DANISH WINDOW VERIFICATION

Technical Requirements for DVV

Approved October 2020

VinduesIndustrien – The Association of Danish Window Manufacturers

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Technical Requirements for DVV – Danish Window Verification

7th Edition, Rev. 8, October 2020

1. Introduction

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

The requirements describe and specify a number of requirements concerning manufacturer's organisation, product information, manufacturing plant, quality control, materials and execution/design as well as performance requirements for the finished product. The Requirements also include rules in relation to product certification. The notes are for general guidance.

The Requirements serve to ensure that the products leaving the factory are of such a high standard in terms of materials and execution as to meet or exceed the requirements of these Technical Requirements and the manufacturers own product description and labelling.

As an ongoing part of this process and to ensure they are up to date, the Technical Requirements are reviewed at least once a year.

The Requirements are managed by a Technical Committee set up by VinduesIndustrien.

This edition of the Requirements was approved by the VinduesIndustrien Technical Committee in October 2020.

The use of these Technical Requirements for certification or inspection purposes is only permitted by prior written agreement with VinduesIndustrien.

2. General requirements on the manufacturer

2.0 General

It is assumed that in order to comply with the requirements in the technical sections of the present Requirements, the manufacturer shall, as a minimum, meet the general requirements set out in this chapter.

The company shall produce for sale windows, window sections and/or external doors in a permanent factory.

The products shall be manufactured using profiles developed by or at the request of the manufacturer or bought in as semi-finished standardized profiles.

2.1 Manufacturing plant

Production must employ machines to such an extent that, essentially, all geometric dimensions, tolerances and shapes of individual profiles and completed units depend exclusively on the machining accuracy of the machines employed. Furthermore, machine settings should be altered only when changing type or when tools require maintenance.

In order to check the machining accuracy of their machines, all machine operators must at all times have at their disposal a model, template or drawing indicating tolerances as well as measuring tools to reveal deviations.

2.2 Storage

Finished products must be stored under conditions which ensure that timber parts **maintain** a moisture content of 12 ± 3 %.

Climatic conditions must be such that no component part of the finished unit is damaged by temperature fluctuations or by formation of condensation.

Individual units must be supported in a manner to prevent lasting deformation/distortion occurring.

2.3 Management and staff

Each company must appoint at least one person (operations manager) to take charge of supervising production and the quality of finished units.

The person in charge must be in a position to make arrangements for and manage the company's quality control in conformance with these Requirements.

The staff employed in production and storage must be either skilled or semi-skilled workers. Particularly important and demanding manufacturing operations must be carried out by staffs who have received suitable training in the operation performed.

2.4 Brochures and user manuals

At complex profiles window types are named after the visible main materials which must be maintained, from the inside as well as the outside.

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 consist of one or more documents and be available as a hard copy and/or electronic copy.

If published as a hard copy, it must be apparent from the brochures and the user manual accompanying the products whether special burglary prevention measures/accessories can be fitted to or incorporated into the units in question. Release date must be stated.

2.5 Product description

As the basis for production an adequate production basis for each individual product type must be avalilabe.

Drawings must be available in proper scales and show a cross-sectional view of individual profiles.

Drawings must show all relevant dimensions.

By way of example, Annex 3 contains a vertical cross-section of a timber window.

2.6 Information about performance testing

Type testing subject to Annex ZA of EN 14351-1:2006 + A2:2016 must be performed by an accredited laboratory, which has been notified by the EU Commission. Other tests may be performed by a non-accredited laboratory if the testing is supervised by the certification body. Companies which meet the EU definition of micro-enterprises may use assessment and verification level 4 as agreed with VinduesIndustrien.

The test reports must be kept on file for as long as the product remains in production plus at least 10 years.

The manufacturer must have determined the load bearing capacity of the safety devices of each unit as stipulated in EN 14351-1 point 4.8.

Top/swing windows must have passed type testing in accordance with EN 14609 demonstrating the capability of the casement to support a 350 N load for at least 60 seconds.

2.7 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 manufacturer's name, telephone no., and/or web address and the time of manufacture.

Alternatively, in addition to the DVV logo and the time of manufacture, the label may give the manufacturer's registration number with the certification body and the text: *For further information, see www.dvv.dk.*

When companies are trading with each other, traceability of the original manufacturer must be secured.

The label must not contain a reference to a certificate concerning systems certification (the ISO 9000 series).
Certified units must be provided only with one label stating consumer warranty.

The DVV inspection and warranty label must not appear alongside with the name or logo of the certification body other than on the certificate issued.

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

For aesthetic reasons, e.g. in protected or preservation-worthy buildings, the certification 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.

The label (may be used in red and in black color):

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

The size of the logo is optional, the text, however, must be legible.
Specification of colours:

- CMYK colours: m100, y100 + black text
- Pantone colours: 032 + black text
- RGB colours: 229, 0, 3 + black text

The logo may also be shown in black.

Approved versions of logo/text must be available for download from the certification body's homepage.
Dealers of DVV-labelled units may use the logo, provided they add *"Dealer of DVV-labelled products."*

2.8 Product liability

Manufacturers must take out a combined commercial and product liability insurance covering a sum total of DKK 10 million (damage to persons/property). The insurance shall 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 shall 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).

The above-mentioned obligation also should also apply to suppliers of hardware and hinges.

For insurance coverage requirements, please see Annex 15.

A copy of the insurance policy must be forwarded to FPR Forsikringsmægler A/S, Skagensgade 39, 2630 Taastrup, Denmark.

2.9 Consumer protection in Denmark

The window and glazing unit manufacturers must be affiliated to the DVV warranty scheme which, as a minimum, provides coverage for consumers to the levels mentioned below. As an alternative to the DVV warranty scheme, the obligations may be covered by a recognized insurance company with an office in Denmark.

A copy of the insurance policy must be forwarded to FPR Forsikringsmægler A/S, Skagensgade 39, 2630 Taastrup, Denmark.

- For each sale the window manufacturer shall, in connection with entering into an agreement for this sale, provide the consumer with 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 shall 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 five years after the window manufacturer's delivery date, however not later than three months after discovery of the defects.
- The warranty scheme must provide cover in case the supplier cannot or will not rectify defects.
- Claims are dealt with 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. Defects are rectified in accordance with the findings of the Board.
- The warranty must provide cover of up to DKK 10,000 incl. VAT for each component/unit and up to DKK 200,000 incl. VAT for each disputed building project.
- The warranty must provide cover of up to DKK 1,000,000 incl. VAT per company per calendar year for 5 years.
- 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.
- 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 manufacturer must have signed a warranty like Annex 21.

3. Quality control requirements

3.0 General

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 a company to control its quality levels.

A quality control system should comprise the following main points:

- A description of the manufacturer's quality aims and the means employed to achieve these aims.
- An organizational 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 aims.
- 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.

3.1 Quality control system documentation

The quality manual and the quality control system as implemented in practice should at least comprise the following points:

a. Management responsibility:

Management must describe the policy and aims to be pursued by the manufacturer in relation to quality. It should 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 authorized to make decisions which influence the quality of the finished product.

It must appear clearly from an organizational plan who is responsible for and authorized 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 shall 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.

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 of a person delegated to sign on his behalf using a signature or the like, possibly a digital signature.
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 subcomponents 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 point 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 point 3.2 (Requirements concerning inspection of finished goods)

i. Inspection, measuring and test equipment:

A written procedure must be in place for checking and adjusting the measuring and test equipment employed in production. As a minimum, the equipment must be checked and have an accuracy as specified in Annex 13.

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 authorized to decide about use, rework or rejection.

k. Corrective action:

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 action taken to prevent recurrence.

l. Handling, packaging and delivery:

A written procedure must be drawn up to ensure that both subcomponents 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.

3.2 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 selected **every week** by the person in charge of quality. He must then conduct a thorough inspection to answer the questions which are listed for timber, PVCu, metal, timber/aluminium and FRP in Annexes 4, 5, 6 and 7 or some other form of extended systematic in-house inspection.

Completed 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.

The completed tables must be kept for at least 10 years.

4. Rules concerning product certification

4.0 General

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 and the Construction Products Regulation issued by the EU.
The above implies that only units pre-assembled ex-factory are covered by the certification.

This rule may, however, be deviated from, if a similar level of quality can be obtained, and the company guarantees the warranty, cf. section 2.9, and the units are subject to EN 14351-1, cf. Annex 24. This implies that procedures shall be established, which include the drawing up of fitting instructions, training of fitters and internal and external quality inspections with check lists, which are completed at the building site and kept by the manufacturer for at least 10 years (scanned copies are acceptable). The certification body shall approve the above-mentioned manuals and carry out sample inspections of the quality at the building site. If the units are assembled by other companies than the certified company, a clause shall be added to the basis of agreement on "Cascading ITT" (EN 14351-1, section 7.2.5), to the effect that the certification body shall have access to carrying out quality inspections of the finished assembled units.

In addition, the DVV product certificate serves to ensure that the product corresponds to the manufacturer's own product description in every respect.

The product inspection carried out by the certification body must be conducted ex-factory and comprise: Frame and casement, hardware, weather seals and surface treatment and, in so far as the product is supplied factory glazed, also the optical quality and thermal value of the glass as well as installation method and materials. For sealed glazing units the inspection does not include the ability of the unit to remain free from condensation inside the sealed unit.

When a company opts for the VinduesIndustrien's Technical Requirements as the basis for its product certification, it is obliged to subject to certification of all its standard products sold in the Danish market, yet may still manufacture special products to order. However, it must be clearly evident from the contract for such products that the products are not certified. If the standard products are sold in export markets without being manufactured in accordance with VinduesIndustrien's Technical Requirements, the manufacturer must have in place written procedures about how to ensure that these products are not sold as certified products.

Standard products shall mean products manufactured on the basis of profiles developed by or at the request of the manufacturer or bought in as semi-finished standardized profiles.

These Technical Requirements include elements mounted in vertical openings in walls.

By special agreement, certification may comprise the manufacture of special products when requested in writing by the manufacturer. The request must be accompanied by specifications for the additional features which have been agreed in relation to the ordinary basis for certification.

As the basis for product certification, the manufacturer must have prepared an appropriate production basis.

No changes in the specifications given on the data sheet or drawings may be executed before a revised sheet has been forwarded to and commented on by the certification body nor before compliance with instructions, if any, from the certification body has been documented.

If approved materials, constructions and designs are changed in significant respects, compliance with relevant functional requirements must be documented by presenting test reports from an accredited testing institution or by a non-accredited laboratory if the testing is supervised by the certification body.

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

4.1 Continuous monitoring (inspection visits)

4.1.1 Inspection frequency

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

Under normal circumstances continuous monitoring comprises 2 inspection visits per year.

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

- For an uninterrupted period of 2 years comprising 4 inspection visits there must have been no recorded cases of critical defects leading to the imposition of stricter control
- during the same period the number of significant defects at each of the 4 inspection visits must not exceed the upper control limit ($ØKG_a$) minus 0.4 defects per unit
- the number of immaterial defects at each of the 4 inspection visits must not exceed the upper control limit ($ØKG_b$)
- within 5 to 7 months of the annual inspection visit the manufacturer must forward electronically and in collected form to the certification body a copy of the inspection log for the first week of each month.

When a manufacturer has acquired the right to only 1 inspection visit per year this inspection visit frequency will continue for as long as the above limits and the forwarding of in-house inspection results are complied with.

If having been given five days' advance notice in writing the manufacturer does not forward in-house inspection results or if an inspection visit finds the manufacturer in breach of the above limits for the number of defects, the frequency returns to 2 inspection visits per year.

The manufacturer may regain the entitlement to 1 inspection visit per year when the above conditions are met at two successive visits.

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

The certification body chooses the time of the ordinary biannual inspection visits, and visits may be paid without prior notification to the manufacturer.

Visits may be paid on any weekday that is Monday to Friday, with the exception of public holidays and holiday periods.

In principle, the time of the visit is chosen randomly for each manufacturer but should be planned so as to keep travelling costs at a reasonable level.

4.1.2 Sampling basis and scope

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**, in order for continuous inspection measures to be limited to focussing on **production quality** and the effectiveness of the quality control system. Inspection visits are therefore limited to investigating whether changes, if any, in the manufacturer's quality control have been implemented, checking main dimensions, visually checking general material properties and manual functional testing conducted on a sample consisting of normally 10 units.

Quality assessment is thus based on representative **samples**, with the absolute quality statement being replaced by a **probability**. The quality statement is categorized and weighted in the same way as you may expect the consumer to do it when assessing the product. Deviation is split into three categories: **Critical defects**, **significant defects** and **immaterial defects**.

Quality limits are established for each of these 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 limits for significant and immaterial defects are set as **number of defects per unit**. For each of the two categories different limits are set; these limits relate to differences in importance and the number of properties to be assessed within each category. The limits for significant defects will thus be narrower than for immaterial defects; likewise, the consequences of exceeding the limits will vary.

A random sample is selected from among various types of finished production units, if possible selected from various places in the storage area to represent several production series.

At ordinary inspection visits normally 10 units are selected for checking against all three defect categories. The units are inspected to see if they meet specifications, and the results are recorded.

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.

The quality control system is checked by sampling in accordance with the existing quality manual and the VinduesIndustrien 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 inspection should be planned so that the entire quality control system of the company is audited within the certification period of 3 years. After the 3-year period the certification body and the company management may agree that in future the inspection shall be performed on changes in the quality control system and on processes, which are deemed to be particularly critical to failures in the functioning of the units or which will reduce the life of the units.

4.1.3 Defect category description

1. Critical defects (K)	2. Significant defects (V)	3. Immaterial defects (U)
Will impact on the functioning and life of the unit	May impact on the functioning and life of the unit to a lesser extent	Will not impact on the functioning and life of the unit
Will be noticed by the customer	Is not likely to be immediately noticeable to the customer	Will not be noticed by the customer
Will result in a complaint	Is not likely to result in a complaint	Will not result in a complaint

Defects and categorization are described in Annex 8.

***Critical defects are measured as number of units with defects*:**
A critical defect is characterized as a defect which will cause the unit to malfunction and therefore, in principle, to be useless. Units with critical defects must either be rejected or repaired to a standard equal to a faultless unit; corrective action must be taken immediately.

Significant and immaterial defects are measured as number of defects per unit:
A large number of the quality criteria established in the Technical Requirements for DVV will be judged differently by consumers; in addition, it will be difficult to establish fixed limits for the extent to which significant and immaterial defects should be permitted. As part of the inspection of the sample these defects will therefore be grouped and added up to a total on the basis of which an average figure per inspected unit may be calculated. The requirements establish a maximum number of defects per unit based on industry experience and the level of quality laid down in the Technical Requirements for DVV. Unless there are comments to the contrary in the inspection report, units with such defects may be delivered without having been repaired. However, corrective action to prevent repetition must be taken as soon as possible. To take the technological development of processes and materials into account, a weighting factor has been included in Annex 8. When adding up the defect categories, this weighting should be taken into account.

4.1.4 Criteria for approval or rejection

***Critical defects*:**
Normal inspection. The inspection is conducted by selecting a random sample of n_1 units from the store of finished units. The quality is deemed to be acceptable if finding no more than C_1 units with critical defects.

The quality is deemed to be unacceptable if there are C_1+1 units with critical defects.

The sample size n_1 and the approval/rejection criterion C_1 are chosen on the basis of a wish to limit risk of type 1, i.e. approval even though the quality is unsatisfactory, to a maximum of 35 % when the permissible production of defective units is 10 %. This requirement is met e.g. by a sample of $n_1 = 10$ and $C_1 = 0$. This means that out of 10 inspected units none are allowed to have critical defects (see 4.1.3 and Annex 9).

Additional inspection. If a normal inspection reveals critical defects, a further sample of n_2 units is selected for an additional inspection. The quality is deemed to be satisfactory if there are no more than C_2 units with critical defects and unsatisfactory if there are C_2+1 units with defects.

In order to achieve the same protection against erroneous results as in normal inspection visits the same sample size and C value must be chosen, i.e. $n_2 = 10$ and $C_2 = 0$; however, a sample size of n = 20 and C = 1 will also give the same protection (see Annex 8). This means that the batch may be approved even though the first sample of 10 contains one defective unit provided there are no defects in the following sample of 10 units.

If each of the two samples of 10 units contains one or more critical defects, the batch is rejected and stricter control implemented.

Significant defects:
The main purpose of the Technical Requirements is to ensure that the finished products are of satisfactory quality when leaving the factory. It is not the purpose of the Requirements to control the quality policy of the companies. In recognition of this and the fact that it would be financially unjustifiable to require products to be faultless it is therefore considered sufficient to indicate an upper limit for the permitted number of defects per unit inspected.

The upper control limit $ØKG_a$ is determined by the VinduesIndustrien Technical Committee on the basis of experience gathered. As of 1. January 2012 the $ØKG_a$ for timber has been fixed at 1.0, while for PVC_u it is 0.6 and for metal and FRP 0.8 significant defects per unit.

If $ØKG_a$ is changed without a new edition of the Technical Requirements being published, the manufacturers must be notified about the change in writing.

If the upper control limit is exceeded, quality is considered unsatisfactory and stricter control implemented.

If an ordinary biannual visit or a visit triggered by imposition of stricter control reveals significant defects on a scale equal to or exceeding twice the upper control limit $ØKG_a$, the quality is considered extremely unsatisfactory, and the matter should be reported immediately to the person in charge at the certification body.

Within 30 days of the visit reported, the person in charge at the certification body shall pay a visit to the manufacturer and, with the ordinary inspection officer, perform a normal sample selection and representative inspection of the products and quality control system.

If the result of this visit is in line with the findings causing the intervention of the person in charge, immediate steps must be taken to revoke the certificate.

If the outcome of the visit by the person in charge and the ordinary inspection officer is a figure below twice the upper control limit $ØKG_a$, the manufacturer shall remain subject to stricter control.

Immaterial defects:
The upper control limit $ØKG_b$ is determined by the VinduesIndustrien Technical Committee on the basis of experience gathered. As of 1. January 2012 the $ØKG_b$ for timber has been fixed at 1.2, while for PVC_u, metal and FRP it is 1.0 immaterial defects per unit. If $ØKG_b$ is changed without a new edition of the Requirements being published, companies must be notified about the change in writing.

If the upper control limit is exceeded, quality is considered unsatisfactory and it is up to the person in charge at the certification body to decide whether or not to impose stricter control.

Stricter control:
The imposition of stricter control triggers two inspection visits every six months. Once imposed, stricter control will continue until it has been established at two successive visits that the level of defects is below the upper limits set for critical and significant defects.

If at a total of three visits within one year of first finding defect levels in excess of the set upper limits the manufacturer is still in breach of these limits, the procedure described under significant defects involving visits by the person in charge and the ordinary inspector must be implemented immediately. Here, the basis for approval or rejection will be the ordinary upper control levels.

If $ØKG_a$ is breached at the following visit, the certificate will be revoked.

4.2 Obligations of certification bodies

4.2.1 General

Certification 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 VinduesIndustrien 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 VinduesIndustrien.

Certification bodies, who have entered into a certification agreement with VinduesIndustrien regarding the use of these Technical Requirements for the certification of companies, will be stated on the website www.dvv.dk with their name, address and VAT or CVR registration number.

A certification period has been fixed at 3 years.

4.2.2 Accreditation

Certification bodies shall be subject to supervision by an accreditation body.

4.2.3 Certificates

Certifying conformity with the Technical Requirements for DVV using a certificate the logo to be used with the Requirements must be visible

Product certificates issued to certify conformity as regards the manufacturing of windows and external doors, acc. to these Requirements, and the manufacturing of laminated and finger-jointed timber, cf. sections 5.3.5 and 5.3.6, as well as glazing unit certificates according to a certification scheme recognised by VinduesIndustrien shall be reported by the certification bodies or the companies to www.dvv.dk v/VinduesIndustrien, where the certificate numbers will be made visible to the public.

According to these Requirements, assigned certificate numbers must include the designation DVV, e.g. DVV-235

To avoid identical certificate numbers, all numbering systems applied by the individual certification bodies must be approved by VinduesIndustrien.

4.2.4 Implementation of revised Technical Requirements

VinduesIndustrien shall grant the certification bodies appropriate transitional periods for the implementation of revised editions or revisions. 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 correction instructions shall appear from Annex 29.

4.2.5 Forwarding of inspection results to DVV v/VinduesIndustrien

To enable the VinduesIndustrien Technical Committee to assess the quality of the samples and perhaps adjust the fixed control limits, the certification bodies shall once a year report the following in an anonymised form:

Inspection frequency

The number of companies, cf. section 4.1, receiving inspection visits at ordinary, reduced or increased frequency, respectively.

Statistics of defects

If the Technical Committee becomes aware that there is a problem area in window constructions or in the materials used, the committee may request that certification bodies report general error statistics to the committee in accordance with a prior agreement with VinduesIndustrien.

The error statistics can e.g. be divided into the categories material, machining, glass and fitting and apply to critical defects, significant defects and immaterial defects, cf. Annex 8.

Warranty Scheme

If the company is not affiliated to the DVV warranty scheme, but covered by a similar insurance scheme, the certification body must see to it that a copy of the insurance policy is forwarded to the DVV warranty scheme rep. by FPR Forsikringsmægler A/S, Skagensgade 39, 2630 Taastrup, Denmark.

Furthermore, if the company is not affiliated to the product and liability insurance programme of VinduesIndustrien, the certification body must see to it that a copy of Annex 15 – Control form, stating the insurance company used, is forwarded to the DVV warranty scheme rep. by FPR Forsikringsmægler A/S, Skagensgade 39,2630 Taastrup, Denmark.

4.2.6 Change to a new certification body

If a company chooses to change to another certification body, with whom VinduesIndustrien has an agreement, the company may adopt the same status as it had with the certification body which the company is leaving. It is up to the company to provide the necessary documentation.

If an agreement has been entered with a new accredited certification body, VinduesIndustrien will, during a transitional period, issue provisional certificates, so that the company may maintain its right to use the DVV label, until the new certification body has issued a new certificate. This provisional certificate will be limited in time as agreed with the new certification body.

5. Timber windows and doors
5.0 Dimensioning and weather tightness

Note:
Large opening casement windows may be affected by functional problems. It is therefore advisable not to manufacture opening casements with an area in excess of 1.7 m^2 and to restrict the length of the longest edge to 1.5 m. If exceeding these dimensions, particular attention should be paid to e.g. casement dimension, fitting of hardware, hinge design and number of fastening points. Furthermore, in the case of side hung casements, the height/width (side) ratio should be examined more closely.

As regards doors, the suitability of the chosen construction, seen in relation to the situation of use in which the unit is to be placed, should be evaluated at an early stage. Requirements or expectations may differ according to whether the door is to be installed for instance in a private residence or in a child care facility.

If there is any doubt about the suitability of the door, it can be tested in accordance with EN 14351-1, point 4.17.

Bowing 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.

When bowing and twisting are assessed, particular emphasis must be put on their impact on the weather tightness and other general functional aspects of the unit.

As a guidance and under specified laboratory conditions, the unit must meet the requirements of Class 3 (max. 2 mm per metre) cf. EN 1530.

Twisting must not exceed 2 mm per 10 cm of workpiece width measured over 1 m.

Measurements shall be carried out according to EN 952 - General and local flatness.

If, in the case of large units, it is deemed necessary to document the resistance to wind load in more detail, tests must be conducted in accordance with EN 12211.

Classification requirements must be stated in accordance with EN 12210.

Normative classification requirements under normal Danish conditions would be:
Class 3 for load
Class C for deflection.

If weather tightness testing of windows and doors is required, tests shall be based on the following standards:
EN 1026 for air permeability
EN 1027 for water tightness.

Classification requirements shall be indicated in conformance with:
EN 12207 for air permeability
EN 12208 for water tightness.

Normative classification requirements under normal Danish conditions would be:

Class 3 for air permeability at an average of measurement of a positive and negative test pressure of 600 Pa for windows and outer doors.
Class 8A for water tightness (pressure 450 Pa for both windows and outer doors)

Normative requirements for classification acc. to low-energy class:
Class 4 for air permeability as an average of measurements at a positive and negative pressure of 600 Pa for windows and external doors. At 100 Pa, air passage may not exceed 1 $m^3/h.m^2$.

Test and classification requirements should be evaluated in relation to the actual use of the units, including the geographical location.

5.1 Burglary prevention

***DVV minimum requirements*:**
The construction, fitting of hardware and installation of glass in windows and doors must be sufficient to enable the intrusion resistance of the unit to meet common practice in the Danish market at the time of manufacture of the units.

It must not be possible to force casement constructions 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. (This requirement is considered to have been met if the glazing unit is spot bonded to the inside of the glazing rebate).

DVV options:
Manufacturers may also have a unit or series of units tested according to the current versions of EN 1628, EN 1629, EN 1630 and then classify the units according to EN 1627. For each tested unit or series of units, a scope must be described.

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

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

5.2 Thermal performance

Documentation in accordance with DS 418 or EN ISO 10077 parts 1 and 2 must be provided for all data concerning the thermal performance of the products.

For each product system, documentation must be provided for a 1.23 x 1.48 m single-light opening casement window.

For external doors values must be given for a panelled door with a standard glazing unit as well as for a flush door. Both doors must be in the standard size of 1.23 x 2.18 m.

If the manufacturer wants an initial type calculation (”ITC”) carried out on a sliding door or a folding door respectively, this calculation must be 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 standard glazing unit defined as the most commonly used glazing unit in the product system in question.

The standard 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 glazing units must be specified with 2 significant digits and be legible/comprehensible in the glazing unit.

Thermal properties of window materials must comply with current norms i.e. a recognized standard or be listed on the materials or positive list of the Association of Danish Window Manufacturers and be available on www.dvv.dk.

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. This can be documented via calculations according to EN ISO 10077-2.

The above requirements regarding minimum temperature do not apply to window and door handles, lock cylinder, door sills and to the junction between frame and casement, but the manufacturer must, at any time, make sure that no condensation is retained in the construction. This may be done by ensuring a continuous wet line and by applying solutions with built-in thermal bridge breakers.

For each delivery of windows and external doors the company must additionally provide all the energy performance data for individual units which are required to calculate the overall energy performance of the building project concerned.

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

5.3 Timber material

If using different timber species in the same window/door component, you must ensure that damp-induced changes in dimensions do not impact negatively on function and weather tightness.

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 separately approved by the Technical Committee and stated in the positive list cf. Annex 18.

If there is more than one timber species in the hatched areas of illustrations in Annex 10, the applicable base coat and surface treatment requirement shall be the one which applies to the species with the poorest natural durability.

Hardwood:
Hardwoods such as Dark Red Meranti, Red Lauan, Sipo (Entandrophragma utile), Araputanga (Swietenia macrophylla), Iroko, Teak and Oak as well as other equally durable hardwood species which meet the requirements of EN 350-2 may be used for windows and external doors under the following conditions:

- The timber must conform with the specifications regarding definitions and performance requirements listed in the table under 5.3.3. Timber density must be at least 500 kg/m^3 at a moisture content of 12 %.
  Timber preservative treatment must be carried out in accordance with the general requirements listed under 5.5.1 (with the exception of door sills where alternative preservatives/methods are permitted).

- Application of base coat and surface treatment must conform with treatment systems 3 or 4 - cf. 5.5.3.

The timber supplier must provide a declaration comprising at least the timber species and its density.

If the 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 selection of the planks must be evenly distributed over the entire batch; the density may be determined using sawn timber. The results must be recorded in weight tables and be kept with the tables recording data from in-house inspection of finished units.

At each inspection visit the weight tables which have been completed since the previous visit are examined; if cases of too low density are found, these are recorded in the inspection report.

If the company has failed to complete weight tables giving density data, this will be registered as a significant defect for the sample at the inspection visit.

Spruce** (European Whitewood)**:
Spruce may be used for windows and external doors under the following conditions:

- The timber must conform with the specifications regarding definitions and performance requirements listed in the table under 5.3.2 and the additional definitions and requirements listed under 5.3.4. Timber density must be at least 450 kg/m^3 at a moisture content of 12 %. The average 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.

- Timber preservative treatment must be carried out in accordance with the general requirements listed under 5.5.1.

