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KOMO-AG 0823

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**ASSESSMENT GUIDELINE
FOR THE KOMO PRODUCT CERTIFICATE FOR
TIMBER SPECIES FOR USE IN JOINERY AND FACADE CLADDING**

Adopted by the Board of Experts SKH dated 15-09-2022

Accepted by the KOMO quality and testing committee dated 28-10-2022



Foreword

This KOMO Assessment Guideline (AG) has been drawn up in collaboration with the guidance committee "Timber species for application in facade joinery (frames, windows and doors) and facade cladding". The AG was adopted by SKH's Board of Experts, in which interested parties in the field of this AG are represented. This Board also supervises the implementation of certification on the basis of this AG and adjusts it if necessary. Where this AG refers to the "Board of Experts" or BoE, this means the above-mentioned board.

This AG will be used by certification bodies, which have a licence agreement for this purpose with the KOMO Foundation, in conjunction with their established procedures for certification. This AG specifies the requirements to be met by an applicant for or holder of a KOMO product certificate and the manner in which this is assessed by the certification body. Its laid down certification procedures lay down the working method used by the certification body when carrying out:

- The examination for the granting and renewal of a KOMO product certificate based on this AG
- Periodic assessments for the purpose of maintaining a KOMO product certificate issued on the basis of this AG

In case of doubt the Dutch version is decisive.

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Table of contents

Foreword	2
1. Introduction, general provisions and general requirements	5
1.1 Introduction.....	5
1.2 Subject matter and scope	5
1.3 Validity	5
1.4 Relationship with laws and regulations	5
1.4.1 European Construction Products Regulation (CPR, EU 305/2011)	5
1.5 Requirements for conformity assessment institutions.....	6
1.6 KOMO product certificate	6
1.7 Marks and indications.....	7
2. Terminology.....	8
3. Requirements for products and/or materials to be processed	9
4. Requirements for the product.....	10
4.1 Timber description and batch testing	10
4.2 Volumetric mass.....	11
4.3 Dimensional stability and application moisture content	11
4.4 Calibration lines for wood moisture content measurements	13
4.5 Hardness	15
4.6 Strength class.....	15
4.7 Sustainability	16
4.8 Water intake and release	17
4.9 Glueability.....	18
4.10 Finishability.....	19
4.11 Insulation value	19
4.12 Break-in resistance.....	20
4.13 Conditions of application/use and processing instructions	20
5. Quality system requirements.....	21
5.1 General.....	21
5.2 Quality system.....	21
5.2.1 Quality manual.....	21
5.2.2 General requirements internal quality control	21
5.2.3 Quality system manager.....	21
5.2.4 Management of documents and records.....	22
5.2.5 Control of measuring equipment	22
5.2.6 Measures in the case of non-matching products	22
5.2.7 Complaint handling.....	22
6. External conformity assessments	23
6.1 General.....	23
6.2 Admission survey	23
6.3 Nature and frequency of periodic reviews.....	23
6.4 Sampling	24
6.5 Verification wood type based on an outdoor exhibit	24
6.6 Shortcomings	25
6.6.1 Weighting of deficiencies.....	25
6.6.2 Follow-up of deficiencies	25
6.6.3 Sanction procedure	26
6.7 Suspension of product certificate	26
7. Requirements for the certification body.....	27
7.1 General.....	27
7.2 Certification staff.....	27
7.2.1 Competence criteria certification staff	27
7.2.2 Qualification of certifying staff	27
7.3 Report admission examination and periodic reviews	27
7.4 Decisions on KOMO product certificate	28
7.5 Reporting to the Board of Experts.....	28
7.6 Interpretation of requirements	28



8.	Documents list.....	29
8.1	Public law regulations.....	29
8.2	Normative documents	29
8.3	Information documents.....	30



1. Introduction, general provisions and general requirements

1.1 Introduction

Based on the requirements in this KOMO Assessment Guideline (AG), a KOMO product certificate is issued for timber species suitable for facade joinery work (window frames, windows and doors) and facade cladding. With this product certificate, the certificate holder can demonstrate to his customers that an expert independent organisation supervises the certificate holder's production process, the quality of the product and the quality assurance relating to it. As a result, it may be assumed that the product possesses the characteristics laid down in this AG.

The requirements laid down in this AG shall be used by the certification bodies accredited for this purpose by the Council for Accreditation, or which have submitted an application for this purpose, and which have a licence agreement for this purpose with the KOMO Foundation, when handling an application for the issue and maintenance of a KOMO product certificate for "Timber species for joinery (frames, windows and doors) and facade cladding".

In addition to the requirements laid down in this AG, the certification bodies set additional requirements in terms of general procedural requirements for certification, as laid down in their internal certification procedures.

1.2 Subject matter and scope

This assessment guideline covers timber species intended for use in facade joinery (frames, windows and doors) or cladding*.

The assessment guideline sets out the requirements to be met by timber types and how this is to be assessed. The product certificates to be issued relate only to the product timber supplied as finger-joined, laminated or calibrated (planed to size) timber.

Remark:

Modified timbers are covered by AG 0605 "Modified timber".

**The requirements for timber for cladding will be added to this AG at a later stage.*

1.3 Validity

The period of validity of the KOMO product certificate is unlimited. The period of validity may be limited (terminated) by, inter alia:

- An amendment to this assessment guideline,
- Failure of the certificate holder to meet its obligations.

1.4 Relationship with laws and regulations

1.4.1 European Construction Products Regulation (CPR, EU 305/2011)

No harmonised European standard applies to the products covered by this AG.

1.4.2 Renewable or recycled content of the KOMO-certified product (optional)

Additional certification renewable and/or recycled content of the KOMO-certified product based on AG 7010.

"When new raw materials are needed, sustainably produced, renewable (inexhaustible) and widely available raw materials are used as much as possible. Such as biomass, which is feedstock from plants, trees and food waste. This makes the Netherlands less dependent on fossil resources and it is better for the environment." (source: <https://www.rijksoverheid.nl/onderwerpen/circulaire-economie/nederland-circulair-in-2050>).



