



KOMO. Kwaliteit zoals beloofd.

AD 2338
dated 06-01-2021

ASSESSMENT DIRECTIVE FOR
THE KOMO[®] PRODUCT CERTIFICATE
FOR
ADHESIVES FOR LOAD-BEARING WOOD CONSTRUCTIONS

Established by the CvD Board of Experts of SKH d.d. 06-11-2020

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PREFACE

This KOMO Assessment Directive (AD) has been compiled by the SKH Board of Experts in which stakeholders in the field of this AD are represented. This board also supervises the implementation of the certification as based on this AD and updates it if necessary. The term "Board of Experts" or BoE in this Assessment Directive refers to the aforementioned Board.

This AD will be used by certification bodies, which have a licence agreement for this with the KOMO Foundation, in connection with their established procedures for certification. In this Assessment Directive, the requirements have been established that an applicant or holder of a KOMO product certificate must adhere to as well as the manner in which the certification body assesses this. In the established certification procedures, the working method is established that is used by the certification body when carrying out:

- Research for the provision and extension of a KOMO product certificate on the basis of this Assessment Directive
- The periodic assessments for the benefit of retaining an issued KOMO product certificate on the basis of this Assessment Directive.

Adjustments in regard to the last version:

- Referral to current international standards
- Addition of sustainability class type 2+ (application such as in roof cavity underneath the roof shingles)

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1 INTRODUCTION

1.1 General

Based on the requirements laid down in this KOMO® - assessment directive a KOMO® -product certificate for Adhesives for load-bearing wood constructions is granted. Using this KOMO® -product certificate the owner of the certificate is able to show his customers an independent and knowledgeable organization is supervising the production process, the quality of the product and the ensuring of it. Therefore one can assume the product will pass the requirements as laid down in this assessment directive.

The requirements laid down in this Assessment Directive are used by the certification bodies, which are recognised for this by the Council for Accreditation and which have a licence agreement for this purpose with the KOMO® Foundation, when processing an application for, or the maintenance of, a KOMO product certificate for adhesives for load-bearing wood constructions.

In addition to the requirements laid down in this assessment directive, the certification bodies impose additional requirements, in the sense of general procedure requirements for certification, as laid down in the general certification regulations of the relevant body.

1.2 Scope

The present Assessment Directive (AD) and the KOMO® product certificate relate to adhesives for load-bearing wooden building structures, main load-bearing structures.

The AD describes a classification and, depending on the chemistry (polycondensation adhesives, one-component polyurethane adhesives, emulsion polymerised isocyanate adhesives), the durability class, the application and application technique, the performance requirements for adhesives suitable for application in load-bearing wooden building constructions. Depending on the climate class (climate classes -I, -II or -III) in which an adhesive is applied, a classification is made to durability class (durability class adhesives type 1, -2+ and -2) and depending on the application, a classification is made to application class (general bonding, gap-filling adhesives, bonding of finger joints and bonding of small surfaces).

In addition, the AD describes the requirements set for the manufacture of adhesives for load-bearing wooden building constructions.

The KOMO® product certificate only includes the adhesives, not the glued wooden building structure.

The test methods are explicitly mentioned or indicated by a reference to an appendix, standard or other designated document.

1.3 Validity

From the date of publication by SKH, KOMO® product certificates can be issued on the basis of this assessment directive. This assessment directive replaces AD 2338 dated 1998-11-15, including the corresponding amendment dated 27-06-2007. The product certificates issued on the basis of the replaced assessment directive will lose their validity 9 months after publication of this assessment directive.

Certificates on the basis of the aforementioned previous version of this AD, new product certificates may be issued at the latest 3 months before the current product certificates have to be replaced.

The validity of the product certificate is unlimited. The period of validity can be limited (terminated) by, among other things:

- An amendment to this assessment directive;
- Failure of the certificate holder to fulfil his obligations.

In case (temporarily) no production processes are carried out, the validity can be (temporarily) suspended at the request of the certificate holder, in case of a stop longer than 12 months. A suspension of validity may be granted by the certification body for a maximum period of 1 year. A suspension may be extended by the certification body on condition that the total duration of the suspension does not exceed 2 years.