- Application of base coat and surface treatment must conform with treatment systems 1, 2 or 2ØKO - cf. 5.5.2.

- 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.

There are no specific requirements regarding penetration and retention when applying base coat in accordance with system 1 and 2 but the process must be the same as for the application of base coat to pine.

The manufacturer must provide a declaration from each supplier/sawmill giving details of the spruce used. The declaration must cover at least the points mentioned in Annex 12.

On receipt of the timber, the company must perform a wood density check on 5 % of the planks received. The selection of the planks must be evenly distributed over the entire batch; the density may be determined using sawn timber. The results must be recorded in weight tables and be kept with the tables recording data from in-house inspection of finished units.

At each inspection visit the weight tables which have been completed since the previous visit are examined; if cases of too low density are found, these are registered in the inspection report.

If the company has failed to complete weight tables giving density data, this will be registered as a significant defect for the sample at the inspection visit.

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

- All timber material which is external to the wet line must be 100 % heartwood.

- The timber must conform with the specifications regarding definitions and performance requirements listed in the table under 5.3.2 and the additional definitions and requirements listed under 5.2.4. The mean timber density 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.

- Timber preservative treatment must be carried out in accordance with the general requirements listed under 5.5.1.

- Application of primer and surface treatment must conform with treatment systems 1, 2 or 2 ØKO - cf. 5.5.2.

There are no specific requirements regarding penetration and retention when applying base coat in accordance with systems 1 and 2 but the process must be the same as for the application of base coat to pine. The manufacturer must provide a declaration from each supplier/sawmill giving details of the larch used. The declaration must cover at least the points mentioned in Annex 11.

***Pine** (European Redwood):*
The following requirements apply to the use of pine:

- The timber must conform with the specifications regarding definitions and performance requirements listed in the table under 5.3.2 and the additional definitions and requirements listed under 5.3.4. The mean timber density 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.

- Timber preservative treatment must be carried out in accordance with the general requirements listed under 5.5.1.

- Application of base coat and surface treatment must conform with treatment systems 1, 2 or 2 ØKO - cf. 5.5.2.

- 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 11.

Requirements for the proportion of heartwood in pine
The requirements for the proportion of heartwood in ***finished*** profiles depends on the treatment system (base coat and surface treatment) which the units will have received before delivery.

In units with coupled casements the heartwood proportion requirements do not apply to internal casements.

Units with laminated curved sections with a laminate thickness of less than 6 mm are exempt from the heartwood proportion requirement.

When using treatment systems 1 and 2 – cf. 5.5.2 – the proportion of heartwood in the ***hatched*** areas in Annex 10 illustrations must constitute at least 60 %. In laminated profiles ***each*** layer in the ***hatched*** areas of Annex 10 illustrations must have a heartwood proportion of at least 60 %.

When using treatment system 2 ØKO – cf. 5.5.2 – the proportion of heartwood in the ***hatched*** areas of Annex 10 illustrations must constitute at least 90%. In laminated profiles ***each*** laminate in the ***hatched*** areas of Annex 10 illustrations must have a heartwood proportion of at least 90 %.

Furthermore, under treatment system 2 ØKO, ***all*** external glazing beads must have a heartwood proportion of at least 90 %.; alternatively, all glazing beads must have had base coats applied in accordance with treatment system 1.

Inspection of heartwood proportion - treatment systems 1 and 2:
At each inspection visit checks must be performed on the heartwood proportion of 20 fully finished or partly machined profiles. The profiles are selected with an equal distribution between casement and frame profiles for windows and doors respectively. The proportion of heartwood in the hatched areas shown in Annex 10 is then recorded.

Each profile with a heartwood proportion below 40 % counts as one significant defect.
A max. of 4 profiles with a heartwood proportion of between 40 and 60 % is permitted; each profile in excess of this counts as one significant defect.

If the total number of profiles with a heartwood proportion below 60 % equals or exceeds 10, this is considered a critical error, triggering checks on a further 20 profiles during the same inspection visit. If during this extended inspection the number of profiles with a heartwood proportion below 60 % also equals or exceeds 10, the manufacturer will be subjected to stricter control under the rules in Chapter 4.

Inspection of heartwood proportion - treatment system 2 ØKO:
At each inspection visit checks must be performed on the heartwood proportion of 20 fully finished or partly machined profiles. The profiles are selected with an equal distribution between casement 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 and the heartwood proportion and base coat application of glazing beads checked.

Each profile with a heartwood proportion below 80 % counts as one significant defect.
A max. of 4 profiles with a heartwood proportion of between 80 and 90 % is permitted; each profile in excess of this counts as one significant defect.

If the total number of profiles with a heartwood proportion below 90 % equals or exceeds 10, this is considered a critical error, triggering checks on a further 20 profiles during the same inspection visit. If during this extended inspection the number of profiles with a heartwood proportion below 90 % also equals or exceeds 10, the manufacturer will be subjected to stricter control under the rules in Chapter 4.

Heat treated timber
Heat treated timber must be classifiable as Class 2 (permanent) under EN 350-2. Heat treated timber must meet the requirements regarding heartwood in treatment system 2ØKO. The surface treatment must be performed according to 5.5.2 - Treatment systems for softwood, system 2ØKO.
The timber supplier must provide a declaration comprising at least the heat treatment method applied, the timber species and the pre-production timber density. The process must be supervised by an external inspection body.
Final customers must be made aware of any odour nuisance from the heat treated timber.

Materials data
As a minimum, documented data must be provided for the following properties:

- Density
- Bending strength
- Screw firmness at a stated screw depth.

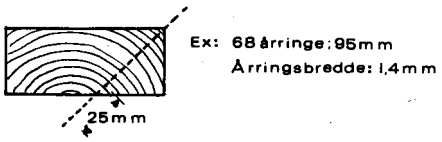
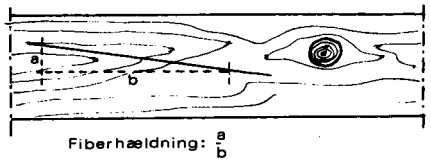
Type testing
Strength/robustness:
Type testing according to EN 14608 must have been performed. The units must be classifiable in Class 2 under EN 13115.
A subsequent increase in the load to 600 Newton must not cause failure in hinges or hardware, their fixing or in door and casement corner joints.

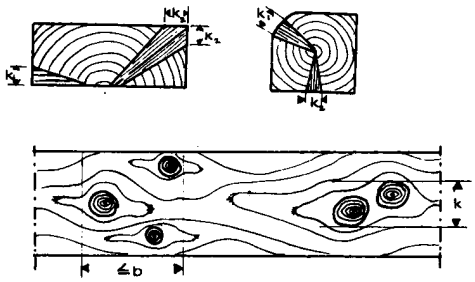
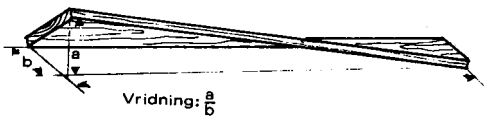
Resistance to wind load:
The resistance to wind load must be documented according to EN 12211 and classified according to EN 12210.
The classification must fulfil:

- Class 3 for load.
- Class C for deflection.

5.3.1 Definitions and measuring rules

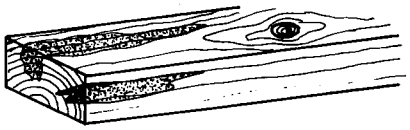
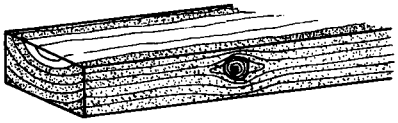
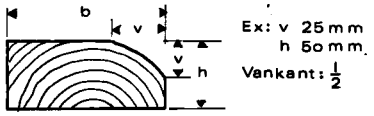
Please refer to the manual ”Nordisk kvalitetssprog for træbranchen – nåletræ” ('The Nordic language of quality for the timber industry - softwood') ISBN 87-7756-568-1, published by Markaryds Grafiska, May 2000, extracts of which can be found in the following 6 pages.

Definitions	Measuring rules
1. Timber species *Tree 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 103ºC ± 2ºC 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 tree 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.* 
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 DS 413. Often, the slope of grain can be seen along shrinkage splits.* 

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 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 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 one side deviate from the common plane of the corners.*	*Twisting is measured over a certain length and 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.* 

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. DS 413. The size of the check is given as the ratio between the depth and the transverse measurement 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, 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 usually 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 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 consist of determining whether it is present or not.* 

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. Grey discoloration caused by weathering *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 consist 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 quartersawn 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.* 

Definitions	Measuring rules
20. Bark *Bark is the outer protective layer on the stem, branches and roots of the tree.*	*Measuring bark will most frequently consist 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 usually 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. The inner part of the wood may not differ from sapwood in terms of colour.*	*The presence of heartwood is usually determined visually, particularly if the workpiece also contains sapwood. In certain conifers 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 usually 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 usually 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 humidity of 12 % and normally given as kg/m^3.*

5.3.2 Workpieces in softwood

Specifications regarding definitions and performance requirements

Narrow - firm	Pith																			
Porous																				
Blue stain - weak, max. 25 % of each workpiece																				
Pitch pockets																				
More than 0.6 x approx. 300 mm/ running metre	Checks																			
Max. 0.6 x approx. 300 mm/ running metre																				
Max. 0.4 x approx. 250 mm/ running metre	Scratche																			
Max. 0.4 x approx. 150 mm/ running metre																				
Synthetic materials																				
Plugging																				
Group	Knots																			
Hole																				
Loose																				
Decayed																				
Large porous	Bark																			
Small firm																				
Dead, partly rooted	Knots																			
Live rooted																				

Knot size	See 5.2.4		
Frames and posts	Max. 2/3 x side measurement, however max. 40 mm		
Casements	Max. ½ x side measurement however max. 30 mm.		
Plug size	As knot + 25 %		
Synthetic materials	As plugging		
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 head rail		
	External side: casement bottom rail		
	Internal casement side		
Glazing bars	Heavy: knots, max. 1/3 x side measurement		
	Thin: Small firm knots permitted		
Glazing beads	Small firm knots permitted		

In addition, the following are not permitted: Ring shakes, top shoot breach, brittle heart, overgrowth, insect damage, rot, waney edge and bark.
Signature: Permitted ☐ Not permitted ▩

5.3.3 Workpieces in hardwood

Point	Definition	Performance requirements
1	Timber species	cf. 5.3
2	Moisture content	12 ± 3 %
3	Width of annual ring	No requirements
4	Slope of grain	Generally, not exceeding 1:10
5	Knots	Single rooted pearl knots permitted
6	Bowing	EN 1530: Class 3
7	Twisting	Max. 2 mm per 10 cm workpiece width measured over 1 m
8	Checks (Radial cracks)	Not permitted on visible surfaces
9 11 12 14 15 16 21 23 24	Ring shakes Thunder shakes Brittle heart Overgrowth Insect holes > 2 mm Rot Sapwood Pith Reaction wood	***Not permitted***
25	Density	Min. 500 kg/m^3

5.3.4 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 measures 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 surfaces 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 filler:
Synthetic filler may be used to the same extent as plugging. However, it should be documented that heating it to 70º C 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 5.3.2
Cracks and checks must 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.

5.3.5 Finger joints

Finger-jointing of end-jointed profiles is permitted on the following conditions:

The profile of the joint must comply with DIN 68140 or a similar, recognized standard.

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.

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

- checking 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

The above inspection and testing activities must meet or exceed the following requirements as regards frequency and performance requirements:

Checks on timber moisture content must be conducted at least every two hours during production hours. The moisture content must fall within the range 12 ± 2 %.

Glue line checks must be conducted twice per shift and once every time workpiece dimensions are changed.

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

The tightness of the joint must be checked at the same frequency as the glue line. 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 testing must be conducted once a week 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 72 hours at 20° $\pm$ 3° and 50 % $\pm$ 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 testing must be conducted once a week 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.

Testing is conducted as shown in Annex 17, and the tensile strength must meet the requirements listed in the Annex.

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 for at least 10 years and be accessible to external inspectors.

Through brochures or by other means buyers must be informed of the fact that products have been manufactured from finger-jointed timber.

Units with end-jointed profiles based on finger-joints must always be supplied with surface treatment completed in accordance with 5.5.2. This requirement does not apply to glazing beads. However, for glazing beads in pine to be exempt from the requirement, the heartwood proportion must be at least 90 %.

If finger-jointed timber is sourced from a subcontractor, the subcontractor/manufacturer must be affiliated to an impartial inspection body approved by VinduesIndustrien and the profiles labelled in accordance with the rules of this body so as to ensure traceability.

5.3.6 Lamination

In laminated profiles, which receive a base coat and surface treatment in accordance with treatment systems 1, 2 or 5, each laminate in the hatched areas of Annex 10 illustrations must have a heartwood proportion of at least 60 %.

In profiles treated in accordance with treatment system 2 ØKO, each laminate in the hatched areas of Annex 10 illustrations must have a heartwood proportion of at least 90 %.

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.

Note:
In terms of the stability and durability of laminated profiles it is essential to take into account that the tangential moisture deformation of (back sawn) timber can be up to twice the radial moisture deformation (quarter sawn timber).
The basic principles of constructing laminated profiles are listed in EN 13307-1, Annex A.

Prior to lamination, the individual laminates must be conditioned to room temperature and a moisture content of 12 ± 2 %.

As regards visual defects etc. the completed laminated profiles are subject to the same requirements as solid timber profiles.

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 bonding process must be completed in accordance with the adhesive supplier's instructions for the type/variant of adhesive used.

Note:
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 inspection and checking:
The manufacturer's own in-house inspections must comprise at least the following activities:

- 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)

Instructions on how to conduct the checks and forms for the recording of the resulting data must be available for all checking and inspection activities. It must be evident from the recorded data whether the activities checked meet the specified requirements.

Performance requirements:
The manufacturing hall and warehouse temperature must be maintained at a minimum of 15º C and the humidity of the ambient air must be controlled to ensure the timber maintains the specified moisture content. (Recommended values are a temperature of 20º C and humidity in the range 55 – 65 %).
Moisture content of timber and laminates ready for bonding: 12 ± 2 %.
The thickness of the outermost laminate measured from the innermost wet line and outwards must be at least 6 mm.

Maximum deviation of individual laminates from mean thickness: +/- 0.1 mm. This applies to the laminate both lengthwise and crosswise.
The dosing of adhesive must comply with the adhesive supplier's instructions.
The lamination process must comply with the instructions which must be provided by the suppliers of lamination equipment and adhesives.

Inspection frequency:
Climatic conditions must be recorded twice per working day/shift.
Timber moisture content 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.

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

The extent of in-house checking and inspection activities and the number of items checked as well as the frequency of checks for each individual activity must comply with the procedures approved by the external inspection body.
Similarly, the way inspection data is recorded must be approved by the external inspection body.

All data record forms must be kept for at least 10 years and be accessible to external inspectors.

In-house testing:

The strength of glue lines must be tested in-house. This can 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.
Sampling must be conducted at least twice per working day/shift, each time selecting at least 3 samples per bonding process line.

Performance requirements:
Shear testing must produce a mean breaking stress value for glue lines of at least 6 N/mm² for each test sample.
When splitting glue lines, the split surfaces must exhibit at least 90 % wood failure.

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.
The requirements in respect of test results, the extent and frequency of testing as well as the recording of test results must be specified in procedures approved by the external inspection body.

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
- selecting samples for external testing.

External testing:
At the external inspection, 6 laminated profiles are selected from each bonding process line. From each of these profiles, a 600 mm long sample is cut and sent for testing at an accredited laboratory or a laboratory approved by VinduesIndustrien.

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

Delamination testing
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.

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.

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.

Requirements for external inspections:
In the case of window manufacturers who are manufacturing their own laminated profiles, external inspections are conducted in connection with the biannual or annual inspection visits by the inspection body.

At each inspection visit samples are selected and sent for external testing at an accredited laboratory or a laboratory approved by VinduesIndustrien.

In the case of other manufacturers of laminated profiles, including manufacturers of curved sections, who act as suppliers to window manufacturers affiliated to the DVV scheme, external inspections must be conducted by an impartial body approved by VinduesIndustrien.

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 – and, at each visit, samples are selected and sent for external testing at an accredited laboratory or a laboratory approved by VinduesIndustrien.

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.

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

Labelling:
Laminated profiles from suppliers must carry a clear supplier's label (name/logo) and the time of manufacture (week and year).

5.4 Finishing

5.4.1 Machining of wood

All faces must be machined to a smooth finish (with the exception of the outside of frames.)

Reduced thickness at profile ends	not permitted
Torn surface around knots and other cross grain	max. depth 0.5 mm
Roller-induced shavings marks	max. depth 0.3 mm
Cutter marks	max. length 2.0 mm
Stripes caused by chipped cutter	not permitted
Roller marks	not permitted
Stripes/marks by shavings stuck in machine	not permitted
Torn-off splinters	not permitted

Measurement tolerances *(at a moisture content of 12 ± 3 %):*

External frame measurement: ± 2 mm at a nominal size of ≤ 2 m.
± 3 mm at a nominal size > 2 m.

Profile cross-section ± 0.5 mm at a size ≤ 50 mm
(width and thickness) ± 1.0 mm at a size > 50 mm
Overturning of glazing bars < Δ 2.0 mm (end to end)

The measurements of the individual components of a unit must not deviate to such an extent as to influence the closing and weather tightness of the unit. Annex 3 contains an example of how to indicate measurements.

5.4.2 Design

As a starting point, windows and external door units must be constructed so as to meet the general or particular requirements of the delivery regarding strength/stiffness, air permeability and water tightness, cf. point 5.0 - Dimensioning and weather tightness.

Furthermore, the construction details must be designed in a way which ensures that the materials used do not break down or degrade.

Timber units are subject to the following requirements:

The outermost 40 mm of glazing rebates in casements and fixed windows and glazed doors with insulated glass units, which may be exposed to water ingress, must be sloping outwards.

If the cross-sectional dimension allows it, geogian glazing bars must be sloping outwards.

In outward opening units the bottom rail rebate of frames and transoms must, in the outermost 40 mm as a minimum, have an outward slope of at least 7º, while at the external face there must be a gap of at least 8 mm between the sill and the casement. The bottom rail of the casement must incorporate a drip groove.

In inward opening units the upward facing side of sills and transoms must have an outward slope of at least 7º, with an upstand/drainage rail at the wet line to prevent water ingress.

Inward opening doors must have a drip sill at the lower edge of door leaves / bottom rails.

The sill of external doors must be manufactured in or covered with a hard-wearing material.

Horizontal posts above 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 post and casement. Units with coupled casements are also required to have a drip sill/seal to the head.

No traces or grooves likely to cause water to collect are permitted in horizontal profiles exposed to driving rain.

When seen from the inside, there must be a uniform gap between the frame and the casement.
The variation in gap must not exceed 2 mm, and must not deviate more than 2 mm from the nominal.

In addition, the construction and choice of materials must ensure that the units meet the requirements listed under point 5.2 Thermal performance.

For units with an additional exterior wet line, deviations from the requirement of min. 8 mm spacing between bottom rail rebate and casement are accepted provided that ventilation is ensured between the wet lines and that this is stated in the drawings.

Note:
Wooden drip grooves must be mounted with tongue-and-groove. Alu/composite drip grooves may be mounted without tongue-and-groove.

5.4.3 Edges

All edges of frames, casements and glazing beads etc. which users may come into contact with when the units is fitted and casements open must be rounded off to ensure e.g. proper adhesion of surface treatment.

In order to get a uniform treatment 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.

The rounding-off measurements must be shown in the drawings.

5.4.4 Joints

All corner joints must be such a tight fit that it requires considerable effort to assemble them by hand. Pressing assemblies together must not cause splits or cracks in the timber.

Frames and casements including transoms and mullions as well as glazing bars for both windows and doors may be assembled using dowels, paying due attention to dimensioning, glueing and impregnation. Wood dowels should preferably be in spruce.

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 sizes when combined with the application of gap-filling adhesive to the contact surfaces of the joint.

On external faces there must be no openings allowing water ingress, e.g. fissures in panels and joints behind drip grooves and kick plates.

No corner joints may contain openings from fastener slots or other similar openings which cause risk of water absorption.

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.

All joints must be assembled under pressure. Once the pressing is completed, all cheeks and corners in tenons and mortises must be completely tight. Joints must be glued using waterproof adhesive which, in so far as possible, should also be applied to end grain. Excess adhesive is permitted on the hidden face of frames.

In both doors and windows, all joints in sill and casement bottom rail rebates as well as glazing bars must be sealed against moisture absorption by a fully covering application of end grain sealant or an externally applied triangular mastic joint. In aluminium-sill doors the entire end grain face towards the aluminium must be sealed with mastic sealant or another suitable sealing system employed. Inward opening doors with timber sills must be sealed in a similar manner at the external reveal.

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 K3 (DS 419).

Rebates must not be constructed by glueing profiles onto a level face without using a loose tongue or tongue-and-groove system at the same time.

5.5 Timber preservative treatment

5.5.1 General

The following Requirements for preservative treatment of timber presuppose that the requirements listed under ***5.3 Timber material*** have been complied with.

All units must be supplied ex manufacturer with timber preservative treatment; information about the treatment in question must be included in quote and order confirmation.

Impregnated profiles where the preservative treatment has not penetrated the timber fully must be reimpregnated after machining or cutting to length, e.g. standard profiles cut to fixed sizes. This is done by dipping the profiles in the original solution for at least 30 minutes at a minimum depth of 100 mm of liquid.

If units are supplied with a base coating only, instructions regarding further surface treatment must be included to ensure that upon fitting, the surface receives a final treatment to leave the surface finished.

Units in softwood supplied with base coat only must have been treated in accordance with treatment system 1.

After application of base coat under treatment system 1, units must be left to dry for long enough for at least half the impregnation solution typically absorbed to have evaporated.

After application of base coat in accordance with other treatment systems, units must be left to dry for the length of time specified by the supplier of the preservative treatment.

The requirements regarding surface treatment coat thickness apply to all surfaces visible when the unit is closed. In rebates, grooves and on end grain the coat may be thinner; however, the surface must be non-absorbent. The surface treatment must further meet the requirements listed in Annex 14 of these Requirements.

Treatment systems other than those given below may be permitted after submission of application and special documentation which must be examined and approved by the VinduesIndustrien Technical Committee after consulting the management of its Timber Section.

5.5.2 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 contained in 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 preservative used must provide effective protection against fungal attack and meet the performance requirements when testing in accordance with Hazard 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 under 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).
- The coat must have an average thickness greater than 60 µm – cf. 4.2.1 d).
- The treatment must be opaque or semi-transparent - cf. 4.2.2 a) and b).

The surface must further meet the performance requirements listed in Annex 14 of these Requirements.

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

The wet film applied must be subject to systematic checks and the results recorded.

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 impregnation solution used must further be approved by the Danish Environmental Protection Agency.

The impregnation process must be performed in a 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 under 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).
- The coat must have an average thickness greater than 80 µm.
- The treatment must be opaque or semi-transparent - cf. 4.2.2 a) and b).

The surface must further meet the performance requirements listed in Annex 14 of these Requirements.

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

The wet film applied must be subject to systematic checks and the results recorded.

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).

- The coat must have an average thickness greater than 80 µm.
- The treatment must be opaque or semi-transparent - cf. 4.2.2 a).

The surface must further meet the performance requirements listed in Annex 14 of these Requirements.

The combined base coat and surface treatment system must contain fungicides of a type and in a quantity so that it, when tested in accordance with EN 152-part 1, can obtain the character 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 927-2 (6.2.1). The tests must establish that the treatment system meets the designation "mould resistant" as regards growth on the surface.

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 manufacturer's product and system classifications are based.

The thickness of the coat of wet film applied during surface treatment must be subject to systematic checks and the results recorded.

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.

5.5.3 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. 4.2.2 of EN 927-1.

When treating door sills, alternative preservatives/methods are permitted.

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. 4.1 and Table 1 (suitable for use on a stable base such as windows and doors).
- The coat must have an average thickness greater than 60 µm.
- The treatment must be opaque - cf. 4.2.2 a).

The surface must further meet the performance requirements listed in Annex 14 of these Requirements.

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

The wet film applied must be subject to systematic checks and the results recorded.

5.6 Adhesive and glueing

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

5.6.1 Adhesive requirements

Adhesives, whether for glueing workpieces where fibres run parallel or at angles to each other, must be waterproof and meet the requirements of Class D4 in EN 204. However, frame and casement joints may be glued using Class D3 adhesive in accordance with EN 204.

If the workpieces have been treated with preservative before glueing, it must be apparent from the manufacturer's information that the adhesive is compatible with the timber preservative used.

5.6.2 Glueing 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.

5.6.3 Glueing of corner joints

After bonding of corner joints, all contact surfaces must bear glue.

5.6.4 Glueing 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.

5.7 Weather seals

5.7.1 Materials requirements

The materials used for weather sealing between casements and frames must have a chemical structure and/or design assumed to possess such elastic properties that they will continue to provide an acceptable seal against air and water ingress for a number of years under normally occurring changes in the size of the joint. These requirements can be met by seals manufactured in rubber or rubber-like plastic shaped as hollow profiles or as lip strip seals. Brush strip seals may be approved in special cases.

Note
In case of dispute over the suitability of the strip seals in relation to the properties mentioned below, type testing in accordance with EN 12365-1 may be requested. The overall results of this testing must prove performance to the following classifications:

- *Working range* *max. Class 4*
- *Compression* *max. Class 2*
- *Temperature stability,* *meeting or exceeding Class 3*
- *Recovery characteristics,* *meeting or exceeding Class 2*

For duplex profiles (extruded using two or more different materials) the use class for recovery characteristics after ageing in accordance with EN 12365-4 will be added following a future revision of the standard.

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. Brochure and user manual must contain instructions on whether subsequent surface treatment requires the use of particular paints to avoid disintegration of weather seals.

The seals must be designed for mechanical fixing and/or insertion into a groove. Also, seals must be designed and fixed in a manner which allows them to be replaced.

It is a condition of the use of hollow profiles that the edge which the seal abuts is rounded to create a smooth face.

5.7.2 Finishing requirements

Weather seals between casements and frames must be fitted to the unit in a manner which suits their design and construction and so as not to expose them to damaging lateral forces when the casement is opened and closed.

The distance between casement and frame must be adapted to the mean compression value of the seals.

Seals must be fixed in a manner which ensures that their position does not change transversely or longitudinally when operating the unit.

Weather seal corner joints must be finished in accordance with the manufacturer's instructions.

If the seals are not positioned on the same wet line, contact between the wet lines must be ensured e.g. by overlapping.

5.8 Hardware, hinges and fitting of hardware

5.8.1 Hardware and hinges

All hardware must be manufactured in materials which meet normal requirements in terms of physical strength, wear and resistance.
The window manufacturer should be informed about the hardware supplier's declared digit codes, cf. recognized product standards for use, wear and tear, weight, fire, safety, corrosion, resistance and friction.

To secure easy identification and description of the requirements which apply to a particular piece of hardware for windows and doors, a special coding is used which simplifies the communication of the required/supplied properties.

In the DS/EN 13126 series the code is constructed in the following way: See Annex 23

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. If there is reason to doubt the strength of the hardware or the way it is fixed, a test in accordance with EN 14608 may be required to prove its adequacy. As a minimum, the requirements of Class 2 under EN 13115 must be met.

A subsequent increase in the load to 600 Newton must not cause failure in hinges or hardware, their fixing or in door and casement corner joints.

Operating handles must have a strength and fixing adapted to their function and must be designed to prevent fingers getting caught during operation.

Fasteners must be designed and functioned so as to ensure correct tightening against the seals. Strike plates on door frames must be inset into the frame or mounted in and supported by a groove.

Fasteners including strike plate etc. must 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 m^2, 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.

When in the closed position, opening casements or ventilation hatches must be secured at a minimum of 4 points including hinges. If the hinges are located in the centre of the casement (pivot/turn windows) there must be at least 4 fastening points located near the corners in addition to the hinges.

If the dimension of the casement at the closing side is less than 0.6 m, one fastening point in addition to the hinges will suffice.

Other fastening systems which provide uniform weather tightness along all casement edges may be approved.