It is possible to have the content of renewable and/or recycled raw materials in products certified on the basis of this AG independently determined by the certification body. The certification body uses AG 7010 for this purpose. The procedure results in a supplementary statement to the existing KOMO (attest-with-) product certificate, after which the products in question may be supplied with a supplementary certification mark. The full procedure is included in AG 7010 and summarised here:

Limit values

To determine the renewable or recycled content of the KOMO-certified product, AG 7010 'Renewable or recycled content of the KOMO-certified product' should be followed. Depending on the percentage of renewable or recycled content, the product is classified in a certain class. This is explained in more detail in AG 7010.

Admission survey

During the admission test, the proportion of renewable raw material or recycled content of the product is determined by the certification body in accordance with the determination method from AG 7010. Based on the result, the product is classified in a corresponding class. Different products can thus be classified in different classes.

KOMO product certificate

The KOMO product certificate shall include an appendix, in which for each product the renewable/recycled content class in which that product is classified shall be included.

Periodic monitoring

During the regular periodic inspection, it is checked whether the product is unchanged and still classified in the same class. Once every five years, a new sample of the certified product is taken and retested if the renewable/recycled content was also determined by a test during the initial authorisation.

1.5 Requirements for conformity assessment institutions

With regard to the requirements included in this assessment guideline, the applicant can, within the framework of external control, submit reports from conformity assessment bodies to demonstrate compliance with the requirements of this AG. It will have to be demonstrated that the relevant inspection, analysis, test and/or evaluation reports have been drawn up by an institution that complies with the relevant applicable accreditation standard for the subject in question, viz:

- NEN-EN-ISO/IEC 17020 for inspection bodies
- NEN-EN-ISO/IEC 17021-1 for institutions certifying management systems
- NEN-EN-ISO/IEC 17025 for laboratories
- NEN-EN-ISO/IEC 17065 for institutions certifying products, processes and services

A body is deemed to meet these criteria when an accreditation certificate for the subject matter in question can be presented, issued by the Council for Accreditation (RvA) or another accreditation body accepted as a member of a multilateral agreement on the mutual recognition and acceptance of accreditation established within EA, IAF and ILAC. If no accreditation certificate can be presented, the certification body itself will assess whether the accreditation criteria have been met.

1.6 KOMO product certificate

KOMO product certificates are issued on the basis of this assessment directive. The statements in these product certificates are based on chapters 4 and 5 and optional section 1.4.2 of this AG, which also indicate which aspects are included in the product certificate for each type of product.



The product certificate may specify the following uses:

- Timber species for application in joinery; in accordance with chapters 4 and 5
- Wood species for use in cladding; to be specified.

The product certificate to be issued shall correspond to the model product certificate as published for this version of the AG on the KOMO website (www.komo.nl).

1.7 Marks and indications

For each batch of timber delivered under certificate, a written specification (delivery documents or delivery voucher) shall be provided to the customer stating per order line::

- The KOMO logo/word mark followed by the certificate number without version indication.
- Name of certificate holder
- Application:
 - BGVT (for application in joinery)
 - GEV (for use in facade cladding)

The implementation of the KOMO logo is as follows:



The implementation of the KOMO word mark is as follows:

KOMO®

In addition, a QR mark referring to the details of the relevant KOMO product certificate on the KOMO website may be affixed.

Once the KOMO product certificate has been issued, this KOMO logo/KOMO word mark may also be used by the certificate holder in his public statements relating to his certified activities as stated in the "Regulations for the use of the KOMO logo" published on the KOMO website.



2. Terminology

For an explanation of the terminology used for certification in this KOMO assessment guideline, see the glossary on the KOMO Foundation website (www.komo.nl).

For terms and definitions relating to timber, reference is made to the terms mentioned in NEN 5461 and the Wood Vademecum.

Facade joinery (wooden) frame, windows and doors in accordance with AG 0801.

Façade cladding (wooden) sections for application to the outer layer of the façade in accordance with AG 4103

ATIBT Association Technique Internationale des Bois Tropicaux

IAWA International Association of Wood Anatomists



3. Requirements for products and/or materials to be processed

For the purposes of this assessment guideline, there are no requirements for the application of raw materials, materials and products.

Note: AG 0823 concerns an assessment guideline for the certification of a (natural) raw material in which, in the context of product certification for the intended application, specific product properties are stipulated for the timber species (see chapter 4 for this).



4. Product requirements

This chapter includes the requirements that the properties of the wood species must meet or information about which must be supplied, and the determination methods to determine that the requirements are met. Where necessary or possible, limit values are set.

4.1 Wood description and lot inspection

Limit value

A timber species must be characterised so that processors are able to check their input material for the correctness of the delivered timber species. The origin (country and regional growing area), trade name (according to NEN-EN 13556, Timber Vademecum or otherwise according to ATIBT) and botanical name (at least genus name, preferably also species name, indicate whether multiple botanical species occur within trade name) shall be indicated and the timber species shall be described.

Determination method

At least 30 planed parts should be available, proven to be from at least 3 different batches if possible.

The sample material shall have a minimum size of 80 x 120 x 2,000 mm (approx. 0.5 m³). Parts with smaller wood dimensions up to 40 x 80 x 2,000 mm are permitted, however, in this case the double number of parts (= 60 parts) should be supplied. Without further stipulation, the heartwood is tested. Any transitional wood shall be tested separately. If the sapwood can no longer be distinguished from the heartwood after drying (as is the case with spruce), it shall be ensured that only heartwood is tested. This can be done by indicating the sapwood-core boundary before drying.

A description of the wood colour, texture and structure shall be made on the basis of the appearance of the 30 planed parts and at least two representative photographs shall be taken of at least 50 cm² of a planed and quartered surface. If the wood discolours within a few days after planing, this should be documented. The magnifying characteristics of the end face shall be described on the basis of one sample and illustrated with a photograph (wood surface of 6 x 6 mm). The wood supplied shall be a representative qualified lot. If the lot is not homogeneous, the sample material shall be divided into homogeneous lots which shall be examined separately.

The anatomical structure is described for at least two sections. Head, radial and tangential cuts with a thickness of about 20 µm are cut. These sections are microscopically viewed and described according to the international standard IAWA "List of microscopic features for hardwood identification" and illustrated with at least one photograph of both the head, radial and tangential surfaces.