1.4 Relationship with the European Construction Products Regulation (CPR, EU 305/2011)

No harmonised European product standard is applicable to the products that belong to the scope of this AD.

1.5 Requirements to be set for assessment institutes

With regard to the requirements included in this AD, the applicant may, as part of an external audit, submit reports from conformity assessment bodies to demonstrate that the requirements of this AD are met. It will have to be demonstrated that these reports were drawn up by a body that meets the applicable accreditation standard for the subject in question, namely:

- NEN-EN-ISO/IEC 17020 for inspection bodies
- NEN-EN-ISO/IEC 17021-1 for certification bodies that certify management systems
- NEN-EN-ISO/IEC 17025 for labs
- NEN-EN-ISO/IEC 17065 for certification bodies that certify “products”

An institution is deemed to meet these criteria if an accreditation certificate can be submitted for the subject in question, issued by the Council for Accreditation or another accreditation body which is accepted as a member of the multilateral agreement on the mutual recognition and acceptance of accreditation within EA, IAF and ILAC. These agreements are respectively indicated with EA-MLA, IAF-MLA and ILAC-MRA. If no accreditation certificate can be submitted, the certification body itself shall assess whether the accreditation criteria have been met.

1.6 KOMO® product certificates

Based on this AD, KOMO® product certificates can be issued. The statements in these product certificates are based on sections 4, 5, 6, and 7 of this AD.

On the KOMO Foundation website (www.komo.nl), the model of the product certificate to be issued that is applicable for this AD can be found. The product certificates to be issued must correspond to this model.

1.7 MERKEN

The supplied certified adhesives for load-bearing wood constructions must be clearly accompanied by the:

- KOMO® word or image logo, at least 5 mm in size;
- Quality declaration number;
- a batch number;
- production date in combination with the best-before or expiry date;
- classification according to section 4
- type of EPI adhesive (EN 16254), PUR (EN 15425) or condensation adhesive (EN 301), only applicable to types I and II adhesives;
- adhesive type (types I, II+ or II);
- temperature at which the adhesive is suited (50°C, 70°C or 90°C);
- application (GP, SP, GF, FJ, SD);
- maximum gap width (0.1, 0.2, 0.3, etc.);
- Application (M mixed, S separate);



In the event of tanker delivery, the information above must be stated in the included documentation (delivery receipt, analysis certificate).

De KOMO® - logo looks as follows:



After publication of the KOMO® -product certificate the owner of the certificate may use this logo in it's public statements related to the certified products.

2 TERMINOLOGY

For the meaning of the terms and definitions used in this AD, the terms and definitions apply as described in EN 923 and other prescribed standards. A few specific terms and definitions have been further described in this section.

For certification related definitions is referred to the website of the KOMO® foundation (www.komoquality.com) and the regulations of the certification body.

Single component polyurethane (PUR) adhesives:

Urethane polymers that crosslink due to a reaction with water, whereby CO₂ is released.

EPI adhesives:

Emulsion polymerised isocyanate adhesives

Polycondensation adhesives:

adhesive mixture made from a resin formed by a polymerisation reaction involving the elimination of water, usually with a hardener

Service class I of EN 1995-1-1:

Service class characterised by a moisture content in the materials that corresponds with an environment temperature of 20 °C and 65% relative humidity (RH), whereby the RH is above 65% only a few weeks a year.

NOTE: Service class I is a typical indoor climate

Service class II of EN 1995-1-1:

Service class characterised by a moisture content in the materials that corresponds with an environment temperature of 20 °C and 85% relative humidity (RH), whereby the RH is above 85% only a few weeks a year.

NOTE: Service class II is typical for sheltered outdoor areas

Service class III of EN 1995-1-1:

Climate conditions that lead to higher wood moisture content than service class II.

NOTE: Service class III is typical for exposed outdoor areas

Type 1 adhesives:

Adhesives applicable in wood constructions used in service classes I, II and III. These adhesives are tested at 70 °C or at 90 °C.

Type 2+ adhesives:

Adhesives applied in wood constructions applied in a service class comparable with service class I, but with an increased temperature and a limited moisture load, such as in roof cavity underneath the roof shingles. These adhesives are tested at 70 °C.