Pivot and top hung 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.

If the material used for hardware is not in itself corrosion resistant, it must be surface treated.

Hardware and screws made of materials which are not corrosion resistant and which are fitted outside of the external face of the unit must be hot-galvanized or protected by other surface treatment to ensure resistance to 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 be at least 5.

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 be at least 5.

Hardware and screws inside the wet line must be made of a material or protected by a surface treatment which ensures resistance to Corrosion Class 2, cf. EN 1670. This can be documented by 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 be at least 5.

Hardware and its fixing screws located outside the wet line must be sufficiently compatible to prevent the formation of galvanic corrosion.

Lift-off hinges must have a pin of brass or similarly corrosion resistant material.

For use with timber which has been treated against rot and fungi or with a fire-retardant agent the impregnation solution must be proven not to cause deterioration of the hardware and fittings used.

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

5.8.2 Fitting

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.

External doors for dwellings or buildings with a similar pattern of use must be equipped with at least 3 hinges and 3 fastening points at the locking side. The requirement for 3 fastening points does not apply to doors equipped with a door closer or an electric locking system. The tightness of a 1-point closing cannot be expected to be similar to that of a 3-point closing. This should be made clear to the customer.

Fewer hinges and fastening points may be allowed if it can be documented that retention, load bearing capacity and permanent sealing properties are not impaired.

Conventional side hung doors with lift-off hinges must always be fixed with at least 3 screws per hinge leaf. Fixing to the casement requires at least 3 x 40 mm or 4 x 30 mm screws threaded all the way to the head.

In frame timber up to 46 mm 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.

In frame timber from 46 mm the nut is not required, provided each hinge is fixed using at least 4 x 30 mm screws threaded all the way to the head.

Alternative solutions are permitted insofar as testing can document that they offer a similar strength.

Other types of hinges, e.g. drilled-in hinges may be approved on the basis of documented strength.

For side hung windows with a casement width in excess of 70 cm hinges must be dimensioned and fixed as for doors.

Side hung units where the size and/or design (e.g. casement with glazing bars) causes particular risk of problems with closing and weathertightness should have a riser/supporting block fitted to the sill at the closing side. In the case of diagonally stable casement and door leaves the riser block may alternatively be fitted at the bottom of the frame at the hinge side.

At the jamb and head, the gap between the frame and the casement (clearance around the casement) must be adapted to the size of the window/door, the hardware system etc. It may be necessary to carry out adjustment when installing in the building but the unit must be designed for the gap between the frame and the casement to be as uniform as possible on all four sides when seen from the inside.
Viewed from the inside, the gap between frame and casement must be uniform.
Variation in the gap must not exceed 2 mm, and must not deviate more than 2 mm in relation to the nominal gap.

Screws must fit the holes in the hardware, be firmly tightened and free from burrs which may cause cut fingers if touched.

The axis of the screw must not deviate by more than 10º from a plane perpendicular to the surface of the hardware, and the head of the screw must be flush with or below the surface of the hardware.

Hardware grooves must be adapted to the geometrical shape and thickness of the hardware. When drilling or machining frame profiles, the resulting groove or hole must stop short of penetrating the full depth of the profile to avoid water or moisture ingress to the wall side of the profile.

If the fitting of a lock case etc. exceptionally requires drilling (machining) through to the glazing rebate, the access of condensation-causing air must be prevented by tape or otherwise.

When fitting casement fasteners with a base plate, care must be taken to ensure sufficient friction around the eye to prevent unintentional misalignment of the casement fastener. This can be done e.g. by drilling a tight hole for the eye thread in the casement section.

Internal casement stays fitted to side hung casements should be of the base plate type. Screws or eyes must be located in the most stable part of the casement cross section.

When the fitting of hardware is completed, adjustable parts should, as a rule, be in the central position.

5.9 Glass/panels and installation of glazing units

5.9.1 Glass and panels

Sealed glazing units must be manufactured to the EN 1279 series, and the manufacturer of the units must be affiliated to a certification scheme with external inspection approved by VinduesIndustrien.

The glazing unit manufacturer and certification scheme and associated certificate number must be stated on the website www.dvv.dk

The thermal performance of glazing units must be stated on the spacers of the glazing units as specified in the sections on thermal performance.

Moreover, the glazing unit manufacturer must have signed Annex 21: Glazing unit manufacturer – warranty declaration and be affiliated to the DVV warranty scheme or a similar scheme with the same coverage.

Individual panes of glass or edge constructions must not contain defects or impurities in the glass in excess of the criteria described or exceed the stated tolerances in Annex 20: Visual deviations in quality in insulated glass units. Tempered and laminated glass must not cause visual distortion according to current EN standards.

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 surface finish please consult the respective sections on materials.

The following applies to panels constructed from wood fibreboard:

The fibreboard material must meet or exceed all "symbol H" requirements (use in humid conditions), cf. EN 316 and EN 622-5 for MDF fibreboards.

When machining the fibreboard material (moulding and profiling) all horizontal traces must have an outward slope of at least 7º.

All edges (also non-visible ones) resulting from grooving/moulding/profiling, must have their corners rounded to a minimum radius of 1.5 mm; this also applies where part of the original surface of the board has been cut away. See example in Annex 16.

Units incorporating wood fibreboard panels must always be supplied with a completed surface treatment. The surface treatment requirements also apply to surfaces and edges which are not visible after the panelled unit has been assembled.

Panels must be incorporated in the unit in a manner which ensures moisture deformation of the panelling can be absorbed without causing damage.

Note:
MDF/HDF boards are dry process fibreboards. MDF boards must have a density of at least 650 kg/m³ and HDF boards a density of at least 800 kg/m³.

Machining (moulding and profiling) will expose the main core of the board whose properties deviate negatively from the unmachined surface.

To prevent damage to board-based panels the board material, surface treatment and assembly system should be well documented.

5.9.2 Installation of glazing units

Insulated glass units 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.

If a fitting method is used that deviates from the above, a type approval must be obtained from the certification body. 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, compatibility declaration – if any, blocking, drainage and ventilation, glazing beads and their fastening.

Drawing and description must be signed by the window manufacturer and – on approval – also be signed by the glazing unit manufacturer and the DVV Technical Committee.

In connection with product inspection visits, defects in the installation of glazing units are rated in accordance with Annex 8 point 5.9 or the type approval.
Rebates and glazing beads must be dimensioned so as to ensure that the glazing unit spacer profile is covered.

Glued glazing units may be allowed, if standardized gluing methods are used. It must be ensured that the application method does not weaken the glazing unit edge seals. Furthermore, to ensure sufficient documentation of compatibility the window manufacturer and the IGU and glue supplier must have a written agreement about terms of responsibility. In order to document the compatibility of different materials (such as adhesives and edge seals), own tests can be used as supplements according to the test description as stated in Annex 27.

Drainage and ventilation
Provisions must be made to ensure that rain or condensation water quickly and efficiently are drained/ventilated away to the exterior side.

Drainage/ventilation holes must have a total cross-sectional area of not less than 200 mm² per running metre bottom rail rebate.

In cases where drainage/ventilation is established by means of raised bottom glazing beads, the gap between glazing bead and its support must not be less than 2 mm.

Holes must be made with a minimum size of Ø8 mm and 5 x 15 mm.

Glazing beads
Glazing beads or other types of fixing must be dimensioned and fitted 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.

Note:
When installing glazing units, air permeability design must be ensured on the interior side, especially in systems where the units are installed using internal glazing beads.

Blocks and blocking
See Annex 19 or the current version of EN 12488.

Glazing tape and joint fillers
Joint fillers must be able to absorb movements caused by wind load, moisture, and variations in temperature without subsequent breakage or reductions in the performance of the seal against the glazing unit.

Applied joint fillers and fitting materials must have been tested and approved according to a recognized standard. For glazing tapes, the standard may be EN 12365-1, and for joint fillers it may be EN 15651-2. Alternatively, a MTK approval may be acceptable with the supplier's acceptance.

Joint sealants used for fitting glazing units or for top or bottom sealing must not affect, disintegrate, or change the properties of the glazing unit edge seal.
The joint filler supplier’s instructions as to preparation, compression, lowest operating temperature, and other operating conditions must always be followed.

6. PVCu windows and doors
6.0 Dimensioning and weather tightness

Note:

Large opening casement windows may be affected by functional problems. It is therefore advisable not to manufacture opening casements with an area in excess of 1.7 m^2 and to restrict the length of the longest edge to 1.5 m. If exceeding these dimensions, particular attention should be paid to e.g. casement dimension, fitting of hardware, hinge design and number of fastening points. Furthermore, in the case of side hung casements, the height/width (side) ratio should be examined more closely.

As regards doors, the suitability of the chosen construction, seen in relation to the situation of use in which the unit is to be placed, should be evaluated at an early stage. Requirements or expectations may differ according to whether the door is to be installed for instance in a private residence or in a child care facility.

If there is any doubt about the suitability of the door, it can be tested in accordance with EN 14351-1, point 4.17.

Bowing 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.

When bowing and twisting are assessed, particular emphasis must be put on their impact on the weather tightness and other general functional aspects of the unit.

As a guidance and under specified laboratory conditions, the unit must meet the requirements of Class 3 (max. 2 mm per metre) cf. EN 1530.

Twisting must not exceed 2 mm per 10 cm of workpiece width measured over 1 m.

Measurements shall be carried out according to EN 952 - General and local flatness.

When determining the external dimensions of the units, due attention must be paid to movements in the PVCu material caused by fluctuations in temperature. This applies in particular to dark coloured profiles, wide units or where several units are fitted side by side.

If, in the case of large units, it is deemed necessary to document the resistance to wind load in more detail, tests must be conducted in accordance with EN 12211.

Classification requirements must be stated in accordance with EN 12210.

Normative classification requirements under normal Danish conditions would be:
Class 3 for load
Class C for deflection.

If weather tightness testing of windows and doors is required, tests shall be based on the following standards:
EN 1026 for air permeability
EN 1027 for water tightness.

Classification requirements shall be indicated in conformance with:
EN 12207 for air permeability
EN 12208 for water tightness.

Normative classification requirements under normal Danish conditions would be:

Class 3 for air permeability at an average of measurement of a positive and negative test pressure of 600 Pa for windows and outer doors.
Class 8A for water tightness (pressure of 450 Pa for both windows and outer doors)

Normative requirements for classification acc. to low-energy class:
Class 4 for air permeability as an average of measurements at a positive and negative pressure of 600 Pa for windows and external doors. At 100 Pa, air passage may not exceed 1 $m^3/h.m^2$.

Test and classification requirements should be evaluated in relation to the actual use of the units, including the geographical location.

6.1 Burglary prevention

***DVV minimum requirements*:**
The construction, fitting of hardware and installation of glass in windows and doors must be of a nature and quality which enables the units to withstand burglary up to the level of what is common practice in the Danish market at the time of manufacture of the units.

It must not be possible to force casement constructions 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. (This requirement is considered to have been met if the glazing unit is spot bonded to the inside of the glazing rebate).

DVV options:
Manufacturers may also have a unit or series of units tested according to the current versions of EN 1628, EN 1629, EN 1630 and then classify the units according to EN 1627. For each tested unit or series of units, a scope must be described.

Units can then be labelled with "DVV-Sikring" cf. Annex 24, stating the class of resistance, according to the current version of EN 1627. The label must be visible and permanent.

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

6.2 Thermal performance

Documentation in accordance with DS 418 or EN ISO 10077 parts 1 and 2 must be provided for all data concerning the thermal performance of the products.

For each product system, documentation must be provided for a 1.23 x 1.48m single-light opening casement window.
For external doors values must be given for a panelled door with a standard glazing unit as well as for a flush door. Both doors must be in the standard size of 1.23 x 2.18 m.

If the manufacturer wants an initial type calculation ("ITC") carried out on a sliding door or a folding door respectively, this calculation must be 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 standard glazing unit defined as the most commonly used glazing unit in the product system in question.

The standard 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 glazing units must be specified with 2 significant digits and be legible/comprehensible in the glazing unit.

Thermal properties of window materials must comply with current norms i.e. a recognized standard or be listed on the materials list of the Association of Danish Window Manufacturers and be available on www.dvv.dk.

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.

This can be documented via calculations according to EN ISO 10077-2.

The above requirements regarding the minimum temperature of interior surfaces do not apply to window and door handles, lock cylinders, door sills and to the junction between frame and casement, but the manufacturer must at all times make sure that no condensation is retained in the construction. This can be ensured through a continuous wet line and by applying solutions with built-in thermal bridge breakers.

For each delivery of windows and external doors the company must additionally provide all the energy performance data for individual units which are required to calculate the overall energy performance of the building project concerned.

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

6.3 Profile material and test requirements

PVCu profiles for the manufacture of windows and doors 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", paragraph 1, current edition.

The profile material must further comply with Danish environmental legislation, including the regulation on lead.

The profile manufacturer must additionally be able to furnish a certificate to the effect that production is subject to quality control under a system complying with the ISO 9000 series.

As a minimum, documentation of compliance with RAL Requirements must comprise the profile manufacturer's technical specifications for the material along with the data sheet (Annex 2).

Based on a more subjective evaluation the following requirements apply:
When inspected from a distance of 1.5 metres or more, the appearance of the profiles must not be disturbed by cracks, stripes or other surface defects.

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 or one layer of PVCu plus one layer consisting of a metal insert. Other fixing methods which have proven to be equally stable may also be used (e.g. screw thread).

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. See also 6.0 above regarding stiffness requirements in connection with sealed glazing units.

Units manufactured from through-coloured dark profiles must be reinforced irrespective of size. Profiles with a dark external surface must be reinforced in accordance with the manufacturer's instructions.

6.4 Finishing

6.4.1 Finishing of profiles

Visible surfaces, edges and corners must not show unintentional marks or other traces from tools nor traces from handling during manufacture and storage.

Outward opening casement corners may not be pointed or sharp enough to cause injury or inconvenience in use or during cleaning.

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 VinduesIndustrien. Fitting instructions must be enclosed with every delivery.

Measurement tolerances: (at 15ºC)

External frame measurement:	± 2 mm at a nominal size < 2 m.
	± 3 mm at a nominal size > 2 m.
Casement measurement:	Frame rebate measurement minus 2 x profile system nominal chamber air gap ± 2 mm
Overturning of glazing bars	< Δ 2.0 mm (end to end)

6.4.2 Joints

Frame and casement corner joints must be welded. Transom and mullion may be scribed together and fixed with a bracket developed for the profile system. The joints must be completely air and watertight.

The data sheet (Annex 2) must contain a short description of the assembly method. The information to be provided for welding includes the guidelines for temperature, time and
pressure during contact with the welding mirror as well as time and pressure for the compression prescribed by the profile supplier for the material and profile in question.

At each ordinary inspection visit a documented check must be carried out to ascertain that welding mirror temperature as well as time and pressure during contact with the welding mirror agree with instrument readings and profile supplier instructions.

After each change of welding mirror lining 8 to 10 test welds must be completed before starting production welding. The cleanliness of the mirror must be monitored carefully and continuously.

The welding machine must be located in a place where drafts from doors and windows do not cause one-sided cooling of the welding mirror.

During inspection visits 4 ***casement corner joint*** samples with a profile width of 60-80 mm 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 himself or somebody appointed by him, 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.

At the place of manufacture, sufficient drainage holes must be incorporated into sills and casement bottom rails to ensure that any rainwater or condensate is led into the open. The minimum size of drainage holes is Ø8 mm or a 5 x 15 mm gap; holes must be located to ensure the removal of all water. In connection with sealed glazing units the total drainage hole area must meet the requirements which is set out in point 6.8.2 Installation of glazing units. Drainage holes must not be connected to cavities containing (metal) reinforcement anywhere.

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.

6.4.3 Bonding

Added profiles such as drip grooves etc. may be bonded on using an adhesive recommended by the profile supplier.

6.5 Surface treatment

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.

PVCu profile surfaces visible from the inside or outside must have a uniform sheen or matt finish.

Profile materials with an external aluminium cladding must meet the requirements listed under 7.3 and the finishing and surface treatment must meet the requirements listed under 7.4 and 7.5.

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.

6.6 Weather seals

6.6.1 Materials requirements

The materials used for weather sealing between casements and frames must have a chemical structure and/or design 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.

Note:
In case of dispute concerning the suitability of the seals in terms of the below properties, type testing in accordance with EN 12365-1 may be requested. Overall, the results of this testing must prove performance to the following classifications:

- *Working range, max. Class 4*
- *Compression, max. Class 2*
- *Temperature stability, meeting or exceeding Class 3*
- *Recovery characteristics, meeting or exceeding Class 2*

For duplex profiles (extruded using two or more different materials) the use class for recovery characteristics after ageing in accordance with EN 12365-4 will be added following a future revision of the standard.

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. Brochure and user manual must contain instructions on whether subsequent surface treatment requires the use of particular paints to avoid disintegration of weather seals.

The seals must be designed for mechanical fixing and/or insertion into a groove. Also, seals must be designed and fixed in a manner which allows them to be replaced.

It is a condition of the use of hollow profiles that the edge which the seal abuts on is rounded so as to create a smooth face.

6.6.2 Finishing requirements

Weather seals between casements and frames must be fitted to the unit in a manner which suits their design and construction and so as not to expose them to damaging lateral forces when the casement is opened and closed.

The distance between casement and frame must be adapted to the mean compression rate of the seals.

Seals must be fixed in a manner which ensures that their position does not change transversally or laterally when operating the unit.

Weather seal corner joints must be finished in accordance with the manufacturer's instructions.
If the seals are not positioned at the same wet line, contact between the wet lines must be ensured e.g. by overlapping.

6.7 Hardware, hinges and fitting of hardware

6.7.1 Hardware and hinges

All hardware must be manufactured in materials which meet normal requirements in terms of physical strength, wear and resistance.
The window manufacturer should be informed about the hardware supplier's declared digit codes, cf. recognized product standards for use, wear and tear, weight, fire, safety, corrosion, resistance and friction.

To secure easy identification and description of the requirements which apply to a particular piece of hardware for windows and doors, a special coding is used which simplifies the communication of the required/supplied properties.

In the DS/EN 13126 series the code is constructed in the following way: See Annex 23

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. If there is reason to doubt the strength of the hardware or the way it is fixed, a test in accordance with EN 14608 may be required to prove its adequacy. As a minimum, the requirements of Class 2 under EN 13115 must be met.

A subsequent increase in the load to 600 Newton must not cause failure in hinges or hardware, their fixing or in door and casement corner joints.

Operating handles must have a strength and fixing adapted to their function and must be designed to avoid fingers getting caught during operation.

Fasteners must be designed and function so as to ensure correct tightening against the seals.

The number and location of fastening points must comply with both profile and hardware suppliers' instructions.

Fasteners including strike plate etc. must 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 m^2, 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.

When in the closed position, opening casements or ventilation hatches must be secured at a minimum of 4 points including hinges. 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.

If the dimension of the casement at the closing side is less than 0.6 m, one fastening point will suffice in addition to the hinges.

Other fastening systems which provide all-year uniform weather tightness along all casement edges may be approved.

Pivot and top hung 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.

Hardware and screws made of materials which are not corrosion resistant and which are fitted outside of the external face of the unit must be hot-galvanized or protected by other 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 be at least 5.

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 be at least 5.

Hardware and screws inside the wet line must be made of a material or 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 be at least 5.

Hardware and its fixing screws located outside the wetline must be sufficiently compatible to prevent the formation of galvanic corrosion.

6.7.2 Fitting

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.

External doors for dwellings or buildings with a similar pattern of use must be equipped with at least 3 hinges and 3 fastening points at the locking side. The requirement for 3 fastening points does not apply to doors equipped with a door closer or an electric locking system. The tightness of a 1-point closing cannot be expected to be similar to that of a 3-point closing. This should be made clear to the customer.

Fewer hinges and fastening points may be allowed if it can be documented that retention, load bearing capacity and permanent sealing properties are not impaired.

For side hung windows with a casement width in excess of 70 cm hinges must be dimensioned and fixed as for doors.

Side hung units where the size and/or design (e.g. casement with glazing bars) causes particular risk of problems with closing and weather tightness should have a riser block fitted to the sill at the closing side. In the case of diagonally stable casement and door leaves the riser block may alternatively be fitted at the bottom of the frame at the hinge side.

At the jamb and head, the gap between the frame and the casement (clearance around the casement) must be adapted to the size of the window/door, the hardware system etc. It may be necessary to carry out adjustment when installing in the building but the unit must be designed for the gap between the frame and the casement to be as uniform as possible on all four sides when seen from the inside.
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.

Screws must fit the holes in the hardware, be firmly tightened and free from burrs which may cause cut fingers if touched.

The axis of the screw must not deviate by more than 10º from a plane perpendicular to the surface of the hardware, and the head of the screw must be flush with or below the surface of the hardware.

Hardware grooves must be adapted to the geometrical shape and thickness of the hardware. When drilling or machining frame profiles, the resulting groove or hole must stop short of penetrating the full depth of the profile to avoid water or moisture ingress to the wall side of the profile.

If the fitting of a lock case etc. exceptionally requires drilling (machining) through to the glazing rebate, the access of condensation-causing air must be prevented by tape or otherwise.

When fitting casement fasteners with a base plate, care must be taken to ensure sufficient friction around the eye to prevent unintentional misalignment of the casement fastener. This can be done e.g. by drilling a tight hole for the eye thread in the casement section.

When the fitting of hardware has been completed, adjustable part should, as a rule, be in the central position.

6.8 Glass/panels and installation of glazing units

6.8.1 Glass and panels

Sealed glazing units must be manufactured to the EN 1279 series, and the manufacturer of the units must be affiliated to a certification scheme with external inspection approved by VinduesIndustrien.

The glazing unit manufacturer and certification scheme and associated certificate number must be stated on the website www.dvv.dk

The thermal performance of glazing units must be stated on the spacers of the glazing units as specified in the sections on thermal performance.

Moreover, the glazing unit manufacturer must have signed Annex 21: Glazing unit manufacturer – warranty declaration and be affiliated to the DVV warranty scheme or a similar scheme with the same coverage.

Individual panes of glass or edge constructions must not contain defects or impurities in the glass in excess of the criteria described or exceed the stated tolerances in Annex 20: Visual deviations in quality in insulated glass units. Tempered and laminated glass must not cause visual distortion according to current EN standards.

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 surface finish please consult the respective sections on materials.

The following applies to panels constructed from wood fibreboard:

The fibreboard material must meet or exceed all "symbol H" requirements (use in humid conditions), cf. EN 316 and EN 622-5 for MDF fibreboards.

When machining the fibreboard material (moulding and profiling) all horizontal traces must have an outward slope of at least 7º.

All edges (also non-visible ones) resulting from grooving/moulding/profiling, must have their corners rounded to a minimum radius of 1.5 mm; this also applies where part of the original surface of the board has been cut away. See example in Annex 16.

Units incorporating wood fibreboard panels must always be supplied with a completed surface treatment. The surface treatment requirements also apply to surfaces and edges which are not visible after the panelled unit has been assembled.

Panels must be incorporated in the unit in a manner which ensures moisture deformation of the panelling can be absorbed without causing damage.

Note:
MDF/HDF boards are dry process fibreboards. MDF boards must have a density of at least 650 kg/m³ and HDF boards a density of at least 800 kg/m³.
Machining (moulding and profiling) will expose the main core of the board whose properties deviate negatively from the unmachined surface.
To prevent damage to board-based panels the board material, surface treatment and assembly system should be well documented.

6.8.2 Installation of glazing units

Insulated glass units 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.

If a fitting method is used that deviates from the above, a type approval must be obtained from the certification body. 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, compatibility declaration – if any, blocking, drainage and ventilation, glazing beads and their fastening.

Drawing and description must be signed by the window manufacturer and – on approval – also be signed by the glazing unit manufacturer and the DVV Technical Committee.
In connection with product inspection visits, defects in the installation of glazing units are rated in accordance with Annex 8 point 5.9 or the type approval.

Rebates and glazing beads must be dimensioned so as to ensure that the glazing unit spacer profile is covered.

Glued glazing units may be allowed, if standardized gluing methods are used. It must be ensured that the application method does not weaken the glazing unit edge seals. Furthermore, to ensure sufficient documentation of compatibility the window manufacturer and the IGU and glue supplier must have a written agreement about terms of responsibility. In order to document the compatibility of different materials (such as adhesives and edge seals), own tests can be used as supplements according to the test description as stated in Annex 27.

Drainage and ventilation
Provisions must be made to ensure that rain or condensed water quickly and efficiently are drained/ventilated away to the exterior side as described under 6.4.2 Joints.

The holes must have a total cross-sectional area of not less than 200 mm² per running metre bottom rail rebate.

In cases where drainage is established by means of raised bottom glazing beads, the gap between glazing bead and its support must not be less than 2 mm.

Glazing beads
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.

Note:
When installing glazing units, air permeability design must be ensured on the interior side, especially in systems where the units are installed using internal glazing beads.

Blocks and blocking
See Annex 19 or the current version of EN 12488.

Glazing tape and joint fillers
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 against the glazing unit.

Applied joint fillers and fitting materials must have been tested and approved according to a recognized standard. For glazing tapes the standard may be EN 12365-1, and for joint fillers it may be EN 15651-2. Alternatively, a MTK approval may be acceptable with the supplier's acceptance.

Joint sealants used for fitting glazing units or for top or bottom sealing must not affect, disintegrate, or change the properties of the glazing unit edge seal.
The joint filler supplier’s instructions as to preparation, compression, lowest operating temperature, and other operating conditions must always be followed.

7. Metal windows and doors
7.0 Dimensioning and weather tightness

Note:

Large opening casement windows may be affected by functional problems. It is therefore advisable not to manufacture opening casements with an area in excess of 1.7 m² and to restrict the length of the longest edge to 1.5 m. If exceeding these dimensions, particular attention should be paid to e.g. casement dimension, fitting of hardware, hinge design and number of fastening points. Furthermore, in the case of side hung casements, the height/width (side) ratio should be examined more closely.

As regards doors, the suitability of the chosen construction, seen in relation to the situation of use in which the unit is to be placed, should be evaluated at an early stage. Requirements or expectations may differ according to whether the door is to be installed for instance in a private residence or in a child care facility.

If there is any doubt about the suitability of the door, it can be tested in accordance with EN 14351-1, point 4.17.

Bowing 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.

When bowing and twisting are assessed, particular emphasis must be put on their impact on the weather tightness and other general functional aspects of the unit.

As a guidance and under specified laboratory conditions, the unit must meet the requirements of Class 3 (max. 2 mm per metre) cf. EN 1530.

Twisting must not exceed 2 mm per 10 cm of workpiece width measured over 1 m.

Measurements shall be carried out according to EN 952 - General and local flatness.

If, in the case of large units, it is deemed necessary to document the resistance to wind load in more detail, tests must be conducted in accordance with EN 12211.

Classification requirements must be stated in accordance with EN 12210.

Normative classification requirements under normal Danish conditions would be:
Class 3 for load
Class C for deflection.

If weather-tightness testing of windows and doors is required, tests shall be based on the following standards:
EN 1026 for air permeability
EN 1027 for water tightness.

Classification requirements shall be indicated in conformance with:
EN 12207 for air permeability
EN 12208 for water tightness.

Normative classification requirements under normal Danish conditions would be:
Class 3 for air permeability at an average of measurement of a positive and negative test pressure of 600 Pa for windows and outer doors.
Class 8A for water tightness (pressure of 450 Pa for both windows and outer doors)

Normative requirements for classification acc. to low-energy class:
Class 4 for air permeability as an average of measurements at a positive and negative pressure of 600 Pa for windows and external doors. At 100 Pa, air passage may not exceed 1 m³/h.m².

Test and classification requirements should be evaluated in relation to the actual use of the units, including the geographical location.

7.1 Burglary prevention

***DVV minimum requirements*:**
The construction, fitting of hardware and installation of glass in windows and doors must be of a nature and quality which enables the units to withstand burglary up to the level of what is common practice in the Danish market at the time of manufacture of the units.

It must not be possible to force casement constructions 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. (This requirement is considered to have been met if the glazing unit is spot bonded to the inside of the glazing rebate).