Admission examination and periodic review

During the initial inspection, the certification body assesses whether the specified requirements are met. During the periodical inspection, a visual assessment is made of whether the description and the timber quality, as described in SKH publication 99-05 tables 1, 2 and 3 (reaction wood, grain progression, content substances, resin pockets, lime, biological infestations, (fungi, insects), knots (size, number), intergrown bark, dark streaks, cracks and presence of heart, sapwood (visible and not visible), heartwood and transitional wood), of the certified timber species are complied with.

Product certificate

The KOMO product certificate gives a description of the certified timber species(s) and quality.



4.2 Volumetric mass

There is no requirement for the average volumetric mass, but because many properties have an important relationship with the volumetric mass, a limited spread in the volumetric mass is important. For this reason, limits are set on the upper and lower values.

Limit value

The minimum and maximum volumetric masses may not differ from the average volumetric mass by more than 25%.

Determination method

The average density is determined according to ISO 13061-2, at the application moisture content corresponding to a climate of $65\% \pm 5\%$ RH measured at 20 ± 2 °C.

Admission examination and periodic review

During the initial inspection, the certification body assesses whether the specified requirements are met. During the periodic inspection, it assesses whether the density of the timber corresponds to the value stated in the certificate.

Product certificate

The KOMO product certificate states the density in kg/m^3 with a lower and upper limit at an equilibrium moisture content corresponding to $65\% \pm 5\%$ RH at 20 ± 2 °C.

4.3 Dimensional stability and application moisture content

Limit value

Application moisture content

The application moisture content for window frames, windows and doors shall be determined at a climate of $65\% \pm 5\%$ RH, 20 ± 2 °C after which on application the wood moisture content shall correspond to the application moisture content +2 percentage points and -4 percentage points for window frames and windows and ± 2 percentage points for doors.

Swelling

Tangential and radial swelling from 50% to 90% RH and the numerical difference between tangential swelling and radial swelling should meet the requirements as shown in the table below.

Table 1; requirements tangential and radial swelling 50-90% RH.

Orientation wood	Claim
Mean tangential swelling [B1].	Average $\leq 3.5\%$, standard deviation $\leq 1\%$
Mean tangential swelling [B1] / mean radial swelling [B2]	$\leq 2,3$

Shrinkage class

As components of different wood species may be combined within one building product/building component (e.g. window, door or frame), the shrinkage class of the wood species must be known. Four shrinkage classes are defined here and classified according to the table below. Four shrinkage classes are defined within the permissible swelling.



Table 2; shrinkage class

Shrinkage class	tangential shrinkage over an area from water-saturated to 65% RH [B4]
1	< 1,5%
2	≥ 1,5% < 2,5%
3	≥ 2,5% < 3,5%
4	≥ 3,5% < 4%

Determination method

Dimensional stability is determined on specimens cut purely radially and tangentially and by conditioning them at different climates until equilibrium is reached. The test is performed on 30 test pieces taken from 15 different parts with a size 50 mm x 50 mm and 10 mm long. If, due to the dimensions of the wood, this specimen size is not possible, it may be deviated from to a minimum of 20 mm x 20 mm with a length of 10 mm.

Swelling and application moisture

Swelling is determined over a range from 50% RH to 90% RH. Due to hysteresis effects, the specimens are first climatized at 30% ± 5% RH, 20 ± 2 °C. Then the specimens are climatized successively at the following climates until equilibrium moisture content is reached (maximum weight change 0.1% in 24 hours):

- Climate of 50% ± 5% RH, 20 ± 2 °C after which weight and dimensions are determined.
- Climate of 65% ± 5% RH, 20 ± 2 °C (for application moisture content) after which weight and dimensions are determined.
- Climate of 90% ± 5% RH, 20 ± 2 °C after which weight and dimensions are determined.

Finally, the samples are dried (24 hours at 103°C) after which the weight is determined again. The dimensions should be determined with minimum accuracy of 0.02 mm and the weight with minimum accuracy of 0.02 grams. The tangential and radial swelling is calculated as:

$$Zt_{50-90\%} = \frac{(Dt_{90} - Dt_{50})}{Dt_{50}} \times 100\% \quad [B1]$$

and

$$Sr_{50-90\%} = \frac{(Dr_{90} - Dr_{50})}{Dr_{50}} \times 100\% \quad [B2]$$

Where

$Zt_{50-90\%}$	tangential swelling over an area of 50% to 90% RH [%]
$Zr_{50-90\%}$	radial swelling over an area of 50% to 90% RH [%].
Dt_{50}	tangential dimension at 50% RH [mm].
Dt_{95}	tangential dimension at 90% RH [mm]
Dr_{50}	radial dimension at 50% RH [mm]
Dr_{95}	radial dimension at 90% RH [mm]



The equilibrium moisture content is calculated as:

$$EHV_{i\%} = \frac{(m_i - m_{od})}{m_{od}} \times 100\% \quad [B3]$$

In which:

$EHV_{i\%}$	Equilibrium moisture content at a relative humidity of $i\%$ RH [%].
m_i	weight after climatisation at $i\%$ RH [g]
m_{od}	dry weight [g]

Shrinkage class

In addition to the series described under 'swelling', the dimensions shall also be determined after water-saturation followed by determining the dimensions after conditioning at 65% RH, 20 °C for the determination of the shrinkage class. The 10 mm long specimens are water-saturated by vacuuming underwater for at least 30 minutes and then leaving the wood under atmospheric pressure for at least 16 hours. The wet dimensions and weight are determined. Then the specimens are climatised at $65 \pm 5\%$ RH, 20 ± 2 °C to equal weight (maximum weight change 0.1% in 24 hours) and the dimensions and weight determined again. Finally, the samples are dried (24 hours at 103°C) after which the weight is determined again. The dimensions should be determined with a minimum accuracy of 0.02 mm and the weight with a minimum accuracy of 0.02 grams. The tangential shrinkage is calculated as:

$$Z_{nat-65\%} = \frac{(D_{t nat} - D_{t65})}{D_{t nat}} \times 100\% \quad [B4]$$

Where

$Z_{nat-65\%}$	tangential shrinkage over an area from waterlogged to 65% RH [%]
$D_{t nat}$	tangential dimension at water saturation [mm]
D_{t65}	tangential dimension at 65% RH [mm]

Admission examination and periodic review

The certification body assesses whether the shrinkage and swelling behaviour meet the requirements and whether the shrinkage class has been determined according to the determination method and meets the limit values and assesses whether the application moisture content has been determined. In the periodic assessment, the application moisture content of the timber species is assessed.