Type 2 adhesives:

Adhesives applicable in wood constructions used in service class I. These adhesives are tested at 50°C.

General Purpose (GP) adhesives:

Adhesives suitable for the general adhesion of wood construction parts and laminates, maximum thickness of glue line 0.3 mm PU adhesives and 0.6 mm polycondensation adhesives.



Gap Filling/Special Purpose (GF/SP) adhesives:

Adhesives suitable for adhesion of joints in which the glue line is thicker than 0.3 mm with polyurethane adhesives (SP) and 0.6 mm with polycondensation adhesives (GF);

Adhesion of Finger Joints (FJ):

Adhesives suitable for adhesion of finger joints in general and finger jointing in lamella.

Adhesion of Special Dimensions (SD):

Adhesives only suitable for the adhesion of beams with a maximum cross-section of 45000 mm² and for finger jointing in laminated parts where the width of the beam is a maximum of 180 mm and the height is a maximum of 300 mm.

3 ADMISSION AND PERIODICAL ASSESSMENT

Before the certification agreement is concluded voluntarily with the applicant, an initial inspection is carried out.

3.1 Start of the inspection

The applicant of the quality declaration indicates which adhesive must be included in the quality declaration. He also provides the information required in order to compile the quality declaration and indicates which statements must be included in the quality declaration by stating:

- The composition/type of adhesive;
- A description of the production process;
- The scope the service class and type of adhesive for which the material is considered suitable;
- He indicates which statements must be included in the quality declaration and provides substantiation for these statements.

In section 4, it has been indicated which statements must or could be included.

3.2 Initial inspection for the KOMO® product certificate

In order to obtain the product certificate, the certification body shall carry out an initial inspection. The certification body must hereby establish that the applicant is capable upon continuation of guaranteeing the product and its quality in such a manner as complies with stated requirements of this AD. The initial inspection includes:

- Assessment of the product requirements whereby it is checked whether these fulfil the requirements in section 4 included in this AD;
- Assessment of the processing instructions, whereby it is checked whether these fulfil the requirements in section 5;
- Assessment of the product requirements whereby it is checked whether these fulfil the requirements in section 6 included in this AD;
- Assessment of the internal quality control of the applicant whereby it is checked if it fulfils the requirements included in section 7 of this AD.

Where relevant, it shall be examined whether the provided documents concerning the production process, the product requirements, the processing instructions and/or internal quality control and the results stated therein fulfil the requirements of this AD.

NOTE:

Companies which are certified according EN-ISO 9001 are supposed to comply with the requirements as stated in chapter 7 as long as the quality management system contains all relevant requirements on product level.

3.3 External quality control

After issuing the product certificate, the certification body shall carry out checks as described in section 8.

4 REQUIREMENTS SET TO THE PRODUCT CHARACTERISTICS

For load-bearing wood constructions, polycondensation adhesives, emulsion polymerised isocyanate (EPI) adhesives and polyurethane adhesives can be applied.

The following sustainability classes are distinguished:

- Type 1 - applicable in wood constructions used in service classes I, II and III.
- Type 2+ - applicable in wood constructions applied in a service class comparable with service class I, but with an increased temperature and a limited moisture load, such as in the cavity underneath the roof shingles.
- Type 2 - applicable in wood constructions used in service class I.

The service classes are assigned in accordance with NEN-EN 1995-1-1

NOTE: EPI adhesives can only be applied in service classes I and II.

The three types of adhesives can be further subdivided into four application classes:

- General (General Purpose; GP),
- Gap Filling/Special Purpose (GF/SP) adhesives:
- Finger Joints (FJ),
- Special Dimensions (SD).

Subsequently in the classification it is indicated at which temperature they have been tested (50 °C, 70 °C or 90 °C), what the filling capacity is and whether it concerns a mix (M) or a separate (S) application; please see the examples below.