DVV options:
Manufacturers may also have a unit or series of units tested according to the current versions of EN 1628, EN 1629, EN 1630 and then classify the units according to EN 1627. For each tested unit or series of units, a scope must be described.

Units can then be labelled with "DVV-Sikring" cf. Annex 24, stating the class of resistance, according to the current version of EN 1627. The label must be visible and permanent.

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

7.2 Thermal performance

Documentation in accordance with DS 418 or EN ISO 10077 parts 1 and 2 must be provided for all data concerning the thermal performance of the products.

For each product system, documentation must be provided for a 1.23 x 1.48m single-light opening casement window.

For external doors values must be given for a panelled door with a standard glazing unit as well as for a flush door. Both doors must be in the standard size of 1.23 x 2.18 m.

If the manufacturer wants an initial type calculation ("ITC") carried out on a sliding door or a folding door respectively, this calculation must be 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 standard glazing unit defined as the most commonly used glazing unit in the product system in question.

The standard 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 glazing units must be specified with 2 significant digits and be legible/comprehensible in the glazing unit.

Thermal properties of window materials must comply with current norms i.e. a recognized standard or be listed on the materials list of the Association of Danish Window Manufacturers and be available on www.dvv.dk.

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.

This can be documented via calculations according to EN ISO 10077-2.

The above requirements regarding the minimum temperature of interior surfaces do not apply to window and door handles, lock cylinders, door sills and to the junction between frame and casement, but the manufacturer must at all times make sure that no condensation is retained in the construction.

This can be ensured through a continuous wet line and by applying solutions with built-in thermal bridge breakers.

For each delivery of windows and external doors the company must additionally provide all the energy performance data for individual units which are required to calculate the overall energy performance of the building project concerned.

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

7.3 Profile material

Metal profiles for the manufacture of window and door elements in pure metal constructions must meet the materials specifications given in Eurocode 9 and Danish standards for aluminium constructions DS 411-420 / ch. 5 – Appendix 2006.
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.

To the extent possible, the composition of the alloy must be given in the data sheet (Annex 2).
The standards given must also be applied in other areas if relevant for the manufacture of window and door elements.

Under normal light conditions there must be no visible defects in terms of oxide impurities, blisters, dents, distortion or cracks. When viewed from a distance in excess of 1.5 metres there must be no visible extrusion stripes or other surface defects.

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.

Please see comments in 7.0 above regarding the stiffness of elements.

Windows and door constructions must not be combined, assembled or fixed with materials posing a risk of corrosion without special steps being taking to prevent this.

If cold bridges occur in the unit, this must be apparent from data sheet(s) and brochure(s). If no cold bridges occur, the type and design of the insulation must be clearly given in the data sheet/brochure.

Units designed for fitting in dwellings and other buildings with a similar pattern of use must be manufactured from thermally broken profiles unless a different profile system has been expressly requested by the customer.

7.4 Finishing

7.4.1 Finishing of profiles

Visible surfaces, edges and corners must not show burrs, unintentional marks or other traces from tools nor from handling during manufacture and storage.

Outward opening casement corners may not be pointed or sharp enough to cause injury or inconvenience in use or during cleaning.

Measurement tolerances (at 15ºC)

External frame measurement:	± 2 mm at a nominal size < 2 m. ± 3 mm at a nominal size > 2 m.
Casement measurement:	Frame rebate measurement minus 2 x profile system nominal chamber air gap ± 2 mm
Overturning of glazing bars	< Δ 2.0 mm (end to end)

7.4.2 Joints

Profiles must be joined by welding suited to the material, by fishplates fixed by 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. Differences in level of 0.3 mm are permitted.

By precise fitting and the addition of sealant the joints must be sufficiently tight to prevent water or air ingress. Where precipitation may affect the unit, holes must be sealed after punching.

Corner or angle plates must be fitted in grooves where required to ensure the joint remains flush and rigid. Rebates in window and door casement heads always require the fitting of corner or angle plates.

At the place of manufacture, sufficient drainage holes must be incorporated into sills and casement bottom rails to ensure that any rainwater or condensate is led into the open.

The minimum size of drainage holes is ø8 mm or a 5 x 15 mm gap; holes must be located to ensure the removal of all water. In connection with sealed glazing units the total drainage hole area must meet the requirements which is set out in point 7.8.2 Installation of glazing units.

Hardware may be fitted using suitable pop rivets, self-tapping screws, threaded inserts, threaded holes or squeeze fixing systems. In terms of corrosion resistance, hardware components must be of the same standard as the element itself.

7.5 Surface treatment

7.5.1 Coating of aluminium

Complete 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 and control body.

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 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. Coat thickness is measured in accordance with EN ISO 2360.

Coating completed, the appearance of the finished profile must be: (visual inspection from 3 metres away in diffuse daylight).

- Uniform
- even and
- have a smooth and opaque surface.

Impurities in the paint are rated in accordance with Annex 8, point 7.5.

Sheen is measured in accordance with 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 when viewed from a distance of 3 or 2 metres for external and internal surfaces respectively, cf. GSB AL 631, point 9.20 or similar.

When measuring adhesion before and after exposure to accelerated tests, adhesion must meet Class 0, cf. ISO 2409. The surface film must not contain defects in the form of blisters or flakes after 2 hours of immersion in boiling distilled water.

Data sheet and brochures must contain information about whether surfaces have been treated or not and give instructions about precautions when installing against other building materials.

7.5.2 Anodizing of aluminium

Overall, anodizing is based on Dansk Standard EN ISO 7599 "Aluminium and aluminium alloys - Anodizing. General requirements of anodized layers on aluminium"

Prior to chemical pre-treatment must mask scratches and stripes to such an extent that, after anodizing has been completed, they are not visible when looking at the surface from a distance of 3 metres with the incident light at less than 45º.

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 layer thickness is class AA20 (20 µm) and for indoor use AA15 (15 µm).

Measurements to be completed using induction effect apparatus in accordance with EN ISO 2360.

All profiles must receive a finishing treatment to achieve a surface sealing which, when tested according to ISO 3210, involves a loss of mass (reduction in weight) of less than 30 mg/dm^2 of anodized surface.

The anodized profile must be free from visible defects on surfaces which can be seen from the inside or outside in normal use.

The colour of profiles in the same order must not deviate so much as to be immediately apparent when looking at the surface from a distance of 3 metres with incident light perpendicular to the surface. The light must be diffuse daylight coming from a northerly direction.

For contractual, documentational, and control purposes reference sheets showing minimum and maximum colour may be used.

7.6 Weather seals

7.6.1 Materials requirements

The materials used for weather sealing between casements and frames must have a chemical structure and/or design assumed to possess such elastic properties that they will continue to provide an acceptable seal against air and water ingress for a number of years under normally occurring changes in the size of the joint. These requirements can be met by seals manufactured in rubber or rubber-like plastic shaped as hollow profiles or as lip strip seals. Brush strip seals may be approved in special cases.

Note
In case of dispute over the suitability of the strip seals in relation to the properties mentioned below, type testing in accordance with EN 12365-1 may be requested. The overall results of this testing must prove performance to the following classifications:

- *Working range,* *max. Class 4*
- *Compression,* *max. Class 2*
- *Temperature stability,* *meeting or exceeding Class 3*
- *Recovery characteristics,* *meeting or exceeding Class 2*

For duplex profiles (extruded using two or more different materials) the use class for recovery characteristics after ageing in accordance with EN 12365-4 will be added following a future revision of the standard.

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. Brochure and user manual must contain instructions on whether subsequent surface treatment requires the use of particular paints to avoid disintegration of weather seals.

The seals must be designed for mechanical fixing and/or insertion into a groove. Also, seals must be designed and fixed in a manner which allows them to be replaced.

It is a condition of the use of hollow profiles that the edge which the seal abuts is rounded to create a smooth face.

7.6.2 Finishing requirements

Weather seals between casements and frames must be fitted to the unit in a manner which suits their design and construction and so as not to expose them to damaging lateral forces when the casement is opened and closed.

The distance between casement and frame must be adapted to the mean compression rate of the seals.

Seals must be fixed in a manner which ensures that their position does not change transversally or laterally when operating the unit.

Weather seal corner joints must be finished in accordance with the manufacturer's instructions.

If the seals are not positioned at the same wet line, contact between the wet lines must be ensured e.g. by overlapping.

7.7 Hardware, hinges and fitting of hardware

7.7.1 Hardware and hinges

All hardware must be manufactured in materials which meet normal requirements in terms of physical strength, wear and resistance.
The window manufacturer should be informed about the hardware supplier's declared digit codes, cf. recognized product standards for use, wear and tear, weight, fire, safety, corrosion, resistance and friction.

To secure easy identification and description of the requirements which apply to a particular piece of hardware for windows and doors, a special coding is used which simplifies the communication of the required/supplied properties.

In the DS/EN 13126 series the code is constructed in the following way: See Annex 23

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. If there is reason to doubt the strength of the hardware or the way it is fixed, a test in accordance with EN 14608 may be required to prove its adequacy. As a minimum, the requirements of Class 2 under EN 13115 must be met.

A subsequent increase in the load to 600 Newton must not cause failure in hinges or hardware, their fixing or in door and casement corner joints.

Operating handles must have a strength and fixing adapted to their function and must be designed to avoid fingers getting caught during operation.

Fasteners must be designed and function so as to ensure correct tightening against the seals.

Fasteners including strike plate etc. must 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 m^2, 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.

When in the closed position, opening casements or ventilation hatches must be secured at a minimum of 4 points including hinges. 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.

If the dimension of the casement at the closing side is less than 0.6 m, one fastening point will suffice in addition to the hinges.

Other fastening systems which provide all-year uniform weather tightness along all casement edges may be approved.

Pivot and top hung 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.

Hardware and screws made of materials which are not corrosion resistant and which are fitted outside of the external face of the unit must be hot-galvanized or protected by other surface treatment to ensure resistance to 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 be at least 5.

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 be at least 5.

Hardware and screws inside the wet line must be made of a material or 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 be at least 5.

Hardware and its fixing screws located outside the wetline must be sufficiently compatible to prevent the formation of galvanic corrosion.

7.7.2 Fitting of hardware

Hardware which is visible when the unit is in its normal position of use must be mounted so that its edges or characteristic design lines are parallel with the edges of the unit.

External doors for dwellings or buildings with a similar pattern of use must be equipped with at least 3 hinges and 3 fastening points at the locking side. The requirement for 3 fastening points does not apply to doors equipped with a door closer or an electric locking system. The tightness of a 1-point closing cannot be expected to be similar to that of a 3-point closing. This should be made clear to the customer.

Fewer hinges and fastening points may be allowed if it can be documented that retention, load bearing capacity and permanent sealing properties are not impaired.

For side hung windows with a casement width in excess of 70 cm hinges must be dimensioned and fixed as for doors.

Side hung units where the size and/or design (e.g. casement with glazing bars) causes particular risk of problems with closing and weather-tightness should have a riser/supporting block fitted to the sill at the closing side. In the case of diagonally stable casement and door leaves the riser block may alternatively be fitted at the bottom of the frame at the hinge side.

At the jamb and head, the gap between the frame and the casement (clearance around the casement) must be adapted to the size of the window/door, the hardware system etc. It may be necessary to carry out adjustment when installing in the building but the unit must be designed for the gap between the frame and the casement to be as uniform as possible on all four sides when seen from the inside.

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.

Screws must fit the holes in the hardware, be firmly tightened and free from burrs which may cause cut fingers if touched.

The axis of the screw must not deviate by more than 10º from a plane perpendicular to the surface of the hardware, and the head of the screw must be flush with or below the surface of the hardware.

Hardware grooves must be adapted to the geometrical shape and thickness of the hardware.

When drilling or machining frame profiles, the resulting groove or hole must stop short of penetrating the full depth of the profile to avoid water or moisture ingress to the wall side of the profile.

If the fitting of a lock case etc. exceptionally requires drilling (machining) through to the glazing rebate, the access of condensation-causing air must be prevented e.g. by taping.

When fitting casement fasteners with a base plate, care must be taken to ensure sufficient friction around the eye to prevent unintentional misalignment of the casement fastener. This can be done e.g. by drilling a tight hole for the eye thread in the casement section.

When the fitting of hardware has been completed, adjustable parts should, as a rule, be in the central position.

7.8 Glass/panels and installation of glazing units

7.8.1 Glass and panels

(Sealed glazing units must be manufactured to the EN 1279 series, and the manufacturer of the units must be affiliated to a certification scheme with external inspection approved by VinduesIndustrien

The glazing unit manufacturer and certification scheme and associated certificate number must be stated on the website www.dvv.dk

The thermal performance of glazing units must be stated on the spacers of the glazing units as specified in the sections on thermal performance.

Moreover, the glazing unit manufacturer must have signed Annex 21: Glazing unit manufacturer – warranty declaration and be affiliated to the DVV warranty scheme or a similar scheme with the same coverage.

Individual panes of glass or edge constructions must not contain defects or impurities in the glass in excess of the criteria described or exceed the stated tolerances in Annex 20: Visual deviations in quality in insulated glass units. Tempered and laminated glass must not cause visual distortion according to current EN standards.

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 surface finish please consult the respective sections on materials.

The following applies to panels constructed from wood fibreboard:
The fibreboard material must meet or exceed all "symbol H" requirements (use in humid conditions), cf. EN 316 and EN 622-5 for MDF fibreboards.

When machining the fibreboard material (moulding and profiling) all horizontal traces must have an outward slope of at least 7º.

All edges (also non-visible ones) resulting from grooving/moulding/profiling, must have their corners rounded to a minimum radius of 1.5 mm; this also applies where part of the original surface of the board has been cut away. See example in Annex 16.

Units incorporating wood fibreboard panels must always be supplied with a completed surface treatment. The surface treatment requirements also apply to surfaces and edges which are not visible after the panelled unit has been assembled.

Panels must be incorporated in the unit in a manner which ensures moisture deformation of the panelling can be absorbed without causing damage.

Note:
MDF/HDF boards are dry process fibreboards. MDF boards must have a density of at least 650 kg/m³ and HDF boards a density of at least 800 kg/m³.
Machining (moulding and profiling) will expose the main core of the board whose properties deviate negatively from the unmachined surface.
To prevent damage to board-based panels the board material, surface treatment and assembly system should be well documented.

7.8.2 Installation of glazing units

Insulated glass units 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.

If a fitting method is used that deviates from the above, a type approval must be obtained from the certification body. 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, compatibility declaration – if any, blocking, drainage and ventilation, glazing beads and their fastening.

Drawing and description must be signed by the window manufacturer and – on approval – also be signed by the glazing unit manufacturer and the DVV Technical Committee.

In connection with product inspection visits, defects in the installation of glazing units are rated in accordance with Annex 8 point 5.9 or the type approval.

Rebates and glazing beads must be dimensioned so as to ensure that the glazing unit spacer profile is covered.

Glued glazing units may be allowed, if standardized gluing methods are used. It must be ensured that the application method does not weaken the glazing unit edge seals. Furthermore, to ensure sufficient documentation of compatibility the window manufacturer and the IGU and glue supplier must have a written agreement about terms of responsibility. In order to document the compatibility of different materials (such as adhesives and edge seals), own tests can be used as supplements according to the test description as stated in Annex 27.

Drainage and ventilation
Provisions must be made to ensure that rain or condensation water quickly and efficiently are drained/ventilated away to the exterior side as described under 7.4.2 Joints.

The holes must have a total cross-sectional area of not less than 200 mm² per running metre bottom rail rebate.

In cases where drainage is established by means of raised bottom glazing beads, the gap between glazing bead and its support must not be less than 2 mm.

Glazing beads
Glazing beads or other types of fixing must be dimensioned and fixed so as to ensure a uniform compression against the window across the entire contact area and so that movements in the unit do not reduce the retention of the window by the mounting material.

Note:
When installing glazing units, air permeability design must be ensured on the interior side, especially in systems where the units are installed using internal glazing beads.

Blocks and blocking
See Annex 19 or the current version of EN 12488.

Glazing tape and joint fillers
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 against the glazing unit.
Applied joint fillers and fitting materials must have been tested and approved according to a recognized standard.

For glazing tapes the standard may be EN 12365-1, and for joint fillers it may be EN 15651-2. Alternatively, a MTK approval may be acceptable with the supplier's acceptance.

Joint sealants used for fitting glazing units or for top or bottom sealing must not affect, disintegrate, or change the properties of the glazing unit edge seal.
The joint filler supplier’s instructions as to preparation, compression, lowest operating temperature, and other operating conditions must always be followed.

8. Timber/aluminium windows and doors
8.0 Dimensioning and weather tightness

Note:

Large opening casement windows may be affected by functional problems. It is therefore advisable not to manufacture opening casements with an area in excess of 1.7 m^2 and to restrict the length of the longest edge to 1.5 m. If exceeding these dimensions, particular attention should be paid to e.g. casement dimension, fitting of hardware, hinge design and number of fastening points. Furthermore, in the case of side hung casements, the height/width (side) ratio should be examined more closely.

As regards doors, the suitability of the chosen construction, seen in relation to the situation of use in which the unit is to be placed, should be evaluated at an early stage. Requirements or expectations may differ according to whether the door is to be installed for instance in a private residence or in a child care facility.

If there is any doubt about the suitability of the door, it can be tested in accordance with EN 14351-1, point 4.17.

Bowing 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.

When bowing and twisting are assessed, particular emphasis must be put on their impact on the weather tightness and other general functional aspects of the unit.

As a guidance and under specified laboratory conditions, the unit must meet the requirements of Class 3 (max. 2 mm per metre) cf. EN 1530.

Twisting must not exceed 2 mm per 10 cm of workpiece width measured over 1 m.

Measurements shall be carried out according to EN 952 - General and local flatness.

If, in the case of large units, it is deemed necessary to document the resistance to wind load in more detail, tests must be conducted in accordance with EN 12211.

Classification requirements must be stated in accordance with EN 12210.

Normative classification requirements under normal Danish conditions would be:
Class 3 for load
Class C for deflection.

If weather tightness testing of windows and doors is required, tests shall be based on the following standards:
EN 1026 for air permeability
EN 1027 for water tightness.

Classification requirements shall be indicated in conformance with:
EN 12207 for air permeability
EN 12208 for water tightness.

Normative classification requirements under normal Danish conditions would be:

Class 3 for air permeability at an average measurement of a positive and negative test pressure of 600 Pa for windows and outer doors.
Class 8A for water tightness (pressure 450 Pa for both windows and doors)

Normative requirements for classification acc. to low-energy class:
Class 4 for air permeability as an average of measurements at a positive and negative pressure of 600 Pa for windows and external doors. At 100 Pa, air passage may not exceed 1 $m^3/h.m^2$.

Test and classification requirements should be evaluated in relation to the actual use of the units, including the geographical location.

8.1 Burglary prevention

***DVV minimum requirements*:**
The construction, fitting of hardware and installation of glass in windows and doors must be sufficient to enable the intrusion resistance of the unit to meet common practice in the Danish market at the time of manufacture of the units.

It must not be possible to force casement constructions 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. (This requirement is considered to have been met if the glazing unit is spot bonded to the inside of the glazing rebate).

DVV options:
Manufacturers may also have a unit or series of units tested according to the current versions of EN 1628, EN 1629, EN 1630 and then classify the units according to EN 1627. For each tested unit or series of units, a scope must be described.

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

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

8.2 Thermal performance

Documentation in accordance with DS 418 or EN ISO 10077 parts 1 and 2 must be provided for all data concerning the thermal performance of the products.

For each product system, documentation must be provided for a 1.23 x 1.48m single-light opening casement window.

For external doors values must be given for a panelled door with a standard glazing unit as well as for a flush door. Both doors must be in the standard size of 1.23 x 2.18 m.

If the manufacturer wants an initial type calculation (”ITC”) carried out on a sliding door or a folding door respectively, this calculation must be 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 standard glazing unit defined as the most commonly used glazing unit in the product system in question.

The standard 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 glazing units must be specified with 2 significant digits and be legible/comprehensible in the glazing unit.

Thermal properties of window materials must comply with current norms i.e. a recognized standard or be listed on the materials list of the Association of Danish Window Manufacturers and be available on www.dvv.dk.

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.

This can be documented via calculations according to EN ISO 10077-2.

The above requirements regarding the minimum temperature of interior surfaces do not apply to window and door handles, lock cylinders, door sills and to the junction between frame and casement, but the manufacturer must at all times make sure that no condensation is retained in the construction.

This can be ensured through a continuous wet line and by applying solutions with built-in thermal bridge breakers.

For each delivery of windows and external doors the company must additionally provide all the energy performance data for individual units which are required to calculate the overall energy performance of the building project concerned.

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

8.3 Timber material

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

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 a DVV positive list, cf. Annex 18.

For heat treated timber: see section 5.3 Timber material.

If there is more than one timber species in the hatched areas of illustrations in Annex 10, the applicable base coat and surface treatment requirement shall be the one which applies to the species with the poorest natural durability.

Hardwood:
Hardwoods such as Dark Red Meranti, Red Lauan, Sipo (Entandrophragma utile), Araputanga (Swietenia macrophylla), Iroko, Teak and Oak as well as other equally durable hardwood species which meet the requirements of EN 350-2 may be used for windows and external doors under the following conditions:

- The timber must conform with the specifications regarding definitions and performance requirements listed in the table under 5.3.3. Timber density must be at least 500 kg/m^3 at a moisture content of 12 %.
- Timber preservative treatment must be carried out in accordance with the general requirements listed under 5.5.1 (with the exception of door sills where alternative preservatives/methods are permitted).
- Application of base coat and surface treatment must conform with treatment systems 3 or 4 - cf. 5.5.3.

The timber supplier must provide a declaration comprising at least the timber species and its density.

If the 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 selection of the planks must be evenly distributed over the entire batch; the density may be determined using sawn timber. The results must be recorded in weight tables and be kept with the tables recording data from in-house inspection of finished units.

At each inspection visit the weight tables which have been completed since the previous visit are examined; if cases of too low density are found, these are recorded in the inspection report.

If the company has failed to complete weight tables giving density data, this will be recorded as a significant defect for the sample at the inspection visit.

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

- The timber must conform with the specifications regarding definitions and performance requirements listed in the table under 8.3.2 and the additional definitions and requirements listed under 8.3.4. Timber density must be at least 450 kg/m^3 at a moisture content of 12 %. The average 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
- Application of base coat and surface treatment must conform with treatment system 5. Alternatively, treatment systems 1 or 2 may be used.

There are no specific requirements regarding penetration and retention when applying base coat in accordance with systems 1 and 2 but the process must be the same as for the application of base coat to pine.
Each supplier/sawmill must provide a declaration giving details of the spruce used.

The declaration must cover at least the points mentioned in Annex 12.

On receipt of the timber, the company must perform a wood density check on 5% of the planks received. The selection of the planks must be evenly distributed over the entire batch; the density may be determined using sawn timber. The results must be recorded in weight tables and be kept with the tables recording data from in-house inspection of finished units.

At each inspection visit the weight tables which have been completed since the previous visit are examined; if cases of too low density are found, these are registered in the inspection report.

If the company has failed to complete weight tables giving density data, this will be registered as a significant defect for the sample at the inspection visit.

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

- All timber material which is external to the wet line must be 100 % heartwood.

- The timber must conform with the specifications regarding definitions and performance requirements listed in the table under 8.3.2 and the additional definitions and requirements listed under 8.3.4. The mean timber density 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
- Application of base coat and surface treatment must conform with treatment system 5. Alternatively, treatment systems 1 or 2 may be used.

There are no specific requirements regarding penetration and retention when applying base coat in accordance with systems 1 and 2 but the process must be the same as for the application of base coat to pine.

The manufacturer must provide a declaration from each supplier/sawmill giving details of the larch used.

The declaration must cover at least the points mentioned in Annex 11.

Pine:
The following requirements apply to the use of pine:

- The timber must conform with the specifications regarding definitions and performance requirements listed in the table under 8.3.2 and the additional definitions and requirements listed under 8.3.4. The mean timber density 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
- Timber preservative treatment must be carried out in accordance with the general requirements listed under 8.5.1.
- Application of base coat and surface treatment must conform with treatment system 5. Alternatively, treatment systems 1 or 2 may be used.

Each supplier/sawmill must provide a declaration giving details of the pine used.

The declaration must cover at least the points mentioned in Annex 11.

Requirements for the proportion of heartwood in pine
The proportion of heartwood must constitute at least 60 % in areas outside the wet line. In laminated profiles each laminate must have a heartwood proportion of at least 60 % in areas outside the wet line. The location of the wet line and the applicable rules/exceptions to rules are mentioned in Annex 10.

Inspection of heartwood proportion - treatment systems 1, 2 and 5:
At each inspection visit checks must be performed on the heartwood proportion of 20 fully finished or partly machined profiles. The profiles are selected with an equal distribution between casement and frame profiles for windows and doors respectively. The proportion of heartwood in the hatched areas shown in Annex 10 is then recorded.

Each profile with a heartwood proportion below 40 % counts as one significant defect.

A max. of 4 profiles with a heartwood proportion of between 40 and 60 % is permitted; each profile in excess of this counts as one significant defect.

If the total number of profiles with a heartwood proportion below 60 % equals or exceeds 10, this is considered a critical error, triggering checks on a further 20 profiles during the same inspection visit. If during this extended inspection the number of profiles with a heartwood proportion below 60 % also equals or exceeds 10, the company will be subjected to stricter control under the rules in Chapter 4.

8.3.1 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 or the excerpts contained in 5.3.1.

8.3.2 Workpieces in softwood

Specifications regarding definitions and performance requirements

Knot size	See 8.3.4
Frames and posts	Max. 2/3 x side measurement, however max. 40
Casements	Max. ½ x side measurement, however max. 30
Plug size	As knot + 25 %
Synthetic materials	As plugging

Name of workpiece		Frames					Posts			Casements						Glazing bars		Glazing beads
		Side facing wall	Reveal: jamb and head	Reveal and rebate, sill	External edge	Internal edge	Sides	External edge	Internal edge	Reveal: casement jamb and head rail	Reveal: casement bottom rail	Edge against rebate	External side, casement jamb and headrail	External side, casement bottom rail	Internal casement side	Heavy: knots, max. 1/3 x side	Thin: Small firm knots permitted	Small firm knots permitted
Narrow - firm	Pit			■	■			■		■	■	■	■	■	■	■	■	■
Porous	Pit		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Blue stain - weak, max. 25 % of each workpiece				■	■			■		■	■	■	■	■	■	■	■	■
Pitch pockets			■	■	■	■	■	■	■	■	■		■	■	■	■	■	■
More than 0.6 x approx. 300 mm/running metre	Check		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Max. 0.6 x approx. 300 mm/running metre	Check			■	■		■	■	■	■	■		■	■	■	■	■	■
Max. 0.4 x approx. 250 mm/running metre	Scr			■							■					■	■	■
Max. 0.4 x approx. 150 mm/running metre	Scr																	■
Synthetic materials																		
Plugging																	■	■
Group	Knots																■	■
Hole	Knots		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Loose	Knots		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Decayed	Knots		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Large porous	Bar		■	■	■	■	■	■	■	■	■		■	■	■	■	■	■
Small firm	Bar																■	■
Dead, partly rooted	Kn			■							■						■	■
Live rooted	Kn																■	■

In addition, the following are not permitted: Ring shakes, top shoot breach, brittle heart, overgrowth, insect damage, rot, waney edge and bark.

Signature: Permitted □ Not permitted ■

8.3.3 Workpieces in hardwood

Point	Definition	Performance requirements
1	Timber species	cf. 8.3
2	Moisture content	12 ± 3 %
3	Width of annual ring	No requirements
4	Slope of grain	Generally not exceeding 1:10
5	Knots	Single rooted pearl knots permitted
6	Bowing	EN 1530: Class 3
7	Twisting	Max. 2 mm per 10 cm workpiece width measured over 1 m
8	Checks (Radial cracks)	Not permitted on visible surfaces
9 11 12 14 15 16 21 23 24	Ring shakes Thunder shakes Brittle heart Overgrowth Insect holes > 2 mm Rot Sapwood Pith Reaction wood	***Not permitted***
25	Density	Min. 500 kg/m^3

8.3.4 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 measures 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 surfaces 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 filler:
Synthetic filler may be used to the same extent as plugging. However, it should be documented that heating it to 70º C 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 8.3.2

Cracks and checks must 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 isclosed.