Product certificate

The KOMO product certificate states for the wood species the tangential and radial swelling from 50% to 90% RH, the shrinkage class and the application moisture content.

4.4 Calibration lines for wood moisture content measurements

Limit value

A calibration line should be established of the wood species to measure the wood moisture content with an electric wood moisture meter during production checks.

Determination method

In 27 samples with a minimum wood dimension of 30 mm x 50 mm and a minimum length of 50 mm, two insulated stainless steel pins 30 mm apart are mounted on the longitudinal surface. The pin tip is not insulated over a length of 8 mm. In pre-drilled holes ($\varnothing$ 3 mm, depth 11 mm), the insulated stainless steel pins are hammered into the wood up to 19 mm using a hammer.

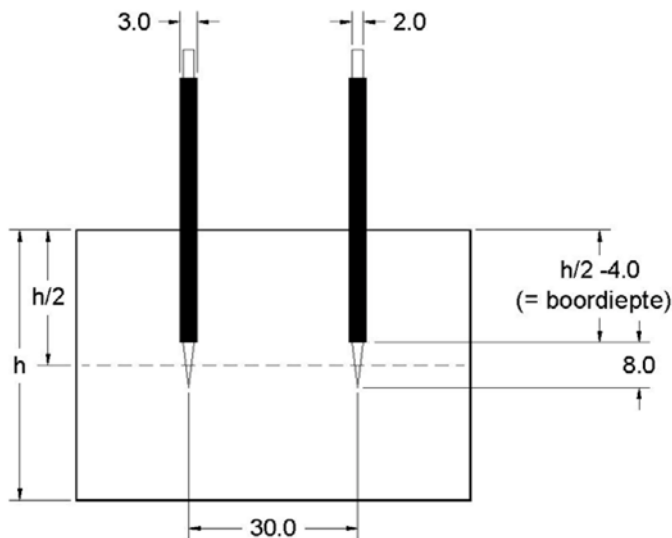


Figure 1 Positioning of the pins

The samples are taken at five different relative humidities

(33%, 65%, 80%, 90% and 95%) and a temperature of 20°C conditioned. After several days, three samples per climate are weighed as a sample. If the weight of the cubes has not changed more than 0.01 g in two days, then all samples are considered fully conditioned. If the weight does change, then the three samples are weighed every two days until the weight remains constant. Of the fully conditioned samples, the wood moisture content is determined using an electric wood moisture meter (set to zero calibration line and corrected for temperature) and weight. Next, the samples are dried in an oven (103 ± 2 °C) for 48 hours, after which the weight is determined again. At each weighing, the weight of the samples is reduced by the weight of the electrodes.

Linear regression, using the least squares method, is applied to the total set of measured values. Here, the moisture contents according to the dry-dust method shall be used as x-values and the values measured with the electric meter as y-values. The correlation coefficient found should be greater than 0.90. The parameters a and b estimated by the regression method (from the equation: $y = ax + b$) are then used to establish a correction formula for the electrical resistance meter.

$$MC_{\text{actual}} = A * MC_{\text{read}} + B$$

In this

$$A = \frac{1}{a},$$

$$B = \frac{-b}{a}$$

In the newer types of electric wood moisture meters, the correction formula is directly programmable.



Admission examination and periodic review

During the admission examination, the certification body assesses whether a benchmark has been established for the type of timber to be certified.

Product certificate

The KOMO product certificate states that the limit value is met.

4.5 Hardness

This feature is important in relation to the risk of damage from impacts.

Limit value

The wood species shall be shown to have a minimum Janka hardness of 1500 N .

Remark:

timbers with a density $\geq 450 \text{ kg/m}^3$ comply with the Janka hardness of at least 1500 N

Determination method

Janka hardness is determined in accordance with ASTM D143-14 and expressed in N. Hardness is determined under laboratory conditions on small, error-free test pieces.

Admission examination and periodic review

During the admission examination, the certification body assesses whether the specified requirements are met. No verification of hardness takes place during the periodic assessment.

Product certificate

The KOMO product certificate states that the limit value is met and may state the Janka hardness.

4.6 Strength class

For certain applications of the wood species in joinery (frames, windows, doors), the strength class of the wood species should be known.

Limit value

The strength class is at least C18.

Determination method

The strength class of the timber species in relation to the timber quality can be derived from NEN-EN 1912 or determined in accordance with NEN-EN 384.

Remark:

From timber produced and supplied exclusively finger jointed or optimised, the strength class can be determined for use in joinery (frames, windows, doors) according to the above method. In that case, this strength class can only be used for application in windows, frames or doors. If the strength class is determined from optimised timber, it only applies to the application of optimised timber. If the strength class is determined from finger jointed timber, this applies only for the application of finger jointed or optimised timber.



A wood species may be admitted without the strength class being declared. In this case, the density must be at least 350 kg/m³ (at application moisture content) and it can be assumed that the strength class of the wood species is at least C18.

The strength class can also be determined using an alternative procedure. First, 10 samples are destructively tested (according to NEN-EN 384). Then 30 samples are non-destructively tested with the MTG (Mobile Timber Grader).

Admission examination and periodic review

During the admission examination, the certification body assesses whether the specified requirements are met. During the periodic inspection, the timber quality applicable for the established strength class of the timber species is assessed.

Product certificate

The KOMO product certificate states the strength class of the timber species (as tested: solid/engineered/optimised) with the application condition that this strength class is only applicable for windows, frames or doors .

4.7 Sustainability

Durability refers to resistance to attack by micro-organisms, resulting in white rot and brown rot.

Limit value

The wood species has a minimum durability class 4.

Determination method

If no (reliable) literature on the resistance to fungal attack is available, it will have to be determined. This is determined in accordance with NEN-EN 350 with the test standard CEN TS 15083-1 , taking into account the following deviations and remarks.

Samples are drawn from 30 beams. Four fungi are used: three fungi for both hardwood and softwood, viz: *Coniophora puteana* (brown rot), *Poria placenta* (brown rot), *Coriolus versicolor* (white rot). The fourth fungus is *Gloeophyllum trabeum* (brown rot) for softwood and *Donkiopora expansa* (white rot) for hardwood.

Remark:

In NEN-EN 350, a classification in one or two durability classes (e.g. 3-4) is possible. In addition, it is possible to indicate with the addition "v" that the durability of a timber species is variable.