EN 301 I 70 GP 0.6M:	polycondensation adhesive for general application, type I tested at 70 °C up to a gap width of 0.6 mm of which the hardener and basis for application must be mixed.
EN 301 I 70 FJ 0.1S:	polycondensation adhesive suitable for finger jointing, type I, tested at 70 °C without filling capacity and of which the hardener and basis must be separately applied.
EN 15425 I 90 GP 0.3:	1K PU adhesive for general application, type I, tested at 90 °C up to a gap width of 0.3 mm.
EN 15425 I 90 SP 0.5:	1K PU adhesive with filling capacity, tested at 90 °C up to a gap width of 0.5 mm
EN 16254 I 70 GP 0.3:	EPI adhesive for general application, type I, tested at 70 °C up to a gap width of 0.3 mm
EN 16254 I 90 SP 0.2:	EPI adhesive for adhesion in special dimensions, type I, tested at 90 °C up to a gap width of 0.2 mm.

4.1 General use

Polycondensation adhesives (phenols and aminoplastics) types 1 and 2 that are considered suitable for general use and laminating of load-bearing timber must meet the requirements as stated in section 5 of EN 301.

Polyurethane adhesives types 1 and 2 that are considered suitable for general use and laminating of load-bearing timber must meet the requirements as stated in section 5 and EN 15425.

EPI adhesives types 1 and 2 that are considered suitable for general use and laminating of load-bearing timber must comply with the requirements as stated in section 5 of EN 16254.

Regarding type 2+ adhesives (independent of their chemistry) suitable for general use, the requirements in paragraph 4.5 of this AD apply.

Method of determination

Regarding polycondensation adhesive the tests for types 1 and 2 adhesives should be carried out according table 2 (General Purpose) of EN 301, while respecting the classification in table 1 of EN 301.

Regarding polyurethane adhesives the tests must be carried out according table 2 (General Purpose) of EN 15425: 2017 while respecting the classification in table 1 of EN 15425.

Regarding EPI-adhesives the tests should be carried out according table 2 (General Purpose) of EN 16254, while respecting the classification in table 1 of EN 16254.

Type 2+ adhesives (independent of their chemistry) must be tested according the tests found in table 1 of this AD. As an option, combinations of various materials can be tested as described in 4.5.7

Table 1 Tests for adhesives type 2+ that must be carried out in order to demonstrate the suitability for general use and to demonstrate combinations of materials.

Application	Adhesive gap thickness [#]	§4.5.1 ^a	§4.5.2 ^b	§4.5.3 ^c	§4.5.4	§4.5.5 ^d	§4.5.6 ^e	§4.5.7
General use	0.1 mm	X	X			X		
	0.5 mm	X		X	X			
Combinations of materials	Adhesives must always meet the requirements for general use							X

As standard for general use, the tests are carried out with an adhesive gap of 0.1 mm, if a wider adhesive gap is considered possible, the additionally stated tests must be carried out for gaps of 0.5 mm.

- a. Tests must be carried out with pre-treatments A1, A2, A3 and A7.
- b. Tests must be carried out as with type I, but then with 1 repetition of the "impregnating - drying cycle" instead of 2 repetitions.
- c. Only needs to be tested if the pH of the adhesive or one of the components (with separate application or when using primers) is lower than 3.0.
- d. For climate cycle 1, 70 °C must be used (cycle 1b).
- e. For EPI adhesives and 1K PU adhesives, only an adhesive gap of 0.3 mm needs to be tested, polycondensation adhesives do not need to be tested for creep.

Admission assessment

It will be assessed whether the type of adhesive will pass the stated requirements.

KOMO®-product certificate

The KOMO® -product certificate will state the type of adhesive, it's application(s) and wood species for which it's suitable.

4.2 Gap-filling

Polycondensation adhesives (phenols and amino plastics) types 1 and 2 which can be applied in glue lines of over 0.6 mm, in addition to meeting the performance requirements for general use, must also fulfil the requirements for gap-filling adhesives as stated in section 5 of EN 301.

Polyurethane adhesives types 1 and 2 which can be applied in glue lines of 0.3 to 0.5 mm, in addition to meeting the performance requirements for general use, must also fulfil the requirements for 'Special purpose' adhesives as stated in section 5 of EN 15425.

For EPI adhesives types 1 and 2, no additional requirements are set besides the performance requirements for general use. EPI adhesives can be applied in glue lines of up to a maximum of 0.5 mm.