8.3.5 Finger joints

Finger-jointing of end-jointed profiles is permitted on the following conditions:

The profile of the joint must comply with DIN 68140 or a similar, recognized standard.

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.

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

- checking 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

The above inspection and testing activities must meet or exceed the following requirements as regards frequency and performance requirements:

Checks on timber moisture content must be conducted at least every two hours during production hours. The moisture content must fall within the range 12 ± 2 %.

Glue line checks must be conducted twice per shift and once every time workpiece dimensions are changed.

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

The tightness of the joint must be checked at the same frequency as the glue line. 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 testing must be conducted once a week 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 72 hours at 20° ± 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 testing must be conducted once a week 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.

Testing is conducted as shown in Annex 17, and the tensile strength must meet the requirements listed in the Annex.

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 for at least 10 years and be accessible to external inspectors.

Through brochures or by other means buyers must be informed of the fact that products have been manufactured from finger-jointed timber.

Units with end-jointed profiles based on finger-joints must always be supplied with surface treatment completed in accordance with 8.5.2.

If finger-jointed timber is sourced from a subcontractor, the subcontractor/manufacturer must be affiliated to an impartial inspection body approved by VinduesIndustrien and the profiles labelled in accordance with the rules of this body so as to ensure traceability.

8.3.6 Lamination

In laminated profiles, which receive a base coat and surface treatment in accordance with treatment system 5, each laminate in the hatched areas of Annex 10 illustrations must have a heartwood proportion of at least 60 %.

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.

Note:
In terms of the stability and durability of laminated profiles it is essential to take into account that the tangential moisture deformation of (back sawn) timber can be up to twice the radial moisture deformation (quarter sawn timber).
The basic principles of constructing laminated profiles are listed in EN 13307-1, Annex A.

Prior to lamination, the individual laminates must be conditioned to room temperature and a moisture content of 12 ± 2 %.

As regards visual defects etc. the completed laminated profiles are subject to the same requirements as solid timber profiles.

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). The adhesive must also meet the requirements of EN 14257 regarding resistance and strength at 80° C.

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 bonding process must be completed in accordance with the adhesive supplier's instructions for the type/variant of adhesive used.

Note:
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 inspection and checking:
The manufacturer's own in-house inspections must comprise at least the following activities:

- 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)

Instructions on how to conduct the checks and forms for the recording of the resulting data must be available for all checking and inspection activities. It must be evident from the recorded data whether the activities checked meet the specified requirements.

***Performance requirements**:*
The manufacturing hall and warehouse temperature must be maintained at a minimum of 15º C and the humidity of the ambient air must be controlled to ensure the timber maintains the specified moisture content. (Recommended values are a temperature of 20º C and humidity in the range 55 – 65 %).

Moisture content of timber and laminates ready for bonding: 12 ± 2 %.

The thickness of the outermost laminate measured from the innermost wet line and outwards must be at least 6 mm.

Maximum deviation of individual laminates from mean thickness: +/- 0,1 mm. This applies to the laminate both lengthwise and crosswise.

The dosing of adhesive must comply with the adhesive supplier's instructions.

The lamination process must comply with the instructions which must be provided by the suppliers of lamination equipment and adhesives.

Inspection frequency:
Climatic conditions must be recorded twice per working day/shift.

Timber moisture content 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.

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

The extent of in-house checking and inspection activities and the number of items checked as well as the frequency of checks for each individual activity must comply with the procedures approved by the external inspection body.

Similarly, the way inspection data is recorded must be approved by the external inspection body.

All data record forms must be kept for at least 10 years and be accessible to external inspectors.

In-house testing:

The strength of glue lines must be tested in-house. This can 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.

Sampling must be conducted at least twice per working day/shift, each time selecting at least 3 samples per bonding process line.

Performance requirements:

Shear testing must produce a mean breaking stress value for glue lines of at least 6 N/mm² for each test sample.

When splitting glue lines the split surfaces must exhibit at least 90 % wood failure.

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.

The requirements in respect of test results, the extent and frequency of testing as well as the recording of test results must be specified in procedures approved by the external inspection body.

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
- selecting samples for external testing.

External testing:
At the external inspection, 6 laminated profiles are selected from each bonding process line. From each of these profiles, a 600 mm long sample is cut and sent for testing at an accredited laboratory or a laboratory approved by VinduesIndustrien.

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

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.

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.

Requirements for external inspections:
In the case of window manufacturers who are manufacturing their own laminated profiles, external inspections are conducted in connection with the biannual or annual inspection visits by the inspection body.
At each external inspection samples are selected and sent for external testing at an accredited laboratory or a laboratory approved by VinduesIndustrien.

In the case of other manufacturers of laminated profiles, including manufacturers of curved sections, who act as suppliers to window manufacturers affiliated to the DVV scheme, external inspections must be conducted by an impartial body approved by VinduesIndustrien.

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 – and, at each visit, samples are selected and sent for external testing at an accredited laboratory or a laboratory approved by VinduesIndustrien.

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

Labelling:
Laminated profiles from suppliers must carry a clear supplier's label (name/logo) and the time of manufacture (week and year).

8.3.7 Aluminium (alu) material

Aluminium profiles for the manufacture of window and door elements must meet the materials specifications given in Eurocode 9 and Danish standards for aluminium constructions DS 411-420 / ch. 5 – Appendix 2006.
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.

To the extent possible, the composition of the alloy must be given in the data sheet (Annex 2).

The standards given must also be applied in other areas if relevant for the manufacture of window and door elements.

Under normal light conditions there must be no visible defects in terms of oxide impurities, blisters, dents, distortion or cracks. When viewed from a distance in excess of 1.5 metres there must be no visible extrusion stripes or other surface defects.

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.
Please see comments in 8.0 above regarding the stiffness of elements.

8.3.8 Synthetic materials

Synthetic materials may be used as (partial) components in the frames and casements of windows and door elements.
It is a prerequisite for their use that the following requirements in terms of materials data and type testing have been met.

Materials data
As a minimum, the correct technical term for the synthetic material used must be provided and the following properties documented by data:

- Tensile strength
- E-modulus
- Thermal expansion coefficient
- Softening point

Furthermore, a product description must be provided comprising all relevant information under the headings listed in the Technical Requirements, Annex 2, Product description (Data sheet example).

Testing requirements
Materials must be subjected to type testing conducted in accordance with the conditions and requirements listed in the section **Type testing** below**.**

If there is reason to doubt the weathertightness and/or stability of the units, the certification body may request testing in accordance with EN 1026 (air permeability), EN 1027 (watertightness) and/or EN 12211 (resistance to wind load).

For air permeability and watertightness the outcome of the tests must meet the classification performance requirements listed in the **note** under **8.0**.
Resistance to wind load must meet the requirements of Class C3.

8.3.9 Type testing

In the following cases, a type testing report from a recognized testing institution must be provided:

- if the frame rebate of the unit is manufactured wholly or partly in synthetic materials
- if hinges are fixed to synthetic material in the frame and/or casement profile
- if synthetic materials contribute to the transfer of load from casement to frame.

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 demonstrate the stability and fixing of hinges
- to demonstrate the overall stability and functioning of the unit.

Testing is conducted using a side hung, outward opening window where casement width x casement height = 700 x 700 mm.

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

Test rig and setup
The test rig is constructed as a stable and rigid frame 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.

At the hinge side, frame screws are inserted into the timber frame rebate at the level of the hinges and screwed through the timber section of the frame into the test rig to secure the unit to the rig.

At the handle side, the frame is blocked at fastening points and fixed at the same points using frame screws.

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 90° or the max. opening angle if this is less than 90° 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.

The starting point for each of the four individual tests to be conducted is the recording of the following parameters:

The gap between casement and frame is recorded for each corner of the unit in both directions (a total of eight measurements).

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

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

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

Once the parameters for a load of 400 N (for doors: 600 N) have been recorded, the load is relieved and a subsequent set of measurements taken.

Test procedure - 30° opening
The casement/door leaf 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 leaf is turned to 90° or to max. opening angle if this is less than 90°; the casement/door leaf is secured in this position by means of a lateral guide.
A load of 600 N (for doors: 800 N) is applied vertically to the casement/door leaf head 50 mm from the outer corner of the casement/door leaf.

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 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 four individual tests and a final safety test.

The individual tests are conducted in the following sequence:
90° opening – climatic conditions 1
30° opening – climatic conditions 1
90° opening – climatic conditions 2
30° opening – climatic conditions 2

The safety test, which is the final test, is conducted at:
90° opening – climatic conditions 1
30° opening – climatic conditions 1

Recording of test results
During the application of the 400N load (for doors: 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.

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

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 200Ncm is applied to those 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: 800 N) any failures in materials or construction are 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
The materials and construction are approved if the values recorded after load step 400 (for doors: load step 600 N) meet the following criteria:

- no lasting deformation between the timber and synthetic material section of the frame exceeding 1,0 mm
- no lasting change in the gap between casement and frame exceeding 1,5 mm at all measuring points.

After a potential initial turning, the screw is not allowed to turn at an angle in the following 15 seconds during the application of the 200 Ncm moment load.

Note:
The last-mentioned criterion above is a normative requirement.
Alternatively, special screws or other fixing methods may be used, each of which must be documented and approved by VinduesIndustrien's Technical Committee.

During safety testing, the final 600 N load step (for doors: 800 N) must not cause failure where the synthetic/alu frame rebate is joined to the timber section, nor failure in hinges, their fixing or in casement corner joints.

8.4 Finishing

8.4.1 Machining of wood

All faces must be machined to a smooth finish. (With the exception of the outside of frames).

Reduced thickness at profile ends	not permitted
Torn surface around knots and other cross grain	max. depth 0.5 mm
Roller-induced shavings marks	max. depth 0.5 mm
Cutter marks	max. length 2.0 mm
Stripes caused by chipped cutter	not permitted
Roller marks	not permitted
Stripes/marks by shavings stuck in machine	not permitted
Torn-off splinters	not permitted

Measurement tolerances *(at a moisture content of 12 ± 3 %):*

External frame measurement:	± 2 mm at a nominal size of ≤ 2 m.
	± 3 mm at a nominal size > 2 m.
Profile cross-section	± 0.5 mm at a size ≤ 50 mm
(width and thickness)	± 1.0 mm at a size > 50 mm
Overturning of glazing bars	< Δ 2.0 mm (end to end)

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. Annex 3 contains an example of how to indicate measurements.

8.4.2 Finishing of aluminium

Visible surfaces, edges and corners must not show burrs, unintentional marks or other traces from tools nor from handling during manufacture and storage.

Outward opening casement corners may not be pointed or sharp enough to cause injury or inconvenience in use or during cleaning.

Measurement tolerances (at 15ºC)

External frame measurement:	± 2 mm at a nominal size < 2 m.
	± 3 mm at a nominal size > 2 m.
Casement rebate measurement:	Frame rebate measurement minus 2 x profile system nominal chamber air gap ± 2 mm
Overturning of glazing bars	< Δ 2.0 mm (end to end)

8.4.3 Design of the construction

Window and door units in timber/aluminium are manufactured in accordance with different construction principles. However, all constructions must meet the general or particular requirements of the delivery regarding the strength/stiffness, air permeability and water tightness of the units, cf. point 8.0 - Dimensioning and weather tightness.

The overall construction must be implemented in a manner which prevents the retention of rainwater or condensate.

Furthermore, the construction details must be designed in such a way that the materials used do not break down or degrade.

Timber/aluminium units are subject to the following requirements:
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.

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 and stopping water from collecting on the upwards-facing side of the timber section.

Note:
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. 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.

Horizontal timber components which may be exposed to water ingress must have an outward slope of at least 7º on the upward-facing side; there must be no grooves or the like where water can accumulate.

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 give rise to any direct water ingress, may have an outward slope of at least 5º.

Glazing rebates in casements and fixed windows manufactured from organic material, which may be exposed to water ingress, must be sloping outwards.

Likewise, if the cross-sectional dimension allows it, geogian glazing bars must be sloping outwards.

Seen from the inside, there must be a uniform gap.
Variation in the gap must not exceed 2 mm, and the deviation be no more than 2 mm in relation to the nominal gap.

In addition, the construction and choice of materials must ensure that the units meet the requirements listed under point 8.2 Thermal performance.

8.4.4 Joints between timber components

All joints (mortice and tenon, tenon and hole, dowel joints) must be assembled with an appropriate tightness to ensure tight and stable glued joint properties without cracks in the timber.

Frames and casements including transoms and mullions as well as glazing bars for both windows and doors may be assembled using dowels, paying due attention to dimensioning, glueing and preservative treatment. Wood dowels should preferably be in spruce or wood with similar or better moisture stability.

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 sizes when combined with the application of gap-filling adhesive to the contact surfaces of the joint or sealing of the gaps in a similar manner.
On external faces there must be no openings allowing water ingress, e.g. fissures in panels and joints behind drip grooves and kick plates.

No corner joints may contain openings from fastener slots or other similar openings which cause risk of water absorption.

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.

All joints must be assembled under pressure. Once the pressing is completed, all cheeks and corners in tenons and mortises must be completely tight. Joints must be glued using waterproof adhesive which, in so far as possible, should also be applied to end grain. Excess adhesive is permitted on the hidden face of frames.
Casement and frame joints must be assembled using adhesive which meets the requirements of EN 204-D3 when tested in accordance with EN 205.

In both doors and windows, all joints in sill and casement bottom rail rebates as well as glazing bars must be sealed against moisture absorption by a fully covering application of an end grain sealant or an externally applied triangular mastic joint. In aluminium-sill doors the entire end grain face towards the aluminium must be sealed with mastic sealant or another suitable sealing system employed. Inward opening doors with timber sills must be sealed in a similar manner at the external reveal.

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 K3 (DS 419).

8.4.5 Joints between alu components

The profiles must be cut so as not to produce burrs. Butting faces must have a flush fit. Differences in level of 0.3 mm are permitted.

Joints must have a precise fit and a sealant applied to the joint surfaces to load-bearing alu components to achieve sufficient weather tightness.
Where there is a risk of water accumulating in the construction, through holes resulting from assembly at corner joints must be sealed.

Corner or angle plates must be fitted in grooves where required to ensure the joint remains flush and rigid. Rebates in window and door casement heads always require the fitting of corner or angle plates.

Constructions must not be combined, assembled or fixed with materials posing a risk of corrosion without taking special steps to prevent this.

8.5 Timber preservative treatment

8.5.1 General

The following Requirements for preservative treatment of timber presuppose that the requirements listed under ***5.3 Timber material*** have been complied with.

All units must be supplied ex manufacturer with timber preservative treatment; information about the treatment in question must be included in quote and order confirmation.

Impregnated profiles where the preservative treatment has not penetrated the timber fully must be reimpregnated after machining or cutting to length, e.g. standard profiles cut to fixed sizes. This is done by dipping the profiles in the original solution for at least 30 minutes at a minimum depth of 100 mm of liquid.

If units are supplied with a base coat only, instructions regarding further surface treatment must be included.

Units in softwood supplied with base coat only must have been treated in accordance with treatment system 1.

After application of base coat under treatment system 1, units must be left to dry for long enough for at least half the impregnation solution typically absorbed to have evaporated.

After application of base coat in accordance with other treatment systems, units must be left to dry for the length of time specified by the supplier of the preservative treatment.

The requirements regarding surface treatment coat thickness apply to all surfaces visible when the unit is closed. In rebates, grooves and on end grain the coat may be thinner; however, it should always be thick enough (covered surface) for the colour of the wood not to show through. The surface treatment must further meet the requirements listed in Annex 14 of these Requirements.

Treatment systems other than those given below may be permitted after submission of application and special documentation which must be examined and approved by the VinduesIndustrien Technical Committee after consulting the management of its Timber Section.

8.5.2 Treatment systems for softwood

See Chapter 5.5.2 Treatment systems 1, 2 and 2 ØKO

8.5.3 Treatment systems for hardwood

See Chapter 5.5.3, Treatment systems 3 and 4

8.5.4 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 immersion, 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).
- The coat must have an average thickness greater than 80 µm – cf. 4.2.1 d).
- The treatment must be opaque or semi-transparent - cf. 4.2.2 a), b) and c).

The surface must further meet the performance requirements listed in Annex 14 of these Requirements.

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 927-2 (6.2.1).

The tests must establish that the treatment system meets the designation "mould resistant" as regards growth on the surface.

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 manufacturer's product and system classifications are based.

The wet film applied during base coat and surface treatments must be subject to systematic checks and the results recorded.

The profiles/units may be aged either by 6 months of natural exposure, cf. EN 152-1 or by 4 weeks' QUV laboratory ageing, cf. proposal for revised edition of EN 152-1.

8.6 Surface treatment of aluminium

8.6.1 Coating of aluminium

Complete 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 and control body.

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 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. Coat thickness is measured in accordance with EN ISO 2360.

Coating completed, the appearance of the finished profile must be: (visual inspection from 3 metres away in diffuse daylight)

- uniform
- even and
- have a smooth and opaque surface.

Impurities in the paint are rated in accordance with Annex 8, point 7.5.

Sheen is measured in accordance with 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 when viewed from a distance of 3 or 2 metres for external and internal surfaces respectively, cf. GSB AL, point 9.20 or equivalent.

When measuring adhesion before and after exposure to accelerated tests, adhesion must meet Class 0, cf. ISO 2409. The surface film must not contain defects in the form of blisters or flakes after 2 hours of immersion in boiling distilled water.

Data sheet and brochures must contain information about whether surfaces have been treated or not and give instructions about precautions when installing against other building materials.

8.6.2 Anodizing of aluminium

Overall, anodizing is based on Dansk Standard EN ISO 7599 "Aluminium and aluminium alloys - Anodizing. General requirements of anodized layers on aluminium".

Prior to chemical pre-treatment must mask scratches and stripes to such an extent that, after anodizing has been completed, they are not visible when looking at the surface from a distance of 3 metres with the incident light at less than 45º.

In the absence of instructions to the contrary, mechanical pre-treatment must be in the form of grinding.

Measurements to be completed using induction effect apparatus in accordance with ISO 2360.

All profiles must receive a finishing treatment to achieve a surface sealing which, when tested according to ISO 3210, involves a loss of mass (reduction in weight) of less than 30 mg/dm^2 of anodized surface.

The anodized profile must be free from visible defects on surfaces which can be seen from the inside or outside in normal use.

The colour of profiles in the same order must not deviate so much as to be immediately apparent when looking at the surface from a distance of 3 metres with incident light perpendicular to the surface. The light must be diffuse daylight coming from a northerly direction.
For contractual, documentational, and control purposes of this, reference sheets showing minimum and maximum colour may be used.

For outdoor use the minimum permitted layer thickness is class AA20 (20 µm) and for indoor use AA15 (15 µm).

8.7 Weather seals

8.7.1 Materials requirements

The materials used for weather sealing between casements and frames must have a chemical structure and/or design assumed to possess such elastic properties that they will continue to provide an acceptable seal against air and water ingress for a number of years under normally occurring changes in the size of the joint. These requirements can be met by seals manufactured in rubber or rubber-like plastic shaped as hollow profiles or as lip strip seals. Brush strip seals may be approved in special cases.

Note:
In case of dispute over the suitability of the strip seals in relation to the properties mentioned below, type testing in accordance with EN 12365-1 may be requested. Overall, the results of this testing must prove performance to the following classifications:

- *Working range, max. Class 4*
- *Compression, max. Class 2*
- *Temperature stability, meeting or exceeding Class 3*
- *Recovery characteristics, meeting or exceeding Class 2*

For duplex profiles (extruded using two or more different materials) the use class for recovery characteristics after ageing in accordance with EN 12365-4 will be added following a future revision of the standard.

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. Brochure and user manual must contain instructions on whether subsequent surface treatment requires the use of particular paints to avoid disintegration of weather seals.

The seals must be designed for mechanical fixing and/or insertion into a groove. Also, seals must be designed and fixed in a manner which allows them to be replaced.

It is a condition of the use of hollow profiles that the edge which the seal abuts is rounded to create a smooth face.

8.7.2 Finishing requirements

Weather seals between casements and frames must be fitted to the unit in a manner which suits their design and construction and so as not to expose them to damaging lateral forces when the casement is opened and closed.

The distance between casement and frame must be adapted to the mean compression rate of the seals.

Seals must be fixed in a manner which ensures that their position does not change transversally or laterally when operating the unit.

Weather seal corner joints must be finished in accordance with the manufacturer's instructions.
If the seals are not positioned at the same wet line, contact between the wet lines must be ensured e.g. by overlapping.

8.8 Hardware, hinges and fitting of hardware

8.8.1 Hardware and hinges

All hardware must be manufactured in materials which meet normal requirements in terms of physical strength, wear and resistance. The window manufacturer should be informed about the hardware supplier's declared digit codes, cf. recognized product standards for use, wear and tear, weight, fire, safety, corrosion, resistance and friction.

To secure easy identification and description of the requirements which apply to a particular piece of hardware for windows and doors, a special coding is used which simplifies the communication of the required/supplied properties.

In the DS/EN 13126 series the code is constructed in the following way: See Annex 23

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. If there is reason to doubt the strength of the hardware or the way it is fixed, a test in accordance with EN 14608 may be required to prove its adequacy. As a minimum, the requirements of Class 2 under EN 13115 must be met.

A subsequent increase in the load to 600 Newton must not cause failure in hinges or hardware, their fixing or in door and casement corner joints.

Operating handles must have a strength and fixing adapted to their function and must be designed to avoid fingers getting caught during operation.

Fasteners must be designed and function so as to ensure correct tightening against the seals.

Fasteners including strike plate etc. must 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 m^2, 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.

When in the closed position, opening casements or ventilation hatches must be secured at a minimum of 4 points including hinges. 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.

If the dimension of the casement at the closing side is less than 0.6 m, one fastening point will suffice in addition to the hinges.

Other fastening systems which provide all-year uniform weather tightness along all casement edges may be approved.

Pivot and top hung 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.

Hardware and screws made of materials which are not corrosion resistant and which are fitted outside of the external face of the unit must be hot-galvanized or protected by other surface treatment to ensure resistance to 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 be at least 5.

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 be at least 5.

Hardware and screws inside the wet line must be made of a material or 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 be at least 5.

Hardware and its fixing screws located outside the wetline must be sufficiently compatible to prevent the formation of galvanic corrosion.

8.8.2 Fitting of hardware

Hardware which is visible when the unit is in its normal position of use must be mounted so that its edges or characteristic design lines are parallel with the edges of the unit.

External doors for dwellings or buildings with a similar pattern of use must be equipped with at least 3 hinges and 3 fastening points at the locking side. The requirement for 3 fastening points does not apply to doors equipped with a door closer or an electric locking system. The tightness of a 1-point closing cannot be expected to be similar to that of a 3-point closing. This should be made clear to the customer.

Fewer hinges and fastening points may be allowed if it can be documented that retention, load bearing capacity and permanent sealing properties are not impaired.

For side hung windows with a casement width in excess of 70 cm hinges must be dimensioned and fixed as for doors.

Side hung units where the size and/or design (e.g. casement with glazing bars) causes particular risk of problems with closing and weathertightness should have a riser/supporting block fitted to the sill at the closing side. In the case of diagonally stable casement and door leaves the riser block may alternatively be fitted at the bottom of the frame at the hinge side.

At the jamb and head, the gap between the frame and the casement (clearance around the casement) must be adapted to the size of the window/door, the hardware system etc. It may be necessary to carry out adjustment when installing in the building but the unit must be designed for the gap between the frame and the casement to be as uniform as possible on all four sides when seen from the inside.

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.

Screws must fit the holes in the hardware, be firmly tightened and free from burrs which may cause cut fingers if touched.

The axis of the screw must not deviate by more than 10º from a plane perpendicular to the surface of the hardware, and the head of the screw must be flush with or below the surface of the hardware.

Hardware grooves must be adapted to the geometrical shape and thickness of the hardware.

When drilling or machining frame profiles, the resulting groove or hole must stop short of penetrating the full depth of the profile to avoid water or moisture ingress to the wall side of the profile.

If the fitting of a lock case etc. exceptionally requires drilling (machining) through to the glazing rebate, the access of condensation-causing air must be prevented e.g. by taping.

When fitting casement fasteners with a base plate, care must be taken to ensure sufficient friction around the eye to prevent unintentional misalignment of the casement fastener. This can be done e.g. by drilling a tight hole for the eye thread in the casement section.

When the fitting of hardware has been completed, adjustable parts should, as a rule, be in the central position.

8.9 Glass/panels and installation of glazing units

8.9.1 Glass and panels

Sealed glazing units must be manufactured to the EN 1279 series, and the manufacturer of the units must be affiliated to a certification scheme with external inspection approved by VinduesIndustrien.

The glazing unit manufacturer and certification scheme and associated certificate number must be stated on the website www.dvv.dk

The thermal performance of glazing units must be stated on the spacers of the glazing units as specified in the sections on thermal performance.

Moreover, the glazing unit manufacturer must have signed Annex 21: Glazing unit manufacturer – warranty declaration and be affiliated to the DVV warranty scheme or a similar scheme with the same coverage.

Individual panes of glass or edge constructions must not contain defects or impurities in the glass in excess of the criteria described or exceed the stated tolerances in Annex 20: Visual deviations in quality in insulated glass units. Tempered and laminated glass must not cause visual distortion according to current EN standards.

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 surface finish please consult the respective sections on materials.

The following applies to panels constructed from wood fibreboard:

The fibreboard material must meet or exceed all "symbol H" requirements (use in humid conditions), cf. EN 316 and EN 622-5 for MDF fibreboards.

When machining the fibreboard material (moulding and profiling) all horizontal traces must have an outward slope of at least 7º.

All edges (also non-visible ones) resulting from grooving/moulding/profiling, must have their corners rounded to a minimum radius of 1.5 mm; this also applies where part of the original surface of the board has been cut away. See example in Annex 16.

Units incorporating wood fibreboard panels must always be supplied with a completed surface treatment. The surface treatment requirements also apply to surfaces and edges which are not visible after the panelled unit has been assembled.

Panels must be incorporated in the unit in a manner which ensures moisture deformation of the panelling can be absorbed without causing damage.

Note:
MDF/HDF boards are dry process fibreboards. MDF boards must have a density of at least 650 kg/m³ and HDF boards a density of at least 800 kg/m³.

Machining (moulding and profiling) will expose the main core of the board whose properties deviate negatively from the unmachined surface.

To prevent damage to board-based panels the board material, surface treatment and assembly system should be well documented.

8.9.2 Installation of glazing units

Insulated glass units 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.

If a fitting method is used that deviates from the above, a type approval must be obtained from the certification body. 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, compatibility declaration – if any, blocking, drainage and ventilation, glazing beads and their fastening.

Drawing and description must be signed by the window manufacturer and – on approval – also be signed by the glazing unit manufacturer and the DVV Technical Committee.

In connection with product inspection visits, defects in the installation of glazing units are rated in accordance with Annex 8 point 5.9 or the type approval.

Rebates and glazing beads must be dimensioned so as to ensure that the glazing unit spacer profile is covered.

Glued glazing units may be allowed, if standardized gluing methods are used. It must be ensured that the application method does not weaken the glazing unit edge seals. Furthermore, to ensure sufficient documentation of compatibility the window manufacturer and the IGU and glue supplier must have a written agreement about terms of responsibility. In order to document the compatibility of different materials (such as adhesives and edge seals), own tests can be used as supplements according to the test description as stated in Annex 27.

Drainage and ventilation
Provisions must be made to ensure that rain or condensation water quickly and efficiently are drained/ventilated away to the exterior side.

The holes must have a total cross-sectional area of not less than 200 mm² per running metre bottom rail rebate.

In cases where drainage is established by means of raised bottom glazing beads, the gap between glazing bead and its support must not be less than 2 mm.

Holes must be made with a minimum size of Ø8 mm and 5 x 15 mm.

Glazing beads
Glazing beads or other types of fixing must be dimensioned and fitted so as to ensure a uniform compression against the window across the entire contact area and so that movements in the unit do not reduce the retention of the window by the mounting material.