The durability classification according to NEN-EN 350 is converted to a classification in the following classes I, II, III, IV or IV for application in joinery.

The translation is as follows:

- *The NEN-EN 350 class consisting of one digit is converted directly: 1=I, 2=II, 3=III, 4=VN and 5=V*

The NEN-EN 350 class consisting of two digits is converted to the lowest given durability class

The NEN-EN 350 class with the suffix "v" looks at the cumulative durability class of the individual test specimens. This means that, based on the test report, it is determined at which durability class at least 80% of the tested test pieces fall into the relevant durability class or better¹ . Note: As a rule, this approach means that a durability class 1v becomes 2, 2v becomes 3, 3v becomes 4, etc.



Table 3; translation durability class of timber according to NEN-EN 350 into the classification of the timber species for application in joinery

Durability class NEN-EN 350	classification of the timber species for application in joinery that shall comply with AG 0801 and AG 0803
1	I
1-2	II
1v	Durability class where at least 80% of the tested specimens fall into the relevant durability class or better ¹
2	II
2-3	III
2v	Durability class where at least 80% of the tested specimens fall into the relevant durability class or better ¹
3	III
3-4	IV
3v	Durability class where at least 80% of the tested specimens fall into the relevant durability class or better ¹
4	IV
4-5	V
4v	Durability class where at least 80% of the tested specimens fall into the relevant durability class or better ¹
5	V
5v	V

¹ Note: In the case of a NEN-EN 350 class with the addition "v", it may be decided to classify the timber species in accordance with NEN-EN 350-1 (withdrawn standard). This option creates a so-called level playing field whereby the certificate holder, despite the dispersion in durability of the timber species, chooses to follow the classification of existing timber species (admitted in the past).

Admission examination and periodic review

During the admission examination, the certification body assesses whether the timber species meets the specified requirements. No verification of the durability class takes place during the periodic inspection.

Product certificate

The KOMO product certificate states the durability class of the certified timber species and the classification of the timber species for use in facade joinery.

4.8 Water absorption and release

Limit value

Depending on the structure of a timber species, the relationship between water absorption and water vapour release can vary greatly. Timber with a durability class III or IV as determined in 5.7 can only be used in window frames, windows and doors if there is no high water absorption in combination with low water release (see also durability requirements). High water absorption combined with low water release occurs when:

- Maximum water absorption (average) after 21 days $\geq 0.4 \times$ the maximum water absorption (average) of pine sapwood;
- At moisture content, the average initial moisture content $\pm 1\%$ moisture content after 14 days of climatisation has not been reached.

**Determination method**

To determine the water absorption, 15 stakes of each wood species with dimensions 20 mm x 20 mm x 400 mm are used from 15 different parts. As a reference, 15 stakes of pine sapwood with the same dimensions are included. All stakes are climatized at $65 \pm 5\%$ RH, $20 \pm 2^\circ\text{C}$ to constant weight. All stakes are weighed to the nearest 0.2 g. Twelve stakes are placed in a sealable container in 5-10 mm water. Three stakes are placed in the same container but not in the water. The stakes should stand freely and should not touch each other. The weight of the stakes is determined after 1 and 24 hours and then after 2, 3, 7, 14 and 21 days. The water uptake is determined by sucking up the liquid water and by hygroscopicity due to the creation of high humidity in the sealed container.

After the water uptake period, the moisture release is determined. For this purpose, the stakes are placed in a climate of $65 \pm 5\%$ RH, $20 \pm 2^\circ\text{C}$ and weighed after 24 hours and after 2, 3, 7 and 14 days. After the test, the specimens are tolerated at $103 \pm 2^\circ\text{C}$ for at least 16 hours. The dry weight is determined.

Water uptake and release are determined as:

$$W_i = (m_{wi} - m_{w0}) - (m_{di} - m_{d0})$$

In which:

w_i	Water uptake and release at time i [g]
m_{wi}	mass of water-absorption strike at time i [g]
m_{w0}	mass of water-absorption strike at time 0 [g]
m_{di}	mass of water vapour absorption at time i [g]
m_{d0}	mass of water vapour absorption at time 0 [g]

Admission examination and periodic review

During the admission examination, the certification body assesses whether the specified requirements for water intake and release are met. No hardness control takes place during the periodic inspection.

Product certificate

The KOMO product certificate states the water absorption behaviour of the timber species.

4.9 Glueability

Limit value

For application in joinery (windows, doors, frames) the glueability should be known. Timber for application in windows or doors shall be glueable with an adhesive that complies with AG 2339. Timber for application in window frames must be glued with an adhesive that complies with AG 0819.

Determination method

For application in windows and doors, an investigation according to section 4.1.4 (Exterior joinery) of AG 2339 shall be carried out. For application in window frames, an investigation in accordance with AG 0819 shall be carried out.

Admission examination and periodic review

During the admission examination, the certification body assesses whether the specified requirements are met. No control of the adhesiveness takes place during the periodic assessment.



Product certificate

The KOMO product certificate states the glueability of the timber species. Suitable adhesives are thereby included in the certificate.

4.10 Finish

Limit value

The timber surface in joinery can be finished opaque or transparent with a film-forming system. The finish shall thereby comply with the requirements stated in section 5.2.9.2 and 5.2.9.3 of SKH publication 97-04.

Remark:

In the case of "Option 3" as stated in section 5.2.9.2. of the SKH-Publication, the workability of the timber species has not been demonstrated and therefore its suitability for application in façade joinery.

Determination method

Finishability is demonstrated in accordance with section 5.2.9.3 of the SKH Publication 97-04.

Remark:

In deviation from SKH publication 97-04, tests 1 to 4 and 6 should always be performed and the performance of test 5 "blister test" depends on the results and the size of the variation in the timber species (uniform or erratic behaviour) as described in SKH publication 97-04.

Admission examination and periodic review

During the admission examination, the certification body assesses whether the timber species meets the specified requirements. There is no check on the workability of the timber species during the periodic assessment.

Product certificate

The KOMO product certificate states the workability of the timber species and the conditions applicable to it.

4.11 Insulation value

Limit value

The insulation value (λ -value) of the wood species needs to be known for the application of the wood species in building products/building components used in external separation construction.

