blasting, etching, painting, labelling, or other surface treatment.
- That the window has been maintained according to the window manufacturer's fitting and maintenance instructions.

The warranty does not cover damage arising from frost cracks, chemical attacks on the glass, or thermal impacts in general.

The visual quality of glazing units will be evaluated according to the Technical Requirements for DVV, Annex 20: Visual deviations in quality in insulated glass units and glass. The warranty cannot be revoked or in any other way be nullified, and does thus include all sales of glazing units by the glazing unit manufacturer to the window manufacturer as from the date of signing.

The warranty does not curtail the buyer's common rights in law.
Danish law and venue shall apply to any dispute related to the present warranty.

The present warranty covers glazing units supplied to:	
Window manufacturer's name and address / stamp, if any:	Glazing unit manufacturer's name and address / stamp, if any:
Place, date and signature:	Place, date and signature:
Valid Until: (3 years)	

Annex 22: Inspection, measuring and test equipment

The accuracy of the equipment used must, without particular uncertainty calculations being required, be traceable to a national or international standard if one exists.

If the inspector from the certifying body has equipment with a calibration certificate issued by an accredited body, it is permitted for the company to check its master equipment against the inspector's equipment.

The following equipment at the manufacturer's premises is allowed to deviate as follows from (master) equipment with a calibration certificate:

Tape measure:		
	1 metre tape	deviation 0.5 mm
	2 metre tape	deviation 0.7 mm
	3 metre tape	deviation 0.9 mm
	5 metre tape	deviation 1.3 mm
Callipers:		
	0-150 mm	deviation 0.1 mm
90° angle:		
	At a length of 500 mm	deviation 0.5 mm
Degree gauge:		
		deviation 1/4°
Thermometer: *)		
	0-50°C	deviation 1°C
	50-150°C	deviation 2°C
	150-300°C	deviation 3°C
Timber moisture meter		
	0-15 moisture %	deviation 0.5 moisture %
	15-28 moisture %	deviation 1 moisture %
Mobile equipment for measuring the thickness of hardened surface treatment on a metallic base:		
	0-25 µm	deviation 3µm
	25-200 µm	deviation 10µm
Load cells and dial gauges		

Mobile equipment for measuring the thickness of hardened surface treatment on a timber base:

The result of measuring with known equipment for this purpose is dependent on the operator. Measuring with such equipment can therefore only be for guidance purposes for which reason this equipment is not subject to calibration requirements.

*) Alternatively, an instrument with an approved correction table may be used.

Annex 23: System overview - example

Product system: Triple-glazed wooden window

Opening	Hardware	Casement size [mm] Min. WxH	Max. WxH	Weight [kg] Max.	Comments
Fixed glass		300x300	3000x3000	250	
Top-guided	Manufacturer A Series 1234-4	400x400	1500x1500	80	State the limitations in height/width relations. Rear-edge protection at b>1300mm
Side-guided	Manufacturer A Series 1234-5	400x400	700x1500	45	State the limitations in height/width relations.
	Manufacturer A Series 1234-5		800x1500	45	Casement lifter
Side-hung	Manufacturer B Series abcd-1	350x400	700x1800	60	State the limitations in height/width relations. h<1500 - 2 hinges h<1500 - 3 hinges
Top-swing	Manufacturer A Series 1234-7	500x500	1500x1500	60	State the limitations in height/width relations.
Patio door	Manufacturer B Series abcd-2	450x1500	1100x2300	90	State the limitations in height/width relations. h<2100 - 3 hinges h<2100 - 4 hinges
Facade door	Manufacturer B Series abcd-3	450x1500	1100x2300	90	State the limitations in height/width relations. h<2100 - 3 hinges h<2100 - 4 hinges

Max. size and Max. weight is stated on the casement.

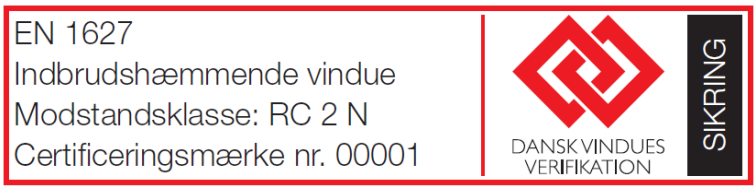
Other components such as espagnolettes/locks, striking plates, seals, handles etc. can be stated with advantage.