Note:
When installing glazing units, air permeability design must be ensured on the interior side, especially in systems where the units are installed using internal glazing beads.

Blocks and blocking
See Annex 19 or the current version of EN 12488.

Glazing tape and joint fillers
Joint fillers must be able to absorb movements caused by wind load, moisture, and variations in temperature without subsequent breakage or reductions in the performance of the seal against the glazing unit.

Applied joint fillers and fitting materials must have been tested and approved according to a recognized standard. For glazing tapes the standard may be EN 12365-1, and for joint fillers it may be EN 15651-2. Alternatively, a MTK approval may be acceptable with the supplier's acceptance.

Joint sealants used for fitting glazing units or for top or bottom sealing must not affect, disintegrate, or change the properties of the glazing unit edge seal.
The joint filler supplier’s instructions as to preparation, compression, lowest operating temperature, and other operating conditions must always be followed.

9 . FRP (fibre re-inforced polymer) windows and doors
9.0 Dimensioning and weather tightness

Note:

Large opening casement windows may be affected by functional problems. It is therefore advisable not to manufacture opening casements with an area in excess of 1.7 m^2 and to restrict the length of the longest edge to 1.5 m. If exceeding these dimensions, particular attention should be paid to e.g. casement dimension, fitting of hardware, hinge design and number of fastening points. Furthermore, in the case of side hung casements, the height/width (side) ratio should be examined more closely.

As regards doors, the suitability of the chosen construction, seen in relation to the situation of use in which the unit is to be placed, should be evaluated at an early stage. Requirements or expectations may differ according to whether the door is to be installed for instance in a private residence or in a child care facility.

If there is any doubt about the suitability of the door, it can be tested in accordance with EN 14351-1, point 4.17.

Bowing 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.

When bowing and twisting are assessed, particular emphasis must be put on their impact on the weather tightness and other general functional aspects of the unit.

As a guidance and under specified laboratory conditions, the unit must meet the requirements of Class 3 (max. 2 mm per metre) cf. EN 1530.

Twisting must not exceed 2 mm per 10 cm of workpiece width measured over 1 m.

Measurements shall be carried out according to EN 952 - General and local flatness.

If, in the case of large units, it is deemed necessary to document the resistance to wind load in more detail, tests must be conducted in accordance with EN 12211.

Classification requirements must be stated in accordance with EN 12210.

Normative classification requirements under normal Danish conditions would be:
Class 3 for load.
Class C for deflection.

If weather tightness testing of windows and doors is required, tests shall be based on the following standards:
EN 1026 for air permeability
EN 1027 for water tightness.

Classification requirements shall be indicated in conformance with:
EN 12207 for air permeability
EN 12208 for water tightness.

Normative classification requirements under normal Danish conditions would be:
Class 3 for air permeability at an average of measurement of a positive and negative test pressure of 600 Pa for windows and outer doors.
Class 8A for water tightness (pressure of 450 Pa for both windows and outer doors).
Normative classification requirements according to acc. to low-energy class:
Class4 for air permeability at an average of measurement of a positive and negative test pressure of 600 Pa for windows and outer doors. At 100 Pa, air passage may not exceed 1 $m^3/h.m^2$.

Moreover, test and classification requirements should be evaluated in relation to the actual use of the units - including the geographical location.

9.1 Burglary prevention

***DVV minimum requirements*:**
The construction, fitting of hardware and installation of glass in windows and doors must be of a nature and quality which enables the units to withstand burglary up to the level of what is common practice in the Danish market at the time of manufacture of the units.

It must not be possible to force casement constructions 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. (This requirement is considered to have been met if the glazing unit is spot bonded to the inside of the glazing rebate).

DVV options:
Manufacturers may also have a unit or series of units tested according to the current versions of EN 1628, EN 1629, EN 1630 and then classify the units according to EN 1627. For each tested unit or series of units, a scope must be described.

Units can then be labelled with "DVV-Sikring" cf. Annex 24, stating the class of resistance, according to the current version of EN 1627. The label must be visible and permanent.

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

9.2 Thermal performance

Documentation in accordance with DS 418 or EN ISO 10077 parts 1 and 2 must be provided for all data concerning the thermal performance of the products.

For each product system, documentation must be provided for a 1.23 x 1.48m single-light opening casement window.

For external doors values must be given for a panelled door with a standard glazing unit as well as for a flush door. Both doors must be in the standard size of 1.23 x 2.18 m.

If the manufacturer wants an initial type calculation ("ITC") carried out on a sliding door or a folding door respectively, this calculation must be 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 standard glazing unit defined as the most commonly used glazing unit in the product system in question.

The standard 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 glazing units must be specified with 2 significant digits and be legible/comprehensible in the glazing unit.

Thermal properties of window materials must comply with current norms i.e. a recognized standard or be listed on the materials list of the Association of Danish Window Manufacturers and be available on www.dvv.dk.

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.)

This can be documented via calculations according to EN ISO 10077-2.

The above requirements regarding minimum temperature do not apply to window and door handles, lock cylinders, door sills and to the junction between frame and casement, but the manufacturer must at all times make sure that no condensation is retained in the construction. This can be ensured through a continuous wet line and by applying solutions with built-in thermal bridge breakers.

For each delivery of windows and external doors the company must additionally provide all the energy performance data for individual units which are required to calculate the overall energy performance of the building project concerned.

Separate energy labelling of sub-components is not permitted (panes etc.).

9.3 FRP material

9.3.1 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.

9.3.2 Materials data

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

- Bending, tensile, and compressive strength.
- E-modulus.
- Thermal conductivity.
- Thermal expansion coefficient.
- Thermal range 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 recognized institution.

9.4 Testing requirements

9.4.1 Type testing

In the following cases, a type testing report from a recognized testing institution must be provided:

- 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.

The testing serves the following purposes:

- To demonstrate sufficient strength and rigidity in sub-components of FRP material.
- To ensure stability and retention of hinges.
- To ensure stability and functioning of the complete unit.

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

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

Test rig and setup
The test rig is constructed as a stable and rigid frame 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.

At the hinge side, the unit to be tested is secured to the test rig with frame screws at the level of each hinge.

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

If the client has supplied mounting instructions prescribing a different method, this may be used instead.

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 must not be present).

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 eight measurements).

Test procedure - 90° opening
The casement/door frame is turned to a 90° opening or – if desired – a smaller opening angle and is secured in this position by means of a "lateral guide".

A load is applied vertically to the casement/door leaf head 50 mm from the outer corner of the casement/leaf.

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 leaf is turned to a 30° opening angle and secured in this position by means of a "lateral guide".

Then the test cycle is completed in accordance with the procedures described in Test procedure - 90° opening (see above) and Recording of test results (see below).

Safety testing
The casement/door leaf is turned to a 90° opening or – if desired - to a smaller max. opening angle and secured in this position by means of a "lateral guide".

A load total of 600 N (for doors: load step 800 N) is applied vertically to the casement/door leaf head 50 mm from the outer corner of the casement/door leaf.

After three minutes, the load is relieved and the same test is 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.

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

Heating to 65° C is considered to be completed 15 minutes after recording a temperature of 65° C on a synthetic material applied to the hinge side.

Test sequence
The test sequence comprises a total of four 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
The gap between casement and frame is measured and the result is compared with the initial recording of values. This procedure applies to both a 90° and a 30° opening.

After load step 400 N, (for doors: load step 600 N), 30° opening, and climatic conditions 2, a moment load of 200 Ncm is applied to those screws in hinges which are anchored in FRP material. 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 taken only after allowing the FRP material at the hinge side to acclimatize for 10 minutes.

Approval criteria
Materials and construction are approved if the values recorded after load step 400 N (for doors: load step 600 N) meet the following criteria:

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.

Note:
The last-mentioned 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 in hinges and their fixing or in casement corner joints.

9.4.2 Performance testing

For each product system, performance testing must have been conducted for a 1.23 x 1.48 m single-light opening casement window.

The testing must have been conducted at an accredited and notified laboratory and must include the following:

Air permeability:	in accordance with	EN 1026
Water tightness:	in accordance with	EN 1027
Resistance to wind load:	in accordance with	EN 12211

The following requirements to classification must have been met:

Air permeability:	Class 3in accordance with	EN 12207
Water tightness:	Class 8A in accordance with	EN 12208
Resistance to wind load:	Class 3 for load and Class C for deflection in accordance with EN 12210	

9.5 Finishing

9.5.1 Machining

The FRP material must be processed with machines and cutting tools which ensure an accurate shaping of saw cuts and grooves etc.

Visible surfaces, edges, and corners must not show burrs, unintentional marks or other traces from tools or from handling during manufacture and storage.

Outward casement corners allowing contact must not be pointed or sharp enough to cause injury or inconvenience during operation or cleaning.

Measurement tolerances (at 15º C)

External frame measurement:	± 2 mm at a nominal size of < 2 m ± 3 mm at a nominal size of > 2 m
Casement rebate measurement:	Frame rebate measurement minus 2 x nominal chamber air of profile system ± 2 mm

9.5.2 Constructional design

Requirements to the constructional design are considered to have been met provided the product system has proved compliance with the requirements in point **9.4.2 Performance testing.**

9.6 Surface treatment

Dependent on the position of the surface, the result of the finished surface treatment must meet the following requirements:

- For visible surfaces of closed element: DLGU (opaque, sealed, smooth and filled surface)
- For visible surfaces of open element: DG (opaque and smooth surface)
- For non-visible surfaces (towards wall): no requirements.
- At a visual inspection of visible surfaces of a closed element the surface must appear smooth and uniform.

The inspection is made from a distance of 3 metres in diffuse daylight.

Defects such as pinholes, paint runs, foreign particles, volcanoes/shrinkage cavities, and raised fibres are recorded and assessed as set out in Annex 8.

The normative value for the dry layer thickness of the surface treatment must be at least 60 µm.

A smaller layer thickness is allowed in grooves, holes etc. which are not directly exposed to weather, but surfaces in these places must always be covered.

The layer thickness is measured in accordance with EN ISO 2360.

Bonding must be classified in accordance with 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 of layer thickness and bonding.

These procedures must give the number of samples and frequency, and also specific requirements to layer thickness and bonding.

All test results must be recorded and be available to the certification body.

9.7 Weather seals

9.7.1 Materials requirements

Materials used for weather sealing between casements and frames must always have a chemical structure and/or design 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”. Brush seals may be approved in special cases.

Note:
In case of dispute over the suitability of the seals in relation to the properties mentioned below, a type testing in accordance with EN 12365-1 may be requested. The overall result of this testing must prove performance to the following classifications:

- *Working range, max. class 4*
- *Compression, max. class 2*
- *Temperature stability, meeting or exceeding class 3*
- *Recovery characteristics, meeting or exceeding class 2*

The use class for recovery characteristics of duplex profiles (extruded using two or more different materials) after ageing, in accordance with DS/EN 12365-4, will be added following a future revision of the standard.

Weather seals must neither 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. Brochure and user manual must contain instructions as to whether subsequent surface treatment requires the use of particular paints to avoid disintegration of weather seals.

The seals must be designed for mechanical fixing and/or insertion into a groove. Another requirement is that design and fixing must allow replacement.

The use of hollow profiles requires that the edge which the seal abuts on is rounded to create a smooth face.

9.7.2 Finishing requirements

Weather seals between casements and frames must be fitted to the unit in a manner adapted to their design and construction in order to prevent exposure to damaging lateral forces when the casement is opened and closed.

The distance between casement and frame must be adapted to the mean compression value of the seals.

Seals must be fixed in a manner which ensures that operation of the unit does not change their position transversely or longitudinally.

Weather seal corner joints must be carried out in accordance with the supplier’s instructions.

If the seals are not positioned on the same wet line, contact between the wet lines must be ensured e.g. by overlapping or in some other way.

9.8 Hardware, hinges and fitting of hardware

9.8.1 Hardware and hinges

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

The window manufacturer should be informed about the hardware supplier's declared digit codes, cf. recognized product standards for use, wear and tear, weight, fire, safety, corrosion, resistance and friction.

To secure easy identification and description of the requirements which apply to a particular piece of hardware for windows and doors, a special coding is used which simplifies the communication of the required/supplied properties.

In the DS/EN 13126 series the code is constructed in the following way: See Annex 23

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. If there is reason to doubt the strength of the hardware or the way it is fixed, a test in accordance with EN 14608 may be required to prove its adequacy. As a minimum, the requirements of Class 2 under EN 13115 must be met.

A subsequent increase in the load to 600 N must not cause failure or breakage in hinges or hardware, their fixing or in casement corner joints.

Operating handles must have a strength and fixing adapted to their function and must be designed to avoid fingers getting caught during operation.

Fasteners must be designed and function so as to ensure correct tightening against the seals.

The fastener including strike plate etc. must 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 m^2, 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.

When in the closed position, opening casements or ventilation hatches must be secured at a minimum of 4 points including hinges. 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.

If the dimension of the casement at the closing side is less than 0.6 m, one fastening point will suffice in addition to the hinges.
Other fastening systems which provide all-year uniform weather tightness along all casement edges may be approved.

Pivot and top hung 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.

Hardware and screws made of non-corrosion resistant materials and which are fitted outside of the external face of the unit must be hot-galvanized or protected by other surface treatment to ensure resistance to Corrosion Class 4, cf. EN 1670. This can be documented through a salt spray testing in accordance with EN ISO 9227 for 240 hours. Test results may also be evaluated in accordance with EN ISO10289, and the rating achieved must be at least 5.

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 the items to a 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.

Hardware and screws inside the wet line must be made of a material or protected by a surface treatment which ensures resistance to Corrosion Class 2, cf. EN 1670. This can be documented by 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.

Hardware and its fixing screws located outside the wet line must be sufficiently compatible to prevent the formation of galvanic corrosion.

9.8.2 Fitting

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.

External doors for dwellings or buildings with a similar pattern of use must be equipped with at least 3 hinges and 3 fastening points at the locking side. The requirement for 3 fastening points does not apply to doors equipped with a door closer or an electric locking system. The tightness of a 1-point closing cannot be expected to be similar to that of a 3-point closing. This should be made clear to the customer.

Fewer hinges and fastening points may be allowed if it can be documented that retention, load bearing capacity and permanent sealing properties are not impaired.

For side hung windows with a casement width in excess of 70 cm hinges must be dimensioned and fixed as for doors.

Side-hung units where the size and/or design (e.g. casement with glazing bars) causes particular risk of problems with closing and weather tightness should have a riser/supporting block fitted to the sill at the closing side. In the case of diagonally stable casement and door leaves, a riser block may alternatively be fitted at the bottom of the frame at the hinge side.

At the jamb and head, the gap between the frame and the casement (clearance around the casement) must be adapted to the size of the window/door, the hardware system etc. It may be necessary to carry out adjustment when installing in the building, but the constructive design must be so that the gap is as uniform as possible on all four sides when seen from the inside.

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 must be no more than 2 mm in relation to the nominal gap.

Screws must fit the holes in the hardware, be firmly tightened and free from burrs which may cause cut fingers if touched.

The axis of the screw must not deviate by more than 10º from a plane perpendicular to the surface of the hardware, and the head of the screw must always be flush with or below the surface of the hardware.

Hardware grooves, if any, must be adapted to the geometrical shape and thickness of the hardware. Neither grooves nor penetrating holes must be made to the wall side of frame profiles.

If the fitting of a lock case etc. exceptionally requires drilling (machining) through to the glazing rebate, the access of condensation causing air must be prevented by tape or otherwise.
When fitting casement fasteners with a base plate, care must be taken to ensure sufficient friction around the eye to prevent unintentional misalignment of the casement fastener. This can be done e.g. by drilling a tight hole for the eye thread in the casement section.

When the fitting of hardware is completed, adjustable parts should, as a rule, be in neutral position.

9.9 Glass/panels and installation of glazing units

9.9.1 Glass and panels

Sealed glazing units must be manufactured to the EN 1279 series, and the manufacturer of the units must be affiliated to a certification scheme with external inspection approved by VinduesIndustrien.

The glazing unit manufacturer and certification scheme and associated certificate number must be stated on the website www.dvv.dk

The thermal performance of glazing units must be stated on the spacers of the glazing units as specified in the sections on thermal performance.

Moreover, the glazing unit manufacturer must have signed Annex 21: Glazing unit manufacturer – warranty declaration and be affiliated to the DVV warranty scheme or a similar scheme with the same coverage.

Individual panes of glass or edge constructions must not contain defects or impurities in the glass in excess of the criteria described or exceed the stated tolerances in Annex 20: Visual deviations in quality in insulated glass units. Tempered and laminated glass must not cause visual distortion according to current EN standards.

Panels require the use of materials which remain stable when exposed to humidity to ensure the panel construction remains permanently flush and tight. As regards surface finish, please consult the respective sections on materials.

The following applies to panels constructed from wood fibreboard:
The fibreboard material must meet or exceed all "Symbol H" requirements (use in humid conditions), cf. EN 316 and EN 622-5 for MDF fibreboards.

When machining the fibreboard material (moulding and profiling) all horizontal traces must have an outward slope of at least 7º.

All edges (also non-visible ones) resulting from grooving/moulding/profiling, must have their corners rounded to a minimum radius of 1.5 mm; this also applies where part of the original surface of the board has been cut away. See example in Annex 16.

Units incorporating wood fibreboard panels must always be supplied with a completed surface treatment. The surface treatment requirements also apply to surfaces and edges which are not visible after the panelled unit has been assembled.

Panels must be incorporated in the unit in a manner which ensures that moisture deformation of the panelling can be absorbed without causing damage.

Note:
MDF/HDF boards are dry process fibreboards.
MDF boards must have a density of at least 650 kg/m³ and HDF boards a density of at least 800 kg/m³.

Machining (moulding and profiling) will expose the main core of the board whose properties deviate negatively from the un-machined surface.

To prevent damage to board-based panels the board material, surface treatment and assembly system should be well documented.

9.9.2 Installation of glazing units

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

If the fitting method differs from these, a type approval must be obtained with the certification body. A type approval requires a description of the installation of glazing units with enclosed sectional drawing, a description of materials used stating manufacture and type, a compatibility declaration, if any, blocking, drainage and ventilation, glazing beads and their fitting.

Drawing and description must be signed by the window manufacturer and, on approval, they must also be signed by the glazing unit supplier and the DVV Technical Committee.

In connection with inspection visits, defects in the installation of the glazing unit are assessed according to Annex 8, point 9.9 or the type approval.

Rebates and glazing beads must be dimensioned so as to ensure that the spacer profile of insulated glass unit is covered.

Glued glazing units may be allowed, if standardized gluing methods are used. It must be ensured that the application method does not weaken the glazing unit edge seals. Furthermore, to ensure sufficient documentation of compatibility the window manufacturer and the IGU and glue supplier must have a written agreement about terms of responsibility. In order to document the compatibility of different materials (such as adhesives and edge seals), own tests can be used as supplements according to the test description as stated in Annex 27.

Drainage and ventilation
Provisions must be made to ensure that rain or condensation water quickly and efficiently can be drained/ventilated away to the exterior side.

The 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 and 5 x 15 mm. In cases where drainage is established by means of raised bottom glazing beads, the gap between glazing bead and its support must not be less than 2 mm.

Glazing beads
Glazing beads or other types of fixing must be dimensioned and fixed so as to ensure a uniform compression against the window across the entire contact area and so that movements in the unit do not reduce the retention of the window by the mounting material.

Note:
When installing glazing units, air permeability design must be ensured on the interior side, especially in systems where the units are installed using internal glazing beads.

Blocks and blocking
See Annex 19 or the current version of EN 12488.

Glazing tape and joint fillers
Joint fillers must be able to absorb movements caused by wind load, moisture, and variations in temperature without subsequent breakage or reductions in the performance of the seal against the glazing unit.

Applied joint fillers and fitting materials must have been tested and approved according to a recognized standard.
For glazing tapes the standard may be EN 12365-1, and for joint fillers it may be EN 15651-2. Alternatively, a MTK approval may be acceptable with the supplier's acceptance

Joint sealants used for fitting glazing units or for top or bottom sealing must not affect, disintegrate, or change the properties of the glazing unit edge seal.

The joint filler supplier’s instructions as to preparation, compression, lowest operating temperature, and other operating conditions must always be followed.

10. Annexes at a glance

Annex no.	Subject area:
1.	Minimum requirements as regards extent of information in brochures
2.	Product description (Data sheet example)
3.	Drawing and measurement example
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.	OC curve: Probability of critical defects being approved
10.	Requirements for the minimum proportion of heartwood
11.	Paradigm for the declaration of pine/larch
12.	Paradigm for the declaration of spruce
13.	Requirements for the checking and accuracy of measuring equipment
14.	Expected performance of industrial surface treatment of timber elements
15.	Insurance cover checklist
16.	Example of wood panels (fibreboard material)
17	Testing of finger-joints
18	Positive list – modified wood
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	Complaints guide concerning windows
23	Coding of hardware for doors and windows
24	Burglary prevention
25	Interpretation of definitions
26	Interior casements
27	Quantitative test method - Compatibility
28	Standards at a glance
29	Technical Requirements for DVV - current and previous editions

Annex 1:
Minimum requirements as regards extent of information in brochures, If published

		Example
1.1	Description/type	Side hung window
1.2	Function	Inward opening
1.3	Type of glazing unit	All types of 20-48 mm thickness
2.1	Module sizes M (M = 0,1 m)	Min.: 6 x 6 M, max.: 12 x 14 M. All sizes in between as per order
2.2	Manufacturing measurements w. x h.	As per order
2.3	Frame reveal measurements:	w. - 88 x h. - 88 mm
2.4	Frame depth:	116 mm
3.1	Hardware:	(Term for hinges and fasteners)
3.2	Fastening function:	Single-hand operation, 2 fastening points ... number of casement fasteners
3.3	Childproofing:	Standard/as per agreement
3.4	Burglary prevention:	Yes/No (if Yes, further description required)
4.1	Application of base coat:	Vacuum treatment/System 2ØKO
4.2	Surface treatment:	Opaque paint treatment (reference to Annex 14)
4.3	Maintenance:	Cf. User manual
5.1	Functional testing:	Yes/No (If Yes, state test method and class in accordance with EN 14351-1)

For each type, a vertical and horizontal cross-section is shown in an appropriate scale.

Annex 2:
Product description (Data sheet example)

Company name:	
Unit function and description:	
Material:	

Module size M. w. x h.

- Min.:
- Max.:
- Max. casement measurement:

Corner joints, jointed using:

- Adhesive - make and type:
- Welding - system:
- Corner plates - make and type:

Weather seals:

- Make and type:
- Fixing:
- Planned compression:

Hardware:

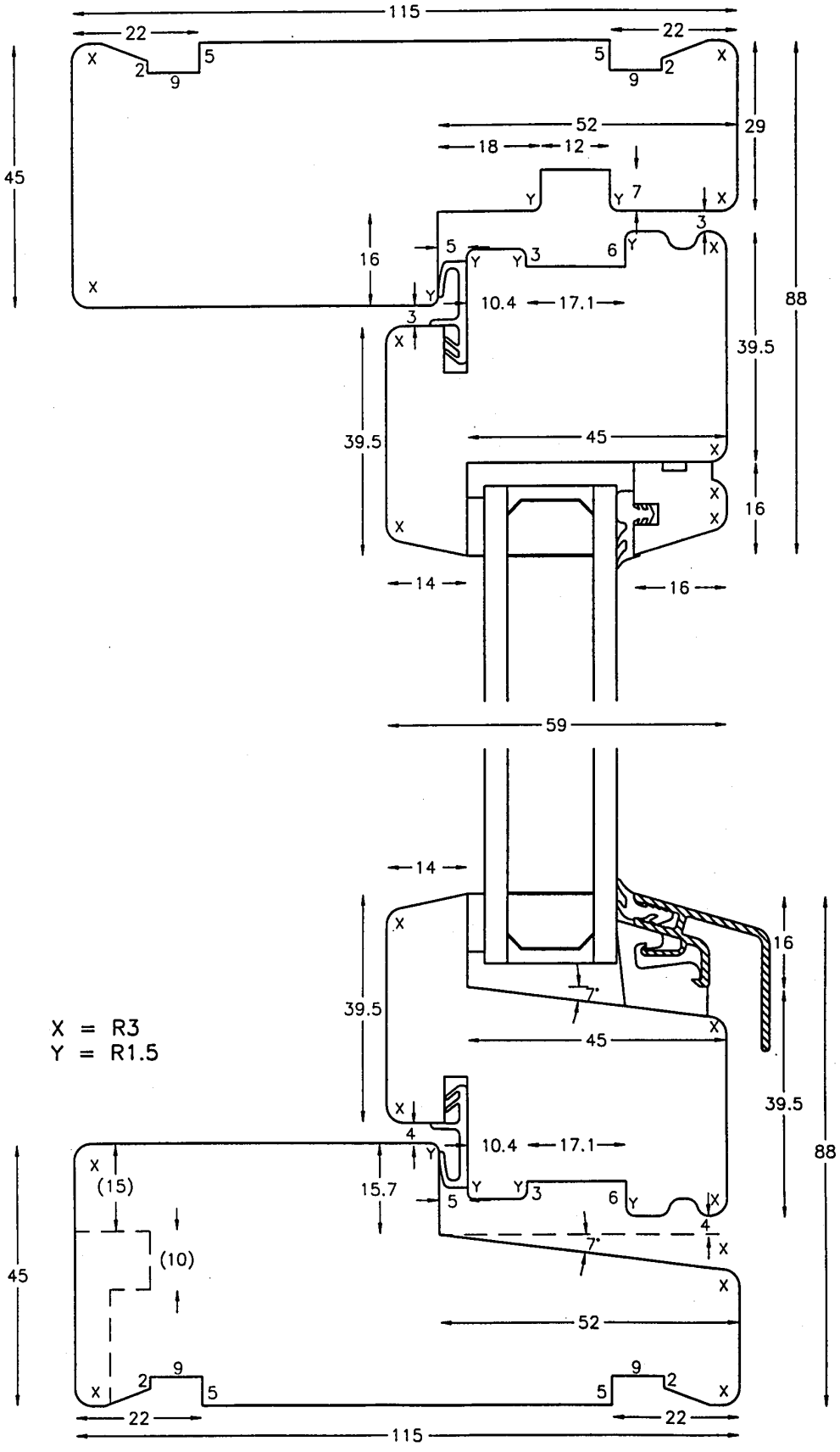
	Number	Location	Material and surface treatment
Hinges			
Operating handles			
Fastening points			
Fastening system			
Ventilation position Fixed ☐ Random ☐			Childproofing: Yes ☐ No ☐

Glazing units:
- Make and type:
- Installation system/materials:

Application of base coat:
- Method and type of solution:

Surface treatment:
- Method and product description

Annex 3: Drawing and measurement example



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 item (please tick)	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
A.	Do outer measurements agree with the order?										
B.	Do frame and casement measurements agree?										
C.	Is the gap between casement and frame correct and uniform?										
D.	Is the surface finish satisfactory?										
E.	Have edges been rounded off in accordance with the Technical Requirements?										
F.	Is the timber quality in accordance with the Technical Requirements?										
G.	Are all corner joints in casement and edges weathertight (jointed/sealed)?										
H.	Have glazing units been installed correctly and are they free from defects?										
I.	Have glazing beads been cut to the correct length, and are sealant tapes completely tight and correctly compressed?										
J.	Is the ventilation (drainage) below sealed glazing units correct?										
K.	Are joints in weather seals and sealant tapes tight and have they been fitted correctly?										
L.	Are the number of fastening points and the compression of weather seals as planned?										
M.	Have screws in hardware been tightened correctly?										
N.	Is timber moisture content 12 ± 3 %?										
O.	Has the unit been labelled in accordance with the Requirements?										
P.	Is the surface treatment, if any, in accordance with the Technical Requirements?										