Determination method

Determination by derivation:

The insulation value of wood is related to the volumetric mass of wood. The volumetric mass of the timber species is determined according to this AG. Based on these values and by interpolating the values from NEN-EN 12524 (density 300, 400, 500, 600, 700 kg/m³ at 12% moisture content gives λ values of 0.09, 0.11, 0.13, 0.15, 0.18), the insulation value (λ -value) for the timber species is determined. If the λ -values are available in the NEN-EN-ISO 10077-2, they can be derived from it.

Determination via testing:

The insulation value can be determined for the timber species in accordance with NEN-EN 12667. For this, 10 samples are used of which 5 are deadwood and 5 are quarterwood, covering the entire range in volume mass and with an application moisture content as determined in section 5.3. The value to be declared is the value within which 90% of all observations fall.



Admission examination and periodic review

During the admission examination, the certification body assesses whether the insulation value (λ -value) has been determined in accordance with the prescribed determination method. No verification of the insulation value takes place during the periodic inspection.

Product certificate

The KOMO product certificate states the insulation value (λ) of the timber species and at which application moisture content it applies.

4.12 Break-in resistance

Limit value

For the application of the timber species in burglar-resistant joinery the suitability shall be demonstrated. The timber species is suitable for burglar-resistant joinery if its splitting strength and screw holding capacity are at least equal to those of spruce.

Remark:

If the splitting strength and screw retaining capacity of the timber species are not at least equal to those of spruce, the burglar resistance can be tested within the framework of AG 0801 and/or AG 0803 on an entire façade element, with specific hardware used in it.

Determination method

Splitting strength should be determined in accordance with ASTM D143-14 and screw holding capacity in accordance with SKH-BGS 002.

Admission examination and periodic review

During the admission examination, the certification body assesses whether the suitability of the timber species for burglar-resistant facade joinery has been demonstrated and which conditions apply. No verification of burglar resistance takes place during the periodical assessment.

Product certificate

The KOMO product certificate states whether the timber species is suitable for use in burglar-resistant facade joinery and which conditions apply.

4.13 Conditions of application/use and processing instructions

A processing and application instruction shall be supplied with the timber in which at least the measures to be taken during transport, storage and protection of the timber in the processing phase shall be included;



5. Quality requirements system

5.1 General

The management of the certificate holder is at all times responsible for the quality of the production process, the operability of the quality system, internal quality control and the quality of the product. The internal quality control must comply with the requirements laid down in this chapter.

5.2 Quality system

5.2.1 Quality manual

The quality system must be tailored to the production, storage and delivery of the products defined in the scope of this assessment guideline.

The certificate holder's quality system is laid down in a quality manual that contains at least the following elements:

a description of the company and its organisation

- the procedures for managing quality documents and quality records
- the procedures for internal assessments
- handling of complaints
- the working methods and instructions described
- procedures for handling deviations and following up corrective actions

the scheme of internal quality control (5.2.2)

5.2.2 General requirements internal quality control

The certificate holder must have a scheme of internal quality control (IQC scheme) applied by him which includes at least the requirements of this chapter.

The certificate holder must demonstrate at least the following in this scheme:

- On which aspects controls are carried out by the certificate holder's organisation;
- According to which methods these checks take place and which equipment should be used for this purpose;
- How often these checks are carried out;
- Whether and, if so, how inspection results are recorded and retained;
- Identification and traceability of deliveries.

The internal quality control shall enable the certificate holder to demonstrate on a continuous basis that the requirements laid down in this assessment guideline are met.

5.2.3 Quality system manager

An officer must be designated within the organisational structure to manage and be responsible for the functioning of internal quality control. This officer must report directly to the management on the functioning of internal quality control. This officer shall have appropriate powers for this purpose.



5.2.4 Management of documents and records

The certificate holder shall ensure that:

- Current versions of the quality documents are available to all staff who need them and in the places where they are used,
- The established procedures and instructions referred to in section 5.2.1 are regularly reviewed and updated where necessary and are effectively implemented on an ongoing basis,
- New and amended quality documents are authorised and released for use by a designated manager,
- The realised records relevant to the demonstrability of the production process controlled in accordance with this assessment guideline are correctly identified, legible and traceable.

The documents and records referred to in this assessment guideline shall be kept for a period of at least 20 years and longer if required by law.

5.2.5 Control of measuring equipment

It must be determined what measuring equipment is required under this assessment guideline to demonstrate that the products meet the specified requirements.

Laboratory and measurement equipment should be checked annually. The certificate holder should record the results of the checks.

5.2.6 Measures in the case of non-matching products

If the results of internal quality control show that certain products do not meet the specified requirements,:

- The product (wood) to be marked and not delivered;
- Check the cause and, where necessary, take corrective action;
- Records should be kept of what deviations have been found and what corrective or additional measures have been taken.

If the deficiencies referred to above only come to light after the product has already been delivered and depending on the nature of the deficiency, the buyer should also be informed and involved in the follow-up steps to be taken.

5.2.7 Complaint handling

The certificate holder must have a procedure for handling complaints in relation to the products supplied. This procedure should at least regulate:

- Who are the officers responsible for assessing and handling complaints,
- Registration of complaints and the corresponding follow-up and handling process,
- The intended succession and settlement times,
- Informing the complainant adequately,
- Taking remedial and corrective action in response to complaints.



6. External conformity assessments

6.1 General

For the purpose of issuing the KOMO product certificate, the certification body carries out an admission examination. After the KOMO product certificate has been issued, the certification body carries out periodic assessments.

The external assessment is recorded by the certification body in accordance with the requirements of the Board of Experts and the product certification regulations of the certification body.

6.2 Admission survey

The applicant of the product certificate indicates which timber species shall be included in the product certificate to be issued. The applicant shall provide all relevant data of these timber species for the purpose of preparing the product specification and the statement of product characteristics as they will be included in the product certificate.

For the purpose of granting the product certificate, the certification body carries out an admission examination in which:

- The certification body assesses whether the applicant is able to guarantee, by means of his quality system, that the products have the characteristics and deliver the performances laid down in chapter 4 of this AG. Assessment of the production process and the finished product are part of this.
- The certification body assesses whether the operational system of quality assurance complies with the requirements in chapter 5 of this AG.
- The certification body reviews the available processing instructions and conditions of application.