For adhesives type 2+ (independent of their chemistry), no additional requirements are set besides the performance requirements for general use. Type 2+ adhesives are generally not applied in thick glue lines.

Method of determination

Polycondensation adhesives (phenols and amino plastics) types 1 and 2 which are classified as gap filling need to be tested according table 2 (Gap filling) of EN 301, while respecting the classification in table 1 of EN 301.

Polyurethane adhesives types 1 and 2 with a glue line thickness in use of 0.3 to 0.5 mm, need to be tested according table 2 (special purpose adhesives) in table 2 of EN 15425, while respecting the classification in table 1 of EN 15425.

Admission assessment

It will be assessed whether the type of adhesive will pass the stated requirements.

KOMO®-product certificate

The KOMO® -product certificate will state the type of adhesive, it's application(s) and wood species for which it's suitable.

4.3 Finger joints

Polycondensation adhesives (phenols and amino plastics) types 1 and 2 that are considered suitable for in finger joints for load-bearing timber must meet the requirements as mentioned in section 5 of EN 301.

Polycondensation adhesives types 1 and 2 that are considered suitable for finger joints in load-bearing timber must meet the requirements as mentioned in section 5 of EN 15425.

EPI adhesives types 1 and 2 that are considered suitable for finger joints in load-bearing timber must comply with the requirements as mentioned in section 5 of EN 16254

For adhesives type 2+ (independent of their chemistry), no additional requirements are set besides the performance requirements for general use. Type 2+ adhesives are generally not used in finger joints.

Method of determination

Polycondensation adhesives (phenols and amino plastics) types 1 and 2 which can be used in finger joints need to be tested according table 2 (Finger jointing) of EN 301, while respecting the classification in table 1 of EN 301.

Polyurethane adhesives types 1 and 2 which can be used in finger joints need to be tested according table 2 (Finger jointing) of EN 15425, while respecting the classification in table 1 of EN 15425.

EPI-adhesives types 1 and 2 which can be used in finger joints need to be tested according table 2 (Finger jointing) of EN 16254, while respecting the classification in table 1 of EN 16254.

Admission assessment

It will be assessed whether the type of adhesive will pass the stated requirements.

KOMO®-product certificate

The KOMO® -product certificate will state the type of adhesive, it's application(s) and wood species for which it's suitable.

4.4 Small dimensions

For polycondensation and polyurethane adhesives, no additional requirements are set besides the performance requirements for general use.

EPI adhesives that are considered suitable for the general adhesion of small dimensions for load-bearing timber must meet the requirements in section 5 of EN 16254.

For type 2+ adhesives, no additional requirements are set besides the performance requirements for general use. Type 2+ adhesives are generally not used for small dimensions.

Method of determination

EPI-adhesives types 1 and 2 which can be used in small dimensions need to be tested according table 2 (small dimensions) of EN 16254, while respecting the classification in table 1 of EN 16254.

Admission assessment

It will be assessed whether the type of adhesive will pass the stated requirements.

KOMO®-product certificate

The KOMO® -product certificate will state the type of adhesive, it's application(s) and wood species for which it's suitable.

4.5 Type 2+ adhesives**4.5.1 Shear strength of the glue line**

If the shear strength is determined as described in EN 302-1 (with the adjustments for 1K polyurethane adhesives as described in 6.2 of EN 15425 and for adjustments with EPI adhesives as described in 6.2 of EN 16254), type 2+ adhesives must fulfil the requirements in table 2.

Table 2 Minimal shear strength for close contact and thick bond lines (N/mm²)

Pre-treatment cycle	close contact glue line	thick bond lines 0.5 mm
A1	10.0	8.0
A2	6.0	4.0
A3	8.0	6.4
A7	6.0	4.0

Admission assessment

It will be assessed whether the type of adhesive will pass the stated requirements.

KOMO®-product certificate

The KOMO® -product certificate will state the type of adhesive, it's application(s) and wood species for which it's suitable.

4.5.2 Resistance against delamination

If the resistance against delamination is determined as described in EN 302-2 for type 1 adhesives, with the exception that 2 repetitions of the impregnating-drying cycle are maintained instead of 3 repetitions, type 2+ adhesives must meet the requirements in table 3.