If the answer to any of the questions is no, please write letter and description of remedial action here or on the reverse:

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 item (please tick)	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
A.	Do outer measurements agree with the order?										
B.	Do frame and casement measurements agree?										
C.	Is the casement fitted symmetrically in relation to the frame?										
D.	Are the profile surfaces satisfactory?										
E.	Are profiles properly aligned at corner joints ?										
F.	Have outward opening casement corners been rounded off correctly?										
G.	Are glazing bead corner joints and the fitting of beads by and large satisfactory?										
H.	Have glazing units been installed correctly and are they free from defects?										
I.	Are joints in weather seals and sealant tapes in order?										
J.	Are holes, if any, for installing the frame in the correct position?										
K.	Has reinforcement been inserted and secured as prescribed?										
L.	Are the number of fastening points and the compression of weather seals as planned?										
M.	Have screws in hardware been tightened correctly?										
N.	Is the drainage of casement and frame as planned?										
O.	Has the unit been labelled in accordance with the Requirements?										

If the answer to any of the questions is no, please write letter and description of remedial action here or on the reverse:

Date:	Signature:

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

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

	Inspection item (please tick)	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
A.	Do outer measurements agree with the order?										
B.	Do frame and casement measurements agree?										
C.	Is the casement fitted symmetrically in relation to the frame?										
D.	Are profile surfaces of uniform colour and free from scratches?										
E.	Are mitres and butt joints tight and flush at the surface?										
F.	Have outward opening casement corners been rounded off correctly?										
G.	Are glazing bead corner joints and the fitting of beads by and large satisfactory?										
H.	Have glazing units, if any, been installed correctly and are they free from defects?										
I.	Are joints in weather seals and sealant tapes in order?										
J.	Are holes, if any, for installing the frame in the correct position?										
K.	Can the fastening mechanism be operated reasonably effortlessly?										
L.	Are the number of fastening points and the compression of weather seals as planned?										
M.	Have screws in hardware been tightened correctly?										
N.	Are casement and frame drainage and the sealing of the inside of corners as planned?										
O.	Has the unit been labelled in accordance with the Requirements?										

If the answer to any of the questions is no, please write letter and description of remedial action here or on the reverse:

Date:	Signature:

Annex 7:
Form for use in in-house inspection of TIMBER /ALUMINIUM WINDOWS

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

	Inspection item (please tick)	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
A.	Do outer measurements agree with the order?										
B.	Do frame and casement measurements agree?										
C.	Is the gap between casement and frame correct and uniform?										
D.	Are profile surfaces of uniform colour and free from scratches?										
E.	Are mitres and butt joints tight and flush at the surface?										
F.	Are outward opening casement corners free from sharp edges?										
G.	Are glazing bead corner joints and the mounting of beads satisfactory?										
H.	Have glazing units been installed correctly and are they free from defects?										
I.	Have glazing beads been cut to the correct length, and are sealant tapes, if any, completely tight and correctly fitted?										
J.	Have frame/transoms been finished with drainage?										
K.	Are all joints in and the fixing of weather seals and glazing gaskets tight and in order?										
L.	Are the number of fastening points and the compression of weather seals as planned?										
M.	Have screws in hardware been tightened correctly?										
N.	Is timber moisture content 12 % ± 3?										
O.	Has the unit been labelled in accordance with the Requirements?										
P.	Is the surface treatment, if any, in accordance with the Technical Requirements?										

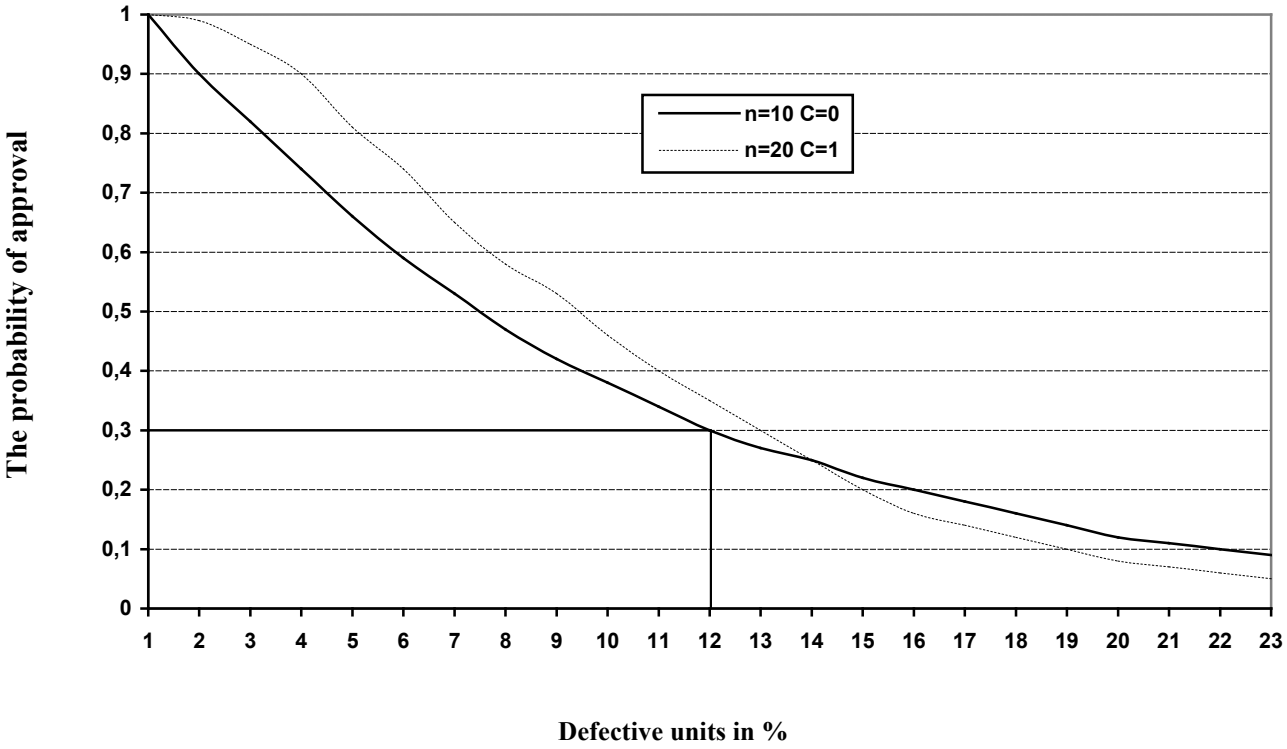
If the answer to any of the questions is no, please write letter and description of remedial action here or on the reverse:

Date:	Signature:

Annex 8: Recording and evaluation of samples

Annex 8 can be required independently from the secretariat.

Annex 9: OC Curve



The diagram illustrates the relationship between the quality of a sample and the probability of approval even if, statistically, the total batch contains defective units.

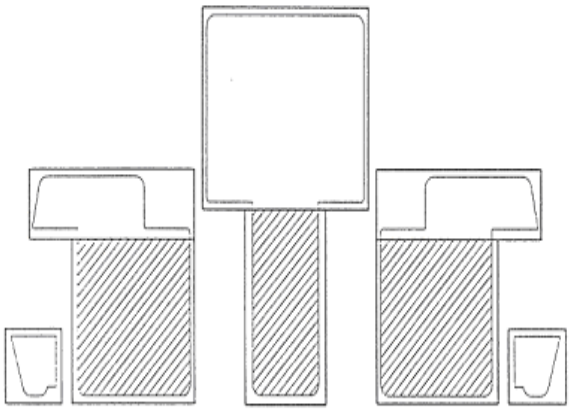
Example:

With a sample size of n=10 and a requirement of zero defective units in the sample (C=0), the diagram shows that if 12 % of the units (indicated on the horizontal axis) in the total batch are defective, there is only a 30 % probability (0.3 on the vertical axis) of the batch getting through the inspection undetected.

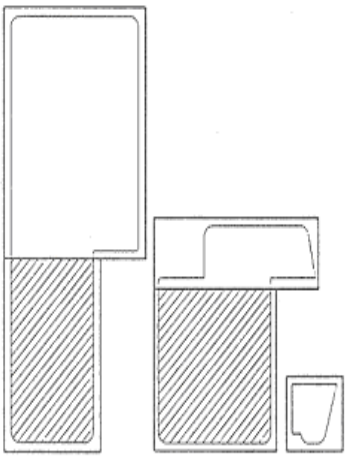
If only 2 % of the units in the batch are defective, there is a 90 % probability of approval. If on the other hand 20 % of the units in the batch are defective, there is less than 15 % probability of approval.

Annex 10:
Requirements for the minimum proportion of heartwood

Cross-sectional view - outward opening windows:



Cross-sectional view of mullion with casements



Cross-sectional view of jamb/head with casement

Note:

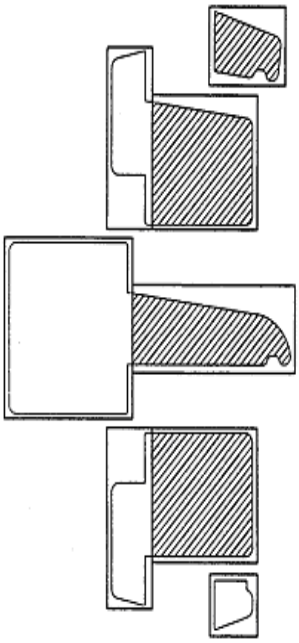
For laminated items ***each*** laminate in the hatched area must meet the requirement of min. 60 % heartwood.

Check beads and similar beads may be manufactured from declaration-covered pine not subject to heartwood proportion requirement.

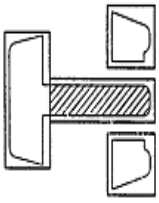
Declaration-covered pine with min. 60 % heartwood.

Declaration-covered pine not subject to heartwood requirements

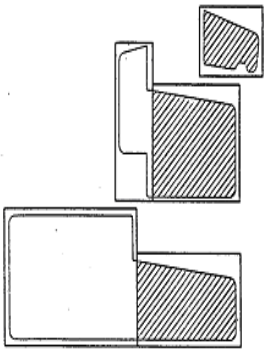
Cross-sectional view - outward opening windows:



Cross-sectional view of mullion and casements



Cross-sectional view of horizontal glazing bar



Cross-sectional view of sill and casement

Note:

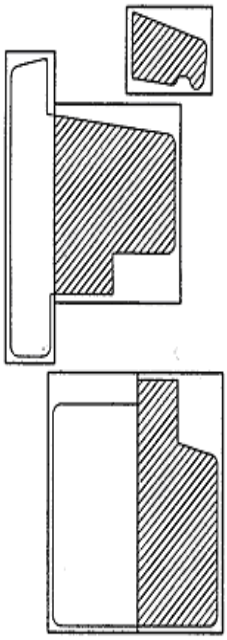
For laminated items ***each*** laminate in the hatched area must meet the requirement of min. 60 % heartwood.

Check beads and similar beads may be manufactured from declaration-covered pine not subject to heartwood proportion requirement.

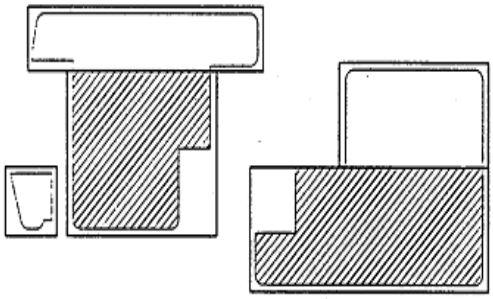
Declaration-covered pine with min. 60 % heartwood.

Declaration-covered pine not subject to heartwood requirements

Cross-sectional view - inward opening windows:



Cross-sectional view of sill and casement



Cross-sectional view of jamb/head and casement

Note:

For laminated items ***each*** laminate in the hatched area must meet the requirement of min. 60 % heartwood.

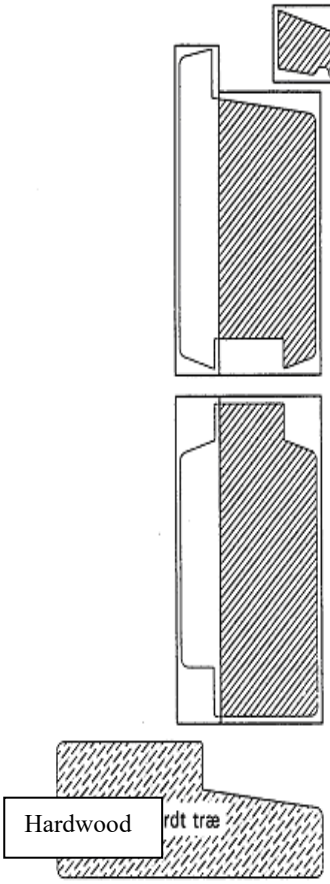
Check beads and similar beads may be manufactured from declaration-covered pine not subject to heartwood proportion requirement.

Declaration-covered pine with min. 60 % heartwood.

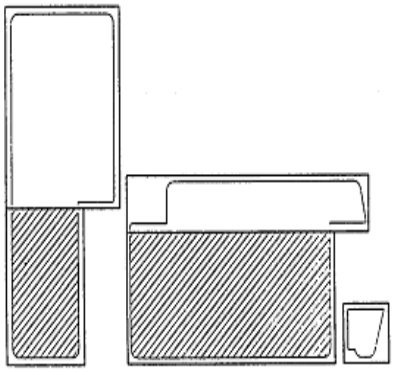
Declaration-covered pine not subject to heartwood requirements

Annex 10:
Requirements for the minimum proportion of heartwood

Cross-sectional view - outward opening doors:



Cross-sectional view of sill and casement



Cross-sectional view of jamb/ head and casement

Note:

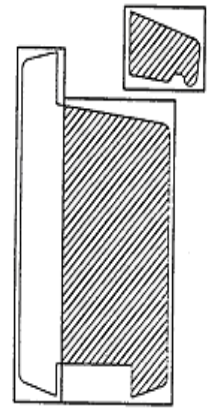
For laminated items ***each*** laminate in the hatched area must meet the requirement of min. 60 % heartwood.

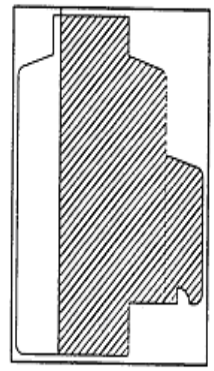
Declaration-covered pine with min. 60 % heartwood.

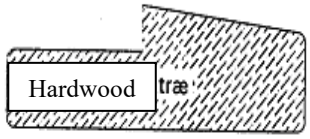
Check beads and similar beads may be manufactured from declaration-covered pine not subject to heartwood proportion requirement.

Declaration-covered pine not subject to heartwood requirements

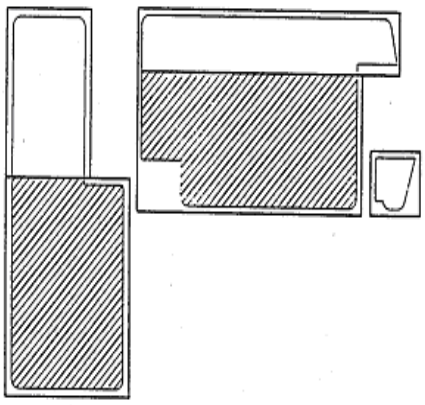
Cross-sectional view - inward opening doors:







Cross-sectional view of sill and casement



Cross-sectional view of jamb/ head and casement

Note:

For laminated items ***each*** laminate in the hatched area must meet the requirement of min. 60 % heartwood.

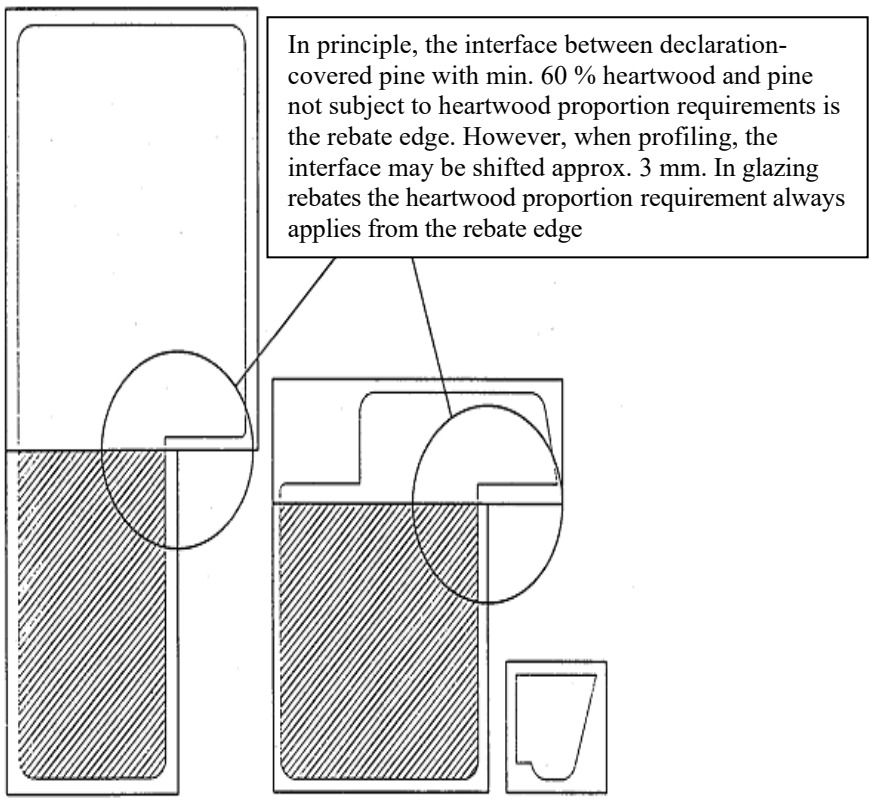
Declaration-covered pine with min. 60 % heartwood.

Check beads and similar beads may be manufactured from declaration-covered pine not subject to heartwood proportion requirement.

Declaration-covered pine not subject to heartwood requirements

Annex 10:
Requirements for the minimum proportion of heartwood

Cross-sectional view:



Note:

For laminated items ***each*** laminate in the hatched area must meet the requirement of min. 60 % heartwood.

Check beads and similar beads may be manufactured from declaration-covered pine not subject to heartwood proportion requirement.

Declaration-covered pine with min. 60 % heartwood.

Declaration-covered pine not subject to heartwood requirements

Annex 11:
Paradigm for the declaration of pine (European Redwood)/larch

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 the width of the annual rings is less than 4 mm	**
That 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.	
For treatment system 2ØKO	
That 80 % of the planks have a heartwood proportion in excess of 90 % cf. Annex 10 and point 5.3	**
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 point 5.3	**
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:	Signature:

Annex 12:
Paradigm for the declaration of spruce (European Whitewood)

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 the width of the annual rings is less than 4 mm	
That the density is above 450 kg/m³ at 12 % moisture content)	
That the wood has not been treated with a chemical preservative	

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

Company stamp:	Place and date:	Signature:

Annex 13:
Requirements for the checking and accuracy of measuring 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 certification 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
Calliper gauge:		
	0-150 mm	deviation 0.1 mm
90° angle:		
	At a length of 500 mm	deviation 0.5 mm
Protractor:		
		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 percent	deviation 0.5 moisture percent
	15-28 moisture percent	deviation 1 moisture percent
Mobile equipment for measuring the thickness of hardened surface treatment on a metal base:		
	0-25 µm	deviation 3µm
	25-200 µm	deviation 10µm

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 dependant 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 14:

Expected performance of industrial surface treatment of timber elements

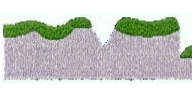
Companies certified in accordance with The Technical Requirements for DVV must complete a surface treatment of timber elements which meets or exceeds the following performance requirements:

(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 Classs*	Comments
Visible faces of closed element	DLGU**	III	Mean value of layer thickness > 60 µm (80 µm)
Visible faces of open element	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. Uneveness, 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 buds 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 15: Insurance cover checklist

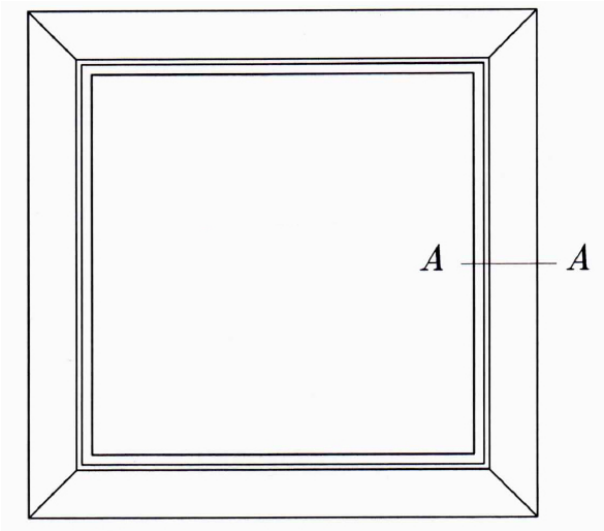
Certified companies must have commercial and product liability insurance as well as warranty insurance providing at least the following coverage. Please note that the checklist is a translation of extracts of the original insurance conditions in Danish. In case of dispute, the Danish original shall be considered final and conclusive.

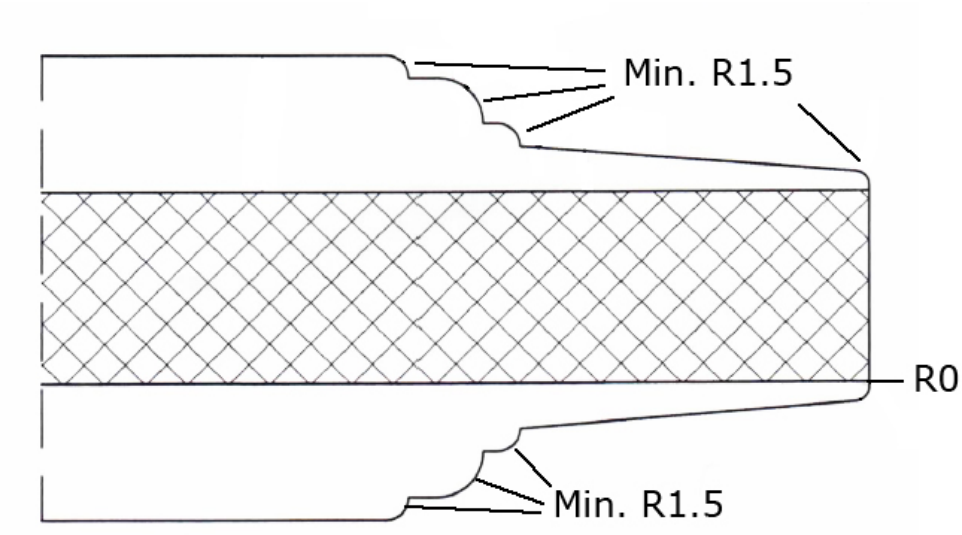
The insured	Name Address Postal code and town CVR (Central Business Register no.)		
Insured risk (it's important that the text corresponds to the activities of the company)	Manufacture of windows and doors in timber, PVCu, aluminium and FRP and/or a combination of these materials and related products and building activities.		
Summary of coverage (compulsory areas)	Commercial liability, product liability, risk avoidance, pollution liability, loss/damage caused by ingredients/components, treatment/processing, recall, warranty.		
Geographical area	Commercial and product liability – min. Denmark Product liability – min. Europe Please confer / note particularly: **Liability**		
Sums insured (minimum)	DKK	10,000,000	Per claim and year under commercial and product liability
	DKK	2,000,000	Per claim under pollution liability
	DKK	10,000,000	Per year for property damage caused by ingredients/components
	DKK	5,000,000	Per year for pecuniary or financial loss caused by ingredients/components
	DKK	5,000,000	Per year for treatment/processing
	DKK	1,000,000	Risk avoidance
	DKK	5,000,000	Recall
	DKK	1,000,000	Warranty, subject to a max. of DKK 200,000 per claim and a max. of DKK 10,000 per unit
Excess (maximum)	DKK	5,000	Any one claim under commercial liability
	DKK	10,000	Any one claim under product liability
	DKK	10,000	Any one claim under pollution liability
	DKK	10,000	Any one claim for damage/loss caused by ingredients/components
	DKK	5,000	Any one claim under risk avoidance costs
	DKK	25,000	Any one claim under recall cover
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.		
Care and 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 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 16: Panels made from wood fibreboard

Example of rounding of edges

SECTION A-A



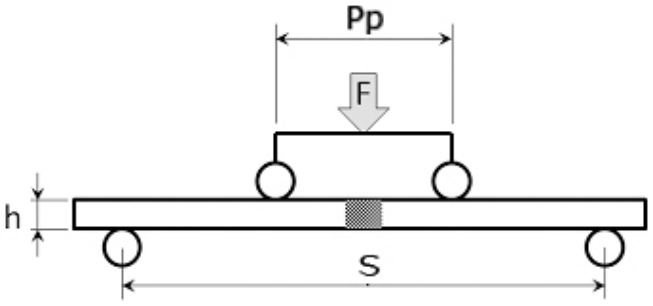


Annex 17: Testing of finger-joints

Requirements:
For requirements see DS/CEN/TS 13307-2 and DS/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 "S" have a spacing of 16 – 18 x the height, and the pressure points "Pp" have a spacing of 6 x the height.



The rolls at "S" and "Pp" 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 vertical towards the direction of 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 Pp = 150 mm and S = 450 mm, and a rate of max. 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 lack of equipment makes it is impossible to measure the strength, the wood failure percentage may in the alternative be estimated to be at least 90 %.

Calculation of tensile strength:

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

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

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

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

Testing date Week/year	**Sample width** mm	**Sample height** mm	**Requirement to P_{min}** N (kg)	**Registered failure load** N (kg)	**Wood failure** %

Annex 18: Positive list – modified wood

Approval number: 18.1

Trade name: Accoya®

Material: 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 for DVV/table 5.3.3 - Workpieces in hardwood

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

Surface treatment: As treatment system 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 guidance, you may 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 VinduesIndustrien Technical Committee on 15 June 2018.

Annex 18: Positive list – modified wood

Approval number: 18.2

Trade name: Kebony®Radiata

Material: 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 for DVV/table 5.3.3 - Workpieces in hardwood

Thermal performance: EN 12667 = 0.16 W/mK

Surface treatment: As treatment system 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, 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 guidance, you may see (Verband Fenster + Fassade) - VFF Guidance HO.06-4. 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 VinduesIndustrien Technical Committee on 8 February 2019.

Annex 19: Blocks and blocking of glazing units

Blocks and blocking

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.

The width of the blocks must be equivalalent to the thickness of the glazing unit + the guiding length.

The length must be at least 50 mm for glazing units less than 2 m² 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.