Where applicable, it shall be verified whether the documents provided with regard to the product and/or internal quality control and the results stated therein comply with the requirements in this assessment directive.

A report is drawn up of the admission examination, on the basis of which the product certificate, may or may not be granted.

6.3 Nature and frequency of periodic reviews

After the product certificate has been issued, the certification body carries out periodic assessments of the certificate holder's compliance with his obligations. The Board of Experts shall decide on the nature, scope and frequency of the periodic assessments to be carried out.

When this assessment guideline came into force, the frequency was set at 4 periodic assessments per year, during the first year. If no deviations are found in the first year, the frequency is changed to 2x per year

The periodic reviews will cover at least:

- The results of the product checks carried out by the certificate holder in accordance with chapter 4.
- Assessment of the continued and effective application of the quality system in accordance with chapter 5.
- The correct way of marking the certified products.
- The continuing value and suitability of the processing instructions and conditions of application prepared by the certificate holder.

The findings of each assessment carried out will be traceably recorded in a report by the certification body.



The applicant's country should generally be safe for assessment visits by the certification body. In the event of negative travel advice, the country will not be visited but the products must be checked upon arrival in the Netherlands. The producer is then obliged to report the shipments, including time and place of receipt, to the certification body in time and in writing.

Remark:

Companies certified on the basis of NEN-EN-ISO 9001 are deemed to comply with the requirements of chapter 5 provided that:

- *the quality system includes all relevant requirements at product level,*
- *the frequency of ISO 9001 certification assessments at least match the requirements in this AG,*
- *the results of the reviews of the ISO 9001 audits are available for/viewable by the CB.*

6.4 Sampling

A sample shall be drawn by the certification body once a year for further examination by an external laboratory in which it is examined whether the timber corresponds with the timber as previously determined in accordance with section 4.1 and 4.2. Additional samples may be drawn if there is reason to do so. The costs for such examination shall be borne by the producer.

The certification body may, for reasons of its own, decide to assess products at the producer's customers in addition to the annual assessments at the producer's premises. This involves assessing whether the products comply with the technical specification as laid down and determined by the certification body. Possibly, this may also involve sampling for laboratory research in which it is examined whether the timber corresponds with the timber as previously determined in accordance with section 4.1 and/or 4.2.

6.5 Verification wood type based on an outdoor exhibit

After 2 years in application, the wood type should be assessed where no serious defects are allowed due to the properties of the wood type.

Limit values

After 2 years of outdoor exposure of window frames manufactured from the relevant wood species, the following defects on the window frames are not allowed (except for the part of the window frame to which a damage has been applied):

- The presence of wood moisture content > 20% and/or wood deterioration;
- The presence of longitudinal cracks with a size larger than in accordance with SKH publication 99-05 is permitted;
- The presence of open joints in frames, windows and doors;
- The presence of defects in the paint layer whereby the requirements for exterior durability of topcoat paint system (section 4.5.2 of AG 0817) must be met;
- Other defects of the wood species that directly affect the functionality of the frames, windows and doors in which the wood species is used.

At the location of the applied damage (cross cut), the presence of wood deterioration is not allowed.

Note: The deliberately introduced damage is to establish the buffer in the durability of the wood species in practice.

If of the defects found there is no identifiable cause related to an improper application of the timber species, the suitability and/or conditions of application of the timber species should be reconsidered.



The research should be carried out by an independent laboratory that meets the criteria according to section 1.5 of this AG.

Determination method

For the study, 2 window frames with a dimension of 1 m x 1 m are manufactured from the relevant wood species. The window frames shall comply with the principles of AG 0801 with a profile for external glazing in a wood dimension of 67 mm x 114 mm. The upper side of the lintel should be flush and taped with butyl tape to prevent excessive moisture load on the upper side of the lintel. The window frames should be provided with a finishing paint system in accordance with AG 0817 in the colour RAL 7016. Fixed measuring pins should be placed at the lintel joints in order to carry out wood moisture measurements during the exterior exposure. In the middle of the lintel, a cross cut will be made at the front in the finishing system in accordance with section 6.3 of SKH-Publication 05-01.

The frames should be placed in an outdoor exposition free from direct ground contact and situated on south, southwest.

The wood moisture content shall be measured at least 4 times a year equally distributed over the year. After 1 year there shall be a visual assessment for defects. After 2 years another visual assessment takes place to check for defects, after which the joints of the window frames are sawn open to be able to determine the presence of (incipient) wood damage.

If defects are found, their cause should be analysed and translated into the potentially present risks of the wood species and application conditions concerned.

6.6 Shortcomings

6.6.1 Weighting of deficiencies

When weighing a shortcoming, within the framework of supervision after the product certificate has been granted by the certification body, a distinction is made between:

- Shortcomings relating to the product properties as mentioned in chapter 4 of this AG (critical shortcomings)
- "Other" deficiencies (non-critical deficiencies).

6.6.2 Follow-up of deficiencies

The follow-up of deficiencies by a certification body is as follows:

- Critical deviations must be able to be dealt with by the certification body within the time limit set by the certification body, with a maximum time limit of 3 months
- Non-critical deviations should be able to be dealt with by the certification body within the time limit set by the certification body, with a maximum time limit of 6 months



6.6.3 Sanction procedure

The sanction to be imposed by the certification body for the following situations is (see also section 6.6.1):

- Critical deficiency; The certificate holder must provide a written response (corrective action) within one month. Assessment of the effect of the corrective action may take place during the next audit.
- Non-critical deficiency; No (written) response required from certificate holder. Assessment can take place during the next inspection.

6.7 Suspension of product certificate

In case no products are (temporarily) produced and/or delivered, in case of a stop longer than 12 months, the validity of his product certificate can be (temporarily) suspended at the request of the certificate holder. Such suspension may be granted by the certification body for a total maximum of 2 years.

After the suspension is granted, a certificate holder may request that his suspension be terminated earlier.

If a suspension period is longer than 1 year, an additional assessment must be carried out prior to resuming production and delivery under product certificate to check whether all requirements in this assessment directive are still met and whether the suspended status can be converted to a valid status.