Table 3 Maximum allowed percentage of delamination per test unit.

Treatment	Maximum allowed delamination per test unit. [% of the total glue line]
Low temperature	10.0
High temperature	n.a.

Admission assessment

It will be assessed whether the type of adhesive will pass the stated requirements.

KOMO®-product certificate

The KOMO® -product certificate will state the type of adhesive, it's application(s) and wood species for which it's suitable.

4.5.3 Tensile perpendicular strength on the wood fibre after ageing

If the pH of the adhesive or one of the components (with separate application or when using primers) is lower than 3.0, the tensile strength perpendicular to the wood fibre after ageing must be determined. When this is determined according to EN 302-3, the average tensile strength of the untreated test units made of pine-wood (*Picea abies* L.) must amount to $\geq 2.0 \text{ N/mm}^2$. For gap-filling adhesives, the average tensile strength of the untreated test units made of birch wood (*Fagus sylvatica* L.) must amount to $\geq 5.0 \text{ N/mm}^2$.

After ageing the tensile strength should amount to at least 80% of the value of the reference test unit.

Admission assessment

It will be assessed whether the type of adhesive will pass the stated requirements.

KOMO®-product certificate

The KOMO® -product certificate will state the type of adhesive, its application(s) and wood species for which it's suitable.

4.5.4 Effect of shrinkage on the shear strength

If the effect of shrinkage on the shear strength is determined according to EN 302-4, the average shear strength must at least amount to 1.5 N/mm^2 .

Admission assessment

It will be assessed whether the type of adhesive will pass the stated requirements.

KOMO®-product certificate

The KOMO® -product certificate will state the type of adhesive, its application(s) and wood species for which it's suitable.

4.5.5 Static load

If the static load is determined according to EN 302-8, whereby the test cycle 1b (70 °C) is maintained, at least five of the six test units must meet the requirement. In the other test units, a maximum average 0.05 mm may exist in the adhesive gap.

If a test unit fails due to wood breakage whereby no distortion of the adhesive gap occurs, this test unit shall not be included in the assessment. In this case, four of the five test unit must meet the requirement stated earlier. When two or more test units fail due to pure wood failure (poor wood quality), the test must be repeated.

Admission assessment

It will be assessed whether the type of adhesive will pass the stated requirements.

KOMO®-product certificate

The KOMO® -product certificate will state the type of adhesive, its application(s) and wood species for which it's suitable.

4.5.6 Creep under bending load

Only applies to 1K PU adhesives and EPI adhesives. Polycondensation adhesives (phenols and amino plastics) do not need to be assessed on creep.

If creep is determined according to EN 15416-3, taking into account an adhesive gap of 0.3 mm, the average value for the creep of all five paired test units must meet the requirements in table 4.

For 1K PU adhesives it applies that if after 13 weeks the value in table 4 is not achieved, the assessment can be postponed to 26 weeks; if at that time the requirement is still not met, the assessment can be postponed to 52 weeks.

EPI adhesives must at all times only be assessed after 26 weeks; if the values do not meet the requirement, the assessment can be postponed after 52 weeks.

Table 4 Maximum permitted creep ratio for the paired test units

category	Adhesive gap thickness	R _{Cmes} .13 weeks	R _{Cmes} .26 weeks	R _{Cmes} .52 weeks
General use	0.3 mm	1.12	1.12	1.15

Admission assessment

It will be assessed whether the type of adhesive will pass the stated requirements.

KOMO®-product certificate

The KOMO® -product certificate will state the type of adhesive, it's application(s) and wood species for which it's suitable.

4.5.7 Bonding to other materials (optional)

In order to demonstrate the adhesion of various kinds of materials, including the adhesion of various cover plates, ribs and insulation materials, the following test (per combination) should be performed.

Samples

Samples are taken as paired samples (reference samples and samples to be tested) so that local deviations due to the industrial bonding process do not affect the assessment.

At least three different elements of one meter long and standard width (60 - 120 cm) are sampled and tested. For each element, all bond lines are examined (all bond lines concerning different materials jointed together in the entire element). A minimum of three repetitions are tested per bond line per paired test piece (i.e. three with and three without ageing).