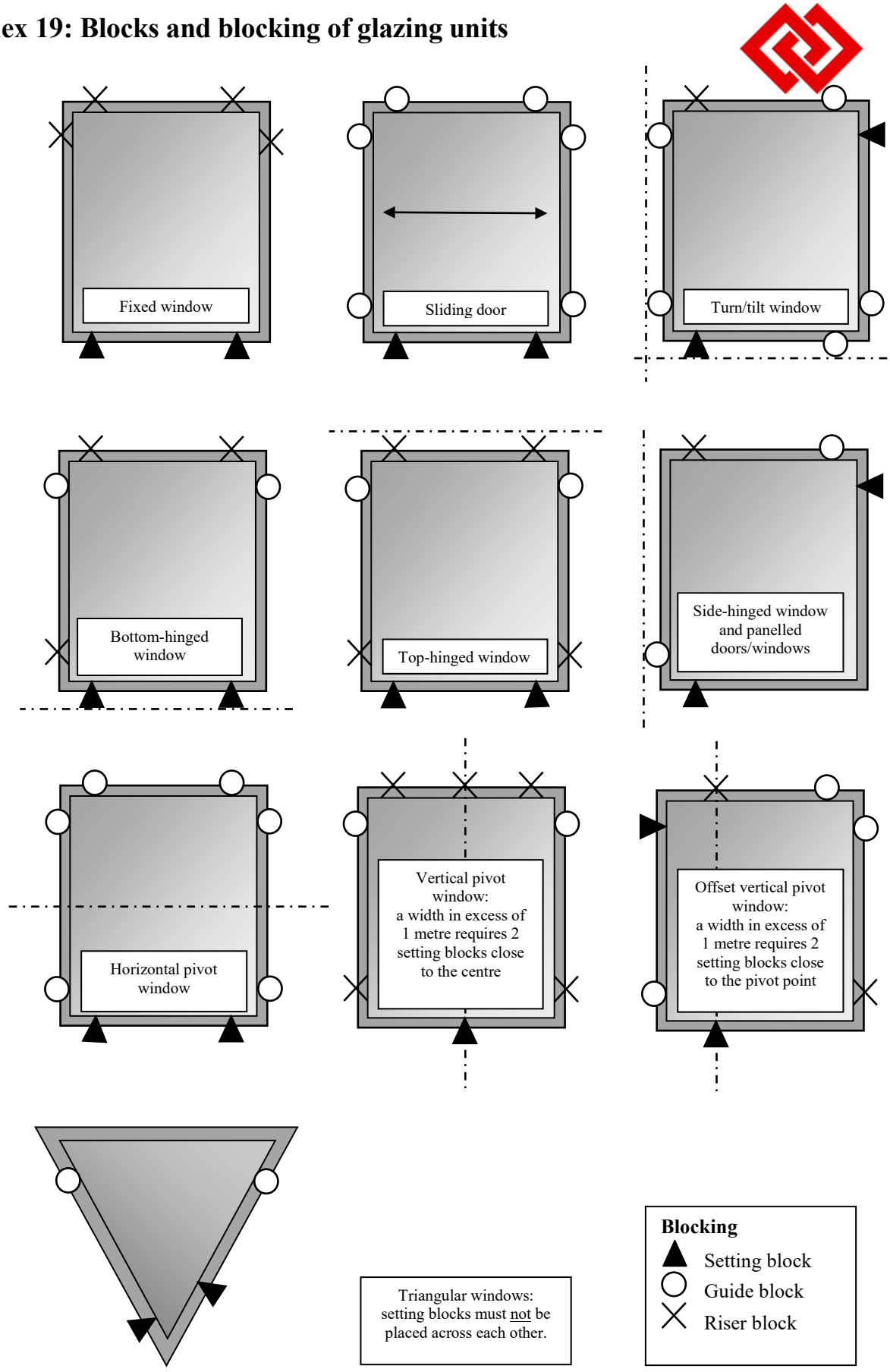
The min. gap between glazing unit and rebate is 4 mm.

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



Annex 20: Visual deviations in quality in insulated glass units

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 3).

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 1279-1/F.7 will be applicable.

Glazing units with coated glass
Coated glass may contain pinholes (small round spot with no coating) which is a phenomenon that may occur from manufacturing.
The assessment criteria for pinholes is shown in the table on p. 3.
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 parallism may appear in wire 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. The phenomenon appears in glass panes manufactured in floatglas due to the extremely good flatness of the glass.

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 strenghts 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 is 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.

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 alcaline washout of substances which get in contact with the glass surface.

Annex 20: Visual deviations in quality in insulated glass units

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 division in zones stated below.

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 m^2 max. 4 of <3 mm Ø. Pane area: >1 m^2 max. 1 of <3 mm Ø per running metre edge length. **Scratches:** Max. 30 mm x 2 mm per individual length. The sum of individual lengths max. 90 mm. **Hairline scratches:** No limit, however not piled up.	**Pinholes:** Ø 1 mm – 1.5 mm 5 pinholes/200 mm Ø >1.5 mm not permitted.
INNER ZONE	**Pores, spots, discolouration etc.:** Pane area: <1 m^2 max. 2 of <2 mm Ø. Pane area: >1 m^2 and <2 m^2 max. 3 of <2 mm Ø. Pane area: >2 m^2 max. 5 of <2 mm Ø. **Scratches and hairline scratches:** As for edge zone.	**Pinholes:** Ø 1 mm – 1.5 mm 2 pinholes/m^2 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.
	HEAT-TREATED GLASS	**COATED HEAT-TREATED GLASS**
EDGE ZONE AND INNER ZONE	Cf. EN 12150	Cf. box for coated glass.

Annex 21: Glazing unit manufacturer – Warranty

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 2.9 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 and dirt inside the glazing unit within the warranty period, or other defects which justify complaints, cf. Annex 20, the replacement table with compensation prices for VinduesIndustrien 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 outer doors and compliance with the rules of the sheme.

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. 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:

Annex 22: Complaints guide concerning windows

In general, it must be accepted that windows and external 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 standard "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 3 months after delivery.*

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 - The visual quality of insulated glass.*

Frame/casements:

- *Timber – Annex 14 - Expected performance of industrial surface treatment of timber elements*
- *PVCu – Section 6.3 Profile material and test requirements*
- *Alu – Section 7.5.1 Coating of aluminium and section 7.5.2 Anodizing of aluminium*
- *Composite – Section 9.6 Surface treatment*

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.

Supplier:
Name:
Address:
Postal code:
Telephone:

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

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

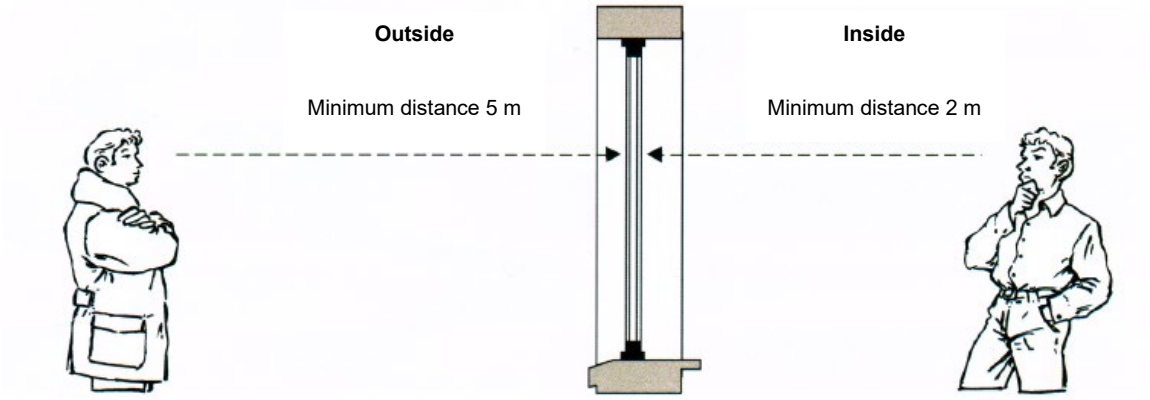
Text in spacer *(must be completed)*	***Width x Height***	***Profile width***

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 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 glass layers*	☐ *Inner zone*	☐ *Yes*	☐ *No*		
☐ *Other defects**	☐ *Inner zone*	☐ *Yes*	☐ *No*		
** Description of other defects:*					
Glazing units, which crack after the installation, and scratches on the outside are defects which do not qualify for a complaint towards the IGU manufacturer.		*Signature customer:* *Case no.*			
Form received	*Date:*	*Complaint approved:*	☐ *Yes*	☐ *No*	

Please note:

Assessment criteria for deviations in quality in insulated glass units, prepared by VinduesIndustrien:

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

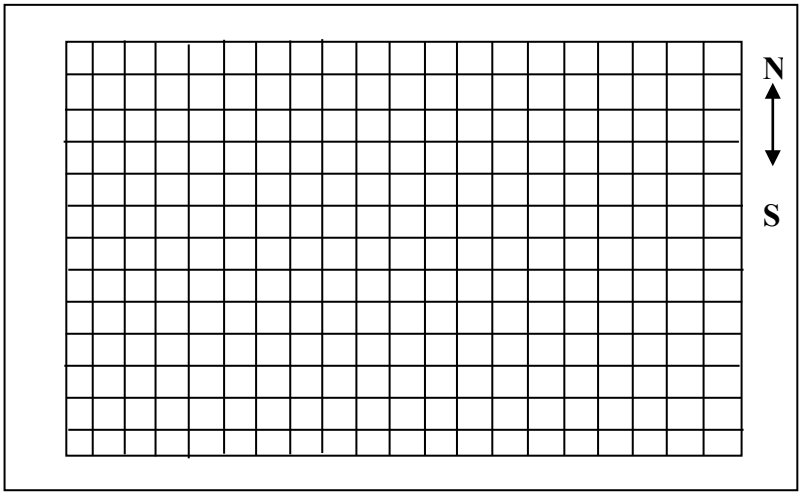
_____

_____

_____

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 23: Coding of hardware for doors and windows

To secure easy identification and description of the requirements which apply to a particular piece of hardware for windows and doors, a special coding is used which simplifies the communication between the manufacturers about the required/supplied properties.

(See chapters 5.1+6.1+7.1+8.1+9.1: Burglary prevention and Annex 26: Standards at a glance).

In the DS/EN 13126 series the code is constructed as below and shall be understood in the following way:

Code	Item	Description
1	Use	Used only in special situations if described in the individual standards. Normally declared with "**-**".
2	Durability	Declared with class for number of open/close cycles. For instance, "**3**" for 10,000 times, "**4**" for 15,000 times and "**5**" for 25,000 times.
3	Mass	The maximum allowable weight load on one piece of hardware. Declared with e.g. "**120**" for 120 kg or "**035**" for 35 kg.
4	Fire	Declared with "**0**" for no classification and "**1**" for classification.
5	Safety in use	Safety in use is described in the individual standards and is always declared with "**1**".
6	Corrosion	Corrosion class is declared according to DS/EN 1670 as class "**2**" to "**5**".
7	Resistance	Burglary resistance according to the classes in DS/EN 1906 and declared "**1**" to "**4**" or "**-**" for no test requirements.
8	Part no. in the standard	Denotes which part of this standard series is referred to. The number indicates the function of the hardware and is declared "**2**" to "**19**". See table on the next page.
9	Tested size	The size of the unit tested with the hardware, stated as W x H in mm, e.g. "**1200/2100**".

Example of a code: "**- 4 100 0 1 4 - 17 1200/2100**"
This means:
"*This hardware is a tilting/sliding piece of hardware (part 17), which has been tested in 15,000 open/close cycles on a door which measures 1.2 m in width and 2.1 m in height. The maximum load bearing capacity of each piece of hardware is 100 kg. The hardware must not be used on fire doors, but has corrosion class 4. And it cannot be tested for burglary resistance*".

Deviations from the 9 digit code:
Unfortunately, the system varies in a very few standards, and the differences are:

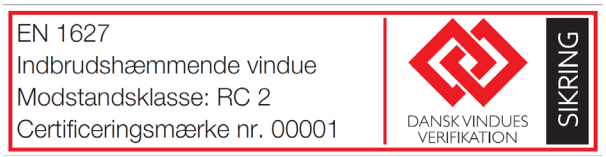
- The first 7 digits in the following 3 standards mean the same as in the DS/EN 13126 series!
- In the **8** digit code in **DS/EN 1906** and **DS/EN 1935** the last digit is used to describe the function of the hardware. The standard describes how.
- In the **9** digit code in **DS/EN 1527** the 8th digit is used to describe the category of the door/window, and the 9th digit describes the allowed starting friction.

Annex 24: 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 3 with glazing unit P5A	
Installation guide no.		
Drawing no.		

Data sheet/specifications:
Data sheet/product description as Annex 2. 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: Interpretation of definitions

Windows and curtain walling kits
(*Source: FAECF Guidance Sheet – FAECF MC (06) 13_REV.1:2006*)

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.

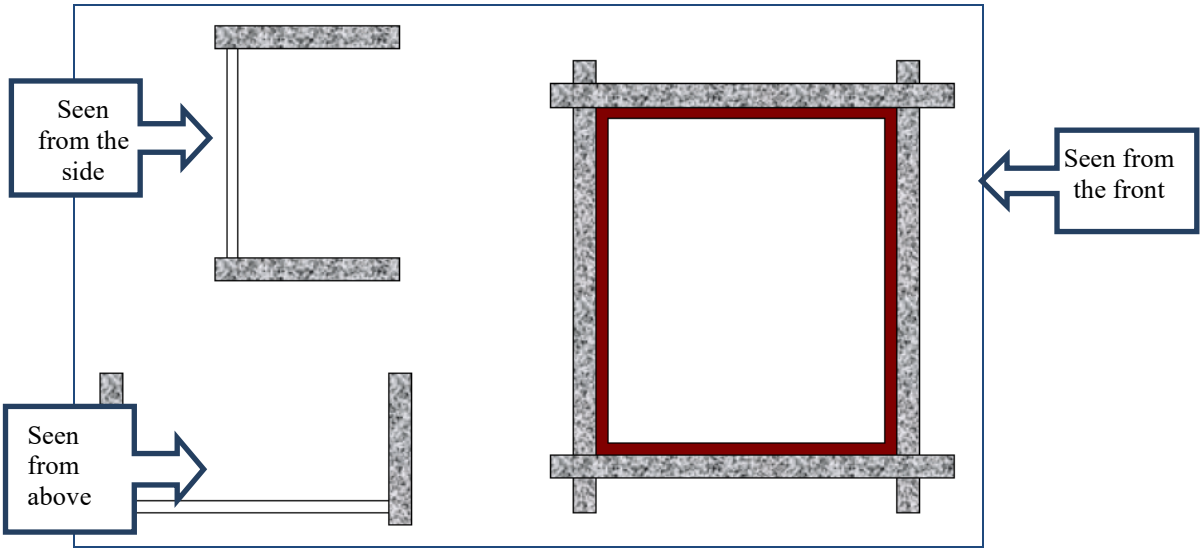


Figure 1: Window

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.

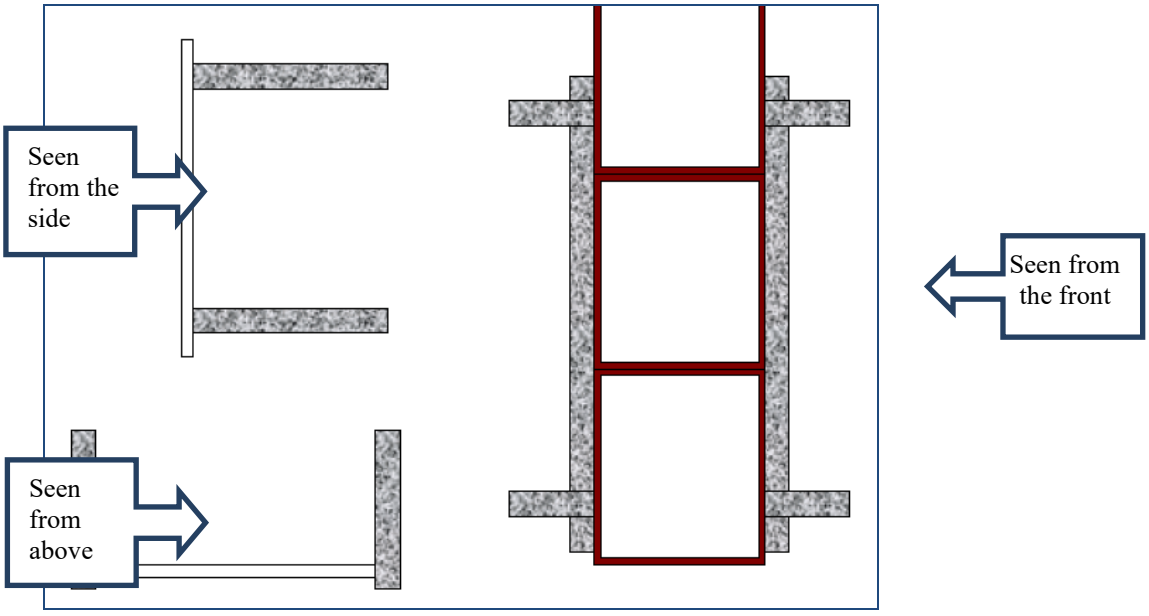


Figure 2: Vertical window band

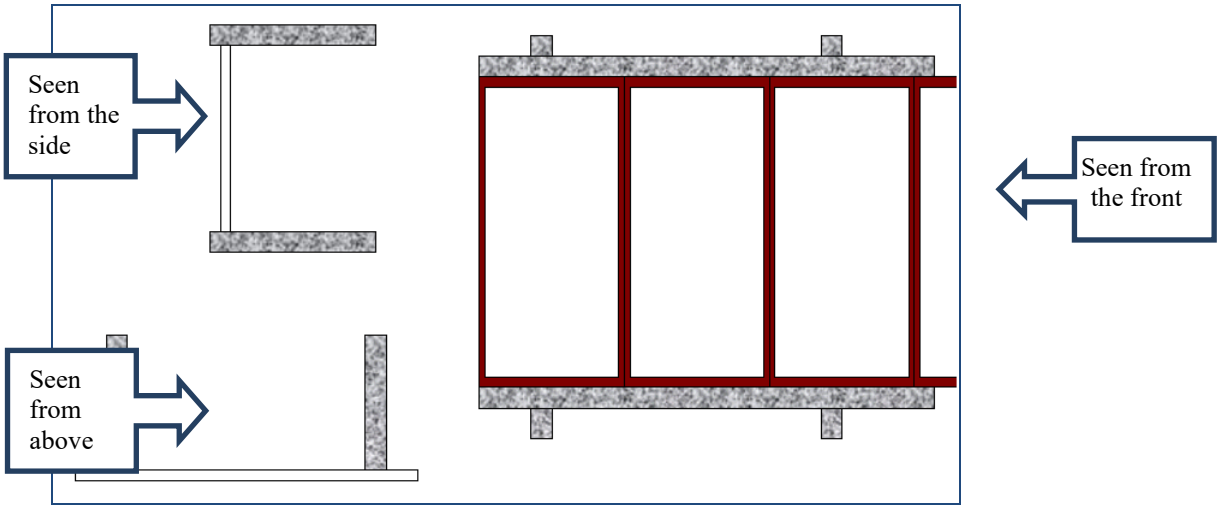


Figure 3: Horizontal window band

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.

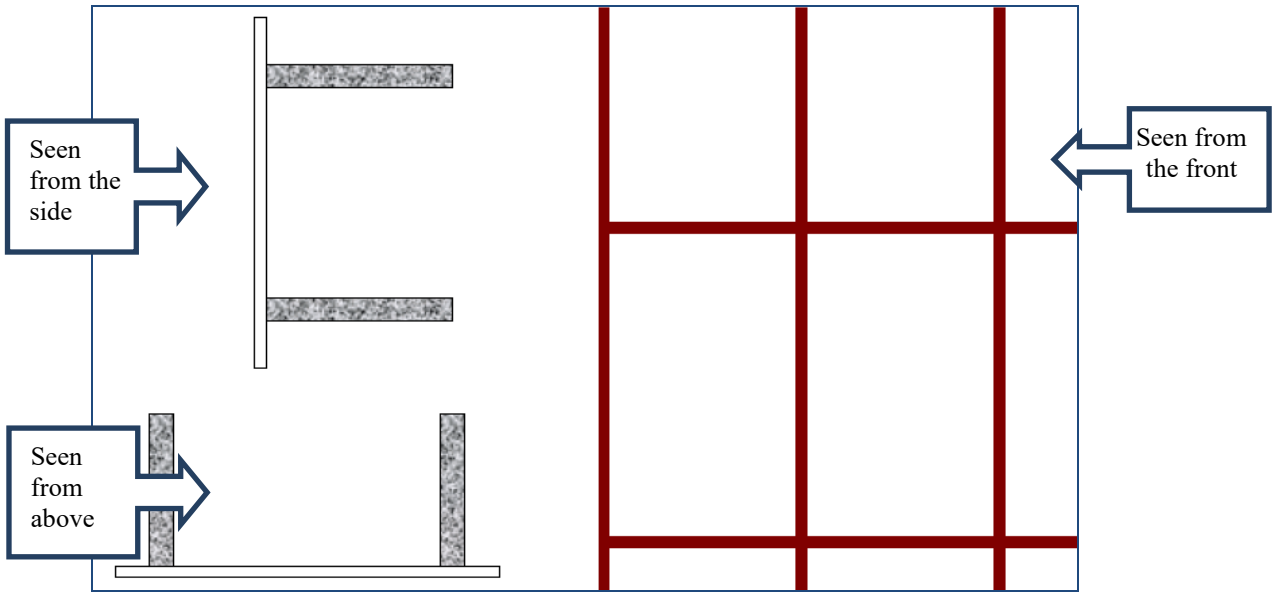


Figure 4: Curtain walling

Annex 26: Interior casements

Interior casements must be made in good craftsmanship quality and meet the requirements as stated under: Finishing, Edges and Joints

Painted surfaces on timber must be made as opaque, sealed, smooth and filled surfaces (DLGU), and the average layer thickness must exceed 80 µm. Other surfaces must be of at least the same quality as specified under the respective sections on materials.

To secure a uniform weather sealing there must be a suitable number of closing devices/fasteners, and the weather seals must be mitre cut.

An installation guidance must be prepared, including a description of the ventilation conditions between interior casements and existing windows.

Annex 27: Quantitative test method - compability

This test method can be used by manufacturers or laboratories to test the compatibility of adhesives and secondary seals of glazing units.

The method should be used as a supplementary test to, for example, products on the Fenzi list published by Fenzi or to a similar list/testing stating compatibility.

The method measures the potential loss or increase of mass which occurs in the secondary seal in glazing units when it comes into contact with adhesive.

The loss of mass is caused by components migrating from the secondary seal into the adhesive or from the adhesive into the secondary seal. This migration must be kept at as a low level as possible.

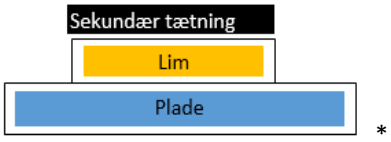
Materials:
Secondary sealing plate. Thickness as expected in the glazing unit.
Adhesive, non-hardened, in cartridge or other packaging
Plate which is able to transport moisture (wood, plasterboard, etc.)
Digital scales, with minimum 3 digits
Oven, 50 degrees Celsius

Procedure:
Cut the secondary seal into pieces, 3x3 cm. Weigh every single piece. Make a note of the weight.
Apply adhesive to the plate in a thickness corresponding to the thickness of the secondary sealing plate.
After 48 timer (the adhesive has hardened), cut the adhesive to match the secondary sealing piece of 3x3 cm.

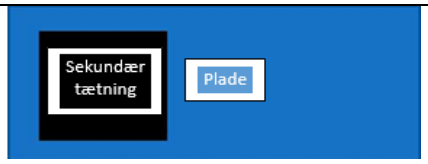
Store the plate with the samples in the oven for 8 days which means that the entire test takes 10 days; 2 days at room temperature + 8 days in the oven.

After oven storage, disengage the secondary sealing pieces and weigh them again. Register the loss or increase of mass in per cent according to the initial weights of the secondary sealing pieces.

If the adhesion between the adhesive and the secondary seal is too strong, the adhesive should harden on the surface before the secondary seal is placed on it.



*



Preparation of sample. Grey plasterboard, white adhesive and black secondary seal measuring 3x3 cm.

Cut away excessive adhesive after 48 hours at room temperature.

*Secondary seal
Adhesive
Plate

Annex 28: Standards at a glance

Page 1

The following table gives information about the 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	Determination of tensile shear strength of lap joints (Bestimmung der Klebfestigkeit von Längsklebungen im Zugversuch)
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. Part 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	Part 1-5: Glass in building - Insulated 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

Annex 28: Standards at a glance

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Standard no.:	Concerning:
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	Part 1-4: Building hardware. Gasket and weatherstripping for doors, windows, shutters and curtain walling
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 Part 1,2,3
EN 14080	Trækonstruktioner - Limtræ og limet konstruktionstræ - Krav
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. 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	Part 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	Plastic window profiles
SS 232740	Wood products - Sawn and planed wood of coniferous wood - Moisture content
prEN 12488	Rules for vertical mounting of panes

Annex 28: Standards at a glance

Page 3
The following standards apply to hardware for windows and doors

Standard	Titel (DK)	Side i TB	Talkode Se bilag 23
DS/EN 1527:2013	Building hardware: Hardware for sliding doors and folding doors – Requirements and test methods	Annex 23	9
DS/EN 1906:2012	Building hardware: Lever handles and knob furniture - Requirements and test methods		8
DS/EN 1935:2002 +/AC:2004 (CE)	Building hardware: Single-axis hinges - Requirements and test methods (awaiting DSF/ FprEN 1935:2013)		8
DS/EN 13126-1:2012	Building hardware: Hardware for windows and door height windows - Requirements and test methods - Part 1: Requirements common to all types of hardware		9
DS/EN 13126-2:2011	Building hardware: Requirements and test methods for windows and doors height windows – Part 2: Window fastener handles		9
DS/EN 13126-3:2012	Building hardware: Hardware for windows and door height windows - Requirements and test methods - Part 3: Handles, primarily for tilt&turn, tilt-first and turn-only hardware		9
DS/EN 13126-4:2009	Building hardware: Requirements and test methods for windows and doors height windows – Part 4: Espagnolettes		9
DS/EN 13126-5:2012	Building hardware: Hardware for windows and door height windows - Requirements and test methods - Part 5: Devices that restrict the opening of windows and door height windows		9
DS/EN 13126-6:2009	Building hardware: Requirements and test methods for windows and doors height windows – Part 6: Variable geometry stay hinges (with or without a friction stay)		9
DS/EN 13126-7:2007	Building hardware: Hardware for windows and door height windows - Requirements and test methods - Part 7: Finger catches		9
DS/EN 13126-8:2006	Building hardware: Hardware for windows and door height windows - Requirements and test methods - Part 8: Tilt&turn, tilt-first and turn-only hardware		9
DS/EN 13126-9:2013	Building hardware: Hardware for windows and door height windows - Requirements and test methods - Part 9: Hardware for horizontal and vertical pivot windows		9
DS/EN 13126-10:2009	Building hardware: Requirements and test methods for windows and doors height windows – Part 10: Arm-balancing systems		9
DS/EN 13126-11:2009	Building hardware: Requirements and test methods for windows and doors height windows – Part 11: Top hung projecting reversible hardware		9
DS/EN 13126-12:2009	Building hardware: Requirements and test methods for windows and doors height windows - Requirements and test methods – Part 12: Side hung projecting reversible hardware		9
DS/EN 13126-13:2012	Building hardware: Hardware for windows and balcony doors - Part 13: Requirements and test methods - Sash balances		9
DS/EN 13126-14:2012	Building hardware: Hardware for windows and balcony doors – Requirements and test methods – Part 14: Sash fasteners		9
DS/EN 13126-15:2008	Building hardware: Hardware for windows and door height windows - Requirements and test methods - Part 15: Rollers for horizontal sliding and sliding folding windows and doors		9
DS/EN 13126-16:2008	Building hardware: Hardware for windows and door height windows - Requirements and test methods - Part 16: Hardware for lift&slide windows and doors		9
DS/EN 13126-17:2008	Building hardware: Hardware for windows and door height windows - Requirements and test methods - Part 17: Hardware for tilt&slide windows and doors		9
DS/EN 13126-18	*Does not exist*		
DS/EN 13126-19:2011	Building hardware: Requirements and test methods for windows and doors height windows – Part 19: Sliding closing devices		9

Annex 29:
Technical Requirements - current and previous editions

1. Edition – August 1993
2. Edition – December 1993
3. Edition – June 1995
4. Edition – June 1996
5. Edition - October 1999
    - appendix 1 – May 2001
    - appendix 2 – May 2002
    - appendix 3 – May 2003
6. Edition – May 2005
6. Edition, 1. rev. – July 2005
6. Edition, 2. rev. – May 2006
6. Edition, 3. rev. – 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
- TR for DVV, 7th Edition, Rev. 4 – 2013
- TR for DVV, 7th Edition, Rev. 5 – January 2016
- TR for DVV, 7th Edition, Rev. 6 – January 2017
- TR for DVV, 7th Edition, Rev. 7 – January 2018
- TR for DVV, 7th Edition, Rev. 8 – October 2020

Annex A:

Technical Requirements for Dansk Rude Verifikation, DRV – Danish IGU Verification

1st Edition, May 2012 (to be ordered separately).

1st Edition, Rev. 2 – January 2017 (to be ordered separately).
(Deleted with Technical Requirements for DVV, 7th Edition, Rev. 8 – October 2020)

Correction instructions:
Correction instructions no. 1 of 4 March 2019 (included in Technical Requirements for DVV, 7th Edition, Rev. 8 – October 2020)

Correction instructions no. 2 of 9 September 2019 (included in Technical Requirements for DVV, 7th Edition, Rev. 8 – October 2020)