7. Requirements for the certification body

7.1 General

The certification body must have a procedure that sets out the general rules used in certification. In particular, these are the general rules for conducting the admission examination, distinguishable by:

- how applicants are informed about the processing of an application;
- implementation of the study;
- The decision following the investigation carried out;
- the general rules regarding the conduct of assessments and the assessment aspects used in them;
- the measures to be taken by the certification body in case of shortcomings;
- the rules on termination of a certificate;
- the possibility of appeal against decisions or measures taken by the certification body.

7.2 Certification staff

The personnel involved in certification can be distinguished by:

- Controller: in charge of carrying out the external assessment;
- pre-examination manager: in charge of carrying out the admission examination and assessing the reports of inspectors/laborators;
- assessor: in charge of assessing the pre-examiner and auditor; decisions on the need for corrective action;
- decision-maker: in charge of taking decisions following admission examinations carried out, continuation of certification following assessments carried out.

7.2.1 Competence criteria certification staff

Personnel involved in the certification process must be demonstrably qualified to perform the required work. With regard to training, expertise/experience, the following qualification requirements apply:

Certification staff	Training	Knowledge and experience
• auditor • preliminary investigator	MBO level	• ISO 9001 auditor training • at least 2 years' experience in timber product certification, or equivalent
• assessor	HBO level	• at least 2 years' experience in timber product certification, or equivalent • qualified assessor, or equivalent
• decision-maker	HBO level	• management experience or equivalent • certification or equivalent • accreditation criteria or equivalent • knowledge of relevant certification systematics

7.2.2 Qualification of certification staff

Certifying staff must be demonstrably qualified by testing demonstrated knowledge and skills against the above requirements. If qualification takes place on the basis of different criteria, this must be recorded in writing.

The qualification authority must be laid down in the certification body's quality system.

7.3 Report admission examination and periodic reviews



The certification body records the findings of its admission examinations and periodic assessments in an unambiguous report. A report must meet the following requirements:

- **Completeness**; the report gives a substantiated account of the degree of conformity established with the requirements laid down in this in the KOMO assessment guideline,
- **Traceability**; the findings on which statements are based must be traceably recorded.

7.4 Decisions on KOMO product certificate

The decision on the granting of the KOMO product certificate and/or the imposition of sanctions and/or its suspension or revocation shall be made by a qualified decision-maker who has not been involved in the certificate examination himself. On the basis of the assessment, the decision-maker shall decide whether the KOMO product certificate can be granted or whether additional data and/or examinations are required before the KOMO product certificate can be granted. The decision must be traceably recorded.

7.5 Report to the Board of Experts

The certification bodies shall report at least annually to the Board of Experts on the work carried out and the results thereof with regard to the product certificates based on this KOMO assessment directive. In this report, the following subjects shall be addressed anonymously:

- Number of checks carried out in relation to established frequency,
- Number of admission tests conducted,
- Results of assessments,
- Measures imposed in case of identified deficiencies,
- Received third-party complaints about certified products.

7.6 Interpretation of requirements

The Board of Experts may lay down the interpretation of the requirements laid down in this assessment guideline in one separate interpretation document. This interpretation document, if applicable, is available via the website of the scheme manager who has drawn up this assessment directive. Any certification body using this assessment directive is obliged to use the interpretations laid down therein.



8. List of documents

8.1 Public law regulations

No public law regulations apply.

8.2 Normative documents

The following documents are referred to normatively in this assessment guideline:

NEN-EN 350:2016	Durability of wood and wood-based products - Testing and classification of resistance to biological agents, water permeability and performance of wood and wood-based materials;
NEN-EN 350-1:1994	Durability of wood and wood-based products - Natural durability of solid wood - Part 1: Guidance on the principles for testing and classifying the natural durability of wood (withdrawn);
NEN-EN 384:2016+A1:2018	Timber for structural applications - Determination of characteristic values of mechanical properties and density;
EN 1912: 2012	Timber for structural applications - Strength classes - Assignment of visual grading classes and timber species;
NEN 2767-1+C1:2019	Condition measurement in the built environment - Part 1: Methodology
EN 12524:2000	Building materials and construction products - Thermal and moisture resistant properties - Overview of design values;
EN 12667:2001	Thermal properties of building materials and products - Determination of thermal resistance using the shielded hot plate method and the heat flow meter method - Medium and high thermal resistance products;
NEN-EN-ISO 9001:2015	Quality management systems - Requirements
NEN-EN ISO 4628-2: 2016	Paints and varnishes - Evaluation of paint degradation - Indication of the intensity, quantity and extent of common defects - Part 2: Assessment of the degree of blistering
NEN-EN-ISO 10077-2:2017	Thermal properties of windows, doors and shutters - Heat transfer coefficient calculation - Part 2: Numerical method for window frames;
ISO 13061-2: 2014/Amd 1:2017	Physical and mechanical properties of wood - Test methods for small defect-free test pieces - Part 2: Determination of density for physical and mechanical tests
ASTM D143-14:2014	Standard Test Methods for Small Clear Specimens of Timber
CEN TS 15083-1: 2005	Durability of wood and wood-based products - Determination of the natural durability of solid wood against wood-degrading fungi - Part 1: Basic diomycetes
AG 0801:2019	Wooden façade elements (frames);
AG 0803:2021	Wooden exterior doors;
AG 0814:2016	Film-forming coatings for application to wood;
AG 0817:2019	Film-forming primer and topcoat systems on wood;
AG 0819:2010	Joining techniques in wooden façade elements;
AG 2339:2012	Adhesives for non-load bearing applications.
AG 7010:2022	Assessment guideline for the KOMO product certificate Addendum for renewable or recycled content of the KOMO-certified product



SKH-Publication 97-04	Evaluation basis	Timber species for application in joinery; requirements and methods of determination;
SKH-Publication 99-05	Approved	timber species for application in wooden façade elements (frames, windows and doors) + appendix quality requirements;
SKH-BGS 002: 2017		Assessment basis for screws suitable for wood - and wood-based panel materials

8.3 Informative documents

The following documents are referred to informatively in this assessment guideline:

NEN 5461:1999/A1:2004	Quality requirements for timber (KVH 2000) - Sawn timber and roundwood - General part
NEN-EN 13556,	Roundwood and sawnwood - Designations of wood species used in Europe;
Houtvademecum;	11th edition, January 2018, Initiator: Centrum Hout, Publisher: PersManager B.V.
IAWA "List of microscopic features for hardwood identification "1989.	IAWA Bulletin n.s. 10 (3): 219-332