Annex 24: – DVV burglary prevention

Standard:
EN 1627, Burglar resistance – Requirements and classification.

		check
Product name		
Test report no.		
Test result:	For instance Window – Resistance class: EN 1627 RC 2 N with glazing unit P5A	
Installation guide no.		
Drawing no.		

Data sheet/specifications:
System description and scope as stated in the test report. All relevant information as stated in the test report, including suppliers with product references, must be given.



Assigned certification label no. _____

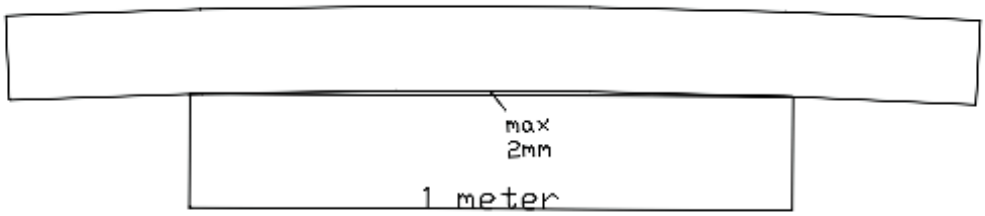
The external inspection shall include a monitoring of compatibility with "the scope" and the above-mentioned information stated in test report, installations guide, drawings and data sheet/specifications.

External inspection performed by	
Inspection date	
Stamp	

Annex 25: – Bowing, cupping and twisting - measuring principles

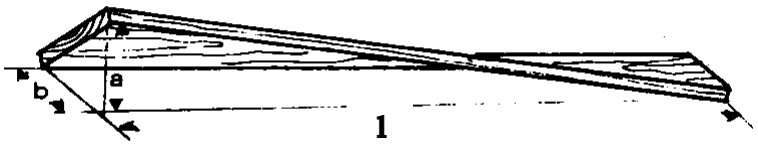
Bowing

- Bowing must not exceed 2 mm/m



Twisting, frame and casement

- Twisting in frames and casement units may not exceed 2 mm per 10 cm workpiece width measured over 1 m.



a <= 2 mm
b = 10 cm
l = 1 m

Annex 26: Standards at a glance

The table below states the contents of the various standards mentioned in the Technical Requirements.

Standard no.	Concerning:
DIN 68140	Wood finger-jointing
DS 418	Calculation of heat loss from buildings
DS 419	Corrosion protection
EN 152	Test methods for wood preservatives - Determination of the protective effectiveness of a preservative treatment against blue stain in wood in service. Laboratory method. Part 1: Brushing procedure
EN 204	Classification of thermoplastic wood adhesives for non-structural applications
EN 205	Adhesives – Wood adhesives for non-structural applications – Determination of tensile shear strength of lap joints
EN 316	Wood fibre boards. Definition, classification and symbols
EN 350-2	Durability of wood and wood-based products
EN 351-1	Durability of wood and wood-based products. Preservative-treated solid wood
EN 392	Glued laminated timber. Shear test of glue lines
EN 408	Wooden constructions – structural timber and laminated wood. Determination of some physical and mechanical qualities (sect. 19)
EN 514	Unplasticized polyvinylchloride (PVC-U) profiles for the fabrication of windows and doors. Determination of the strength of welded corners and T-joints
EN 599-1	Durability of wood and wood-based products. Efficacy of preventive wood preservatives as determined by biological tests
EN 622-5	Fibreboards. Specifications. Part 5: Requirements for dry process boards (MDF)
EN 927	Paints and varnishes - Coating materials and coating systems for exterior wood. Parts 1-3
EN 952	Door leaves – General and local flatness – Measuring method
EN 1026	Windows and doors - Air permeability - Test method
EN 1027	Windows and doors - Watertightness - Test method
EN 1279	Parts 1-6: Glass in building - Insulating glass units
EN 1530	Door leaves – General and local flatness – Tolerance classes
EN 1627	2009+2011. Windows, doors, shutters. Burglar resistance. Requirements and classification
EN 1670	Building hardware. Corrosion resistance. Requirements and test methods
EN 12207	Windows and doors - Air permeability - Classification
EN 12208	Windows and doors - Watertightness - Classification
EN 12210	Windows and doors. Resistance to wind load. Classification
EN 12211	Windows and doors. Resistance to wind load. Test method
EN 12365	Parts 1-4: Building hardware. Gaskets and weatherstripping for doors, windows, shutters and curtain walling
EN 12519	Windows and pedestrian doors - Terminology
EN 12765	Classification of thermosetting wood adhesives for non-structural applications
EN 13115	Windows. Classification of mechanical properties. Racking, torsion and operating forces
EN 13307-1	Timber blanks and semi-finished profiles for non-structural uses. Part 1: Requirements
CEN/TS 13307-2	Laminated and finger-jointed timber blanks and semi-finished profiles for non-structural uses. Part 2: production control
EN 13706	Reinforced plastic composites – Specifications for pultruded profiles Parts 1,2,3