The elements may be supplied by the supplier insofar as they have been produced under an FPC that is under the control of an accredited certification- or notified body. In all other cases, the production must be attended to verify that all production requirements have been met (representativeness of the samples).

Test cycle

Before testing, the elements are climatized for seven days at a temperature of $20 \pm 2^\circ\text{C}$ and a relative humidity of $65 \pm 5\%$. The elements are then exposed to the following cycle:

- 8 hours of irradiation to an even surface temperature of $70 \pm 5^\circ\text{C}$ followed by cooling to ambient temperature for 16 hours over a period of five days;
- Rest period of 2 days;
- 6 hours irradiation to an even surface temperature of $70 \pm 5^\circ\text{C}$ followed by cooling to ambient temperature for up to maximum 1 hour at ambient temperature.

During cooling, the specimens are sawn from the elements and tested. The shear strength is determined on test pieces of 50 x 50 mm (when testing the bonding of tracks, ribs or battens, the width of these parts shall be observed) and taken along the edge of the elements so that edge effects are not neglected.

Ageing is carried out with calibrated IR installation and during the test calibration tiles are used for temperature control.

Requirement

The shear strength of the joints shall be assessed. A paired t-test ($p=0.05$) with the zero hypothesis that the mean value does not deviate by more than 5% shall be used to compare the results of the aged and non aged test pieces. In addition, an estimate is made per 5% of the percentage of material failure. If there is more than 90% material failure, the 5% limit does not apply



Admission assessment

It will be assessed whether the type of adhesive will pass the stated requirements.

KOMO®-product certificate

The KOMO® -product certificate will state the type of adhesive, it's application(s) and wood species for which it's suitable.



5 PROCESSING INSTRUCTIONS

For adhesives that are considered suitable for the use in load-bearing timber, processing instructions must also be submitted or made available (on the website of the producer). At a minimum, the following subjects must be included.

- Measures that can be taken during transport and storage of the adhesive;
- Wood species which can be used;
- The mixing ratio if several components are used;
- Application conditions;
- Safety requirements;
- Possible other aspects and instructions that are important to properly process the product and which could result in creating a stable end product.

When changes to the processing instructions are known or become known, the producer is obliged to submit them to the certification body for assessment

**6 REQUIREMENTS FOR THE INSPECTIONS OF THE ADHESIVE****6.1 General**

The product must come with comprehensive and updated documentation that concerns all the applicable requirements of this AD.

6.2 Registration

The raw materials used for every produced batch, including the batch numbers and the actual quantities, must be registered. The relevant production process parameters must also be registered and a registration of the production inspections must be kept up to date. All of this information must be made available to the certification body during the controls and sampling.

6.3 Uniformity of the production process

The producer must demonstrate that the uniformity of the production process remains consistent. To ensure this uniformity, a sampling of every production batch must occur and be tested in accordance with the internal IQC plan.

When it becomes known that changes shall occur in the production process, the producer is required to inform the certification body of this. If, according to the assessment of the certification body, the production process has been modified to such an extent that changes in the product characteristics can be expected, the characteristics must be demonstrated and established anew.

7 REQUIREMENTS FOR THE INTERNAL QUALITY SYSTEM

7.1 General

The management board of the KOMO® product certificate owner is always responsible for the quality of the product, the production process, the internal quality control and the ensuring of this. The internal quality control must meet the requirements as laid down in this chapter.

7.2 Quality system

The owner of the certificate needs to have a quality system which is tailored to the processes and scope as described in this assessment directive.

The quality system is laid down in the certificate owners quality manual and needs to include at least the following:

- a description of the company and it's organization;
- a procedure on internal assessments;
- a procedure on the handling of complaints;
- work instructions on specific tasks;
- instructions on safety;
- a procedure on deviations and corrective actions;
- a procedure on incoming raw materials;
- a procedure on inspection of the finished products;
- a procedure on the control of measurement equipment;
- a system for internal quality assurance (§7.3).

7.3 Quality system

The owner of the certificate should have a system for internal quality control and assurance, which at least contains the subjects of this chapter.

In the internal quality control system the following should at least be documented and registered:

- what characteristics need to be tested of the certified products;
- according what method should these characteristics be determined and what equipment is needed;
- how often these characteristics need to be tested;
- how registration of the outcome of the tests are recorded and stored;
- identification and traceability of deliveries.

The internal quality assurance system of the certificate holder should demonstrate the certified products produced comply with the requirements as stated in this assessment directive.

7.4 Management of the quality system

Within the organization there should be someone responsible for the internal quality management system. This person needs to directly report to the management board regarding the quality assurance. To this end, the responsible person shall have appropriate powers.

7.5 Assurance of documents and registrations

The owner of the certificate makes sure that:

- the active versions of the quality related documents are available where they are needed for all employees, who could need these. This also counts for project and/or process specific manuals and instructions;
- the procedures and instructions as mentioned in § 7.2 and 7.11 are regularly reviewed and updated and implemented when needed;
- new and changed quality related documents are authorized and released for use by the responsible person;
- relevant registrations are kept to make it demonstrable the quality of the produced product(s), the production process and other norm specific handling meet the requirements as laid down in this assessment directive

The producer needs to have an easy accessible registration of the product characteristics determined during the quality control inspections, to make it demonstrable the produced products meet the requirements of this assessment directive.

Recorded data shall be kept for a minimum of 10 years. Exceptions to the storage period of registrations are the test samples from the entry inspection. These have a storage period of at least 1 year.

Following an inspection, the certification body may decide to shorten or extend the storage period. (In the event of a shortened storage period, delivery data should always be available since the inspection).

7.6 Measurement equipment

Measurement equipment, production equipment and test equipment needs to be calibrated on an annual basis, of which a registration shall be kept. Calibration can be internal (calibrated reference equipment) or externally (calibration company) performed.

7.7 Laboratory

In order to carry out laboratory activities, there must be an equipped (separate) room and the prescribed measuring and testing equipment. If an external laboratory is used, it must be approved by the certification body.

Preferably an external laboratory needs to be independently accredited based on NEN-EN-ISO/IEC 17025.

The samples used for inspection and testing should be clearly identified. Any test sequence must be recognisable.

The producer of the adhesive must, depending on the products that are made and as far as this applies to the mandatory checks to be carried out for the products concerned, have the following equipment at its disposal:

- Temperature-controlled bath (or other equipment to submerge samples in boiling water)
- Drying oven (of at least 100°C), accuracy ± 2 °C
- Weighing scale and/or balance with an accuracy of $\pm 0,01$ gram
- Thermometers, including a calibrated thermometer, accuracy $\pm 0,5$ °C;
- Tensile test machine.

7.8 Supply

Raw materials, semi-finished products, etc., for which reference are made to another assessment directive, must comply with the requirements of the relevant assessment directive. The goods received must be checked in accordance with the quality system and records must be kept of this.

7.9 Non-complying products

When a certified product is produced outside the specifications or for some other reason it does not comply with the requirements as laid down in this assessment directive, the following should take place:

- the product (adhesive) should be marked and not to be delivered to the customer;
- it should be determined what caused the deviation and if corrective actions should be taken;
- a registration should be kept on what deviations are found and what corrective actions have been taken (if so).

If the deviations become known after the product is delivered the customer should be notified and involved in the follow-up.

7.10 Handling of complaints

The owner of the certificate needs to have a procedure on the handling of complaints regarding the delivered products.

This procedure should at least contain:

- the responsible person for handling and assessment of the complaint;
- the registration of the complaint including follow-up and closing;
- a timeline for the follow-up and closing of the complaint;
- a correct communication with the customer (complainant);
- the implementation of corrective action when necessary.



7.11 Procedures and working instructions

The producer must at least include the following components in its quality system procedures:

- Inspection of raw materials;
- inspection of the finished product;
- inspection of the measuring equipment;
- complaints registration the handling of non-complying products (products with short commings).

8 REQUIREMENTS REGARDING THE PERIODICAL ASSESSMENT

8.1 General

The external assessment is recorded by the certifying body in accordance with the regulations from the board of experts and the product certification regulation of the certification body.