Annex 26: Standards at a glance

EN 14080	Wooden constructions – Glued laminated wood and structural timber – Requirements
EN 14257	Adhesives. Wood adhesives. Determination of tensile strength of lap joints at elevated temperature (WATT '91)
EN 14351-1	Windows and doors. Product standard, performance characteristics. Part 1: Windows and external pedestrian doorsets without resistance to fire and/or smoke leakage characteristics
EN 14608	Windows - Determination of the resistance to racking
EN 14609	Determination of the resistance to static torsion
EN AW-6060	Alloys
EN AW-6063	Alloys
EN ISO 2360	Measurement of coating thickness
EN ISO 7599	Anodizing of aluminium and aluminium alloys – General specifications for anodic oxidation coatings on aluminium
EN ISO 9227	Corrosion tests in artificial atmospheres – salt spray tests
EN ISO 10077	Parts 1-2: Thermal performance of windows, doors and shutters
EN ISO 10289	Methods for corrosion testing of metallic and other inorganic coatings on metallic substrates. Rating of test specimens and manufactured articles subjected to corrosion tests
EN ISO 12944	Corrosion protection
ISO 2409	Paints and varnishes. Cross-cut test
ISO 2813	Paints and varnishes. Determination of specular gloss of non-metallic paint films at 20 degrees, 60 degrees and 85 degrees
ISO 3210	Sealed anodic oxide coatings
GSB AL 631	International Quality Regulations for the Coating of Aluminium Building Components.
NTR	Doc. no. 3: 1998 - Preservative treatment
RAL-GZ 716/1	PVCu profiles
SS 232740	Wood products - Sawn and planed wood of coniferous wood - Moisture content
EN 12488	Rules for vertical mounting of panes
NCS	Nordic Certified Scantlings (laminated blanks)
EN 15804	Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
ISO 14025	Environmental labels and declarations - Type III environmental declarations - Principles and procedures
EN 17213	Windows and doors – Environmental Product Declarations – Product category rules for windows and pedestrian doorsets
DS/EN 13126-5	Building hardware: Hardware for windows and door height windows - Requirements and test methods – Part 5: Hardware that restrict the opening of windows and door height windows

Annex 27: Technical Requirements - History

1st edition - August 1993
2nd edition - December 1993
3rd edition - June 1995
4th edition - June 1996
5th edition - October 1999
    appendix 1 - May 2001
    appendix 2 - May 2002
    appendix 3 - May 2003
6th edition - May 2005
    6th edition, rev. 1 - July 2005
    6th edition, rev. 2 - May 2006
    6th edition, rev. 3 - December 2006
7th edition - January 2008
    7th edition, rev. 1 - December 2008
    7th edition, rev. 2 – July 2010
    Technical Requirements for DVV, 7th edition, rev. 3 – 2012
    Technical Requirements for DVV, 7th edition, rev. 4 – 2013
    Technical Requirements for DVV, 7th edition, rev. 5 – January 2016
    Technical Requirements for DVV, 7th edition, rev. 6 – January 2017
    Technical Requirements for DVV, 7th edition, rev. 7 – January 2018
    Technical Requirements for DVV, 7th edition, rev. 8 – April 2020

Annex A: Technical Requirements for Danish IGU Verification
1st edition, rev. 2 - January 2017 (to be ordered separately).
(Deleted with Technical Requirements for DVV, 7th edition, rev. 8 - April 2020)

Correction instructions:
Correction instructions no. 1 of 4 March 2019 (included in Technical Requirements for DVV, 7th edition, rev. 8 - April 2020)
Correction instructions no. 2 of 9 September 2019 (included in Technical Requirements for DVV, 7th edition, rev. 8 - April 2020)

8th edition - May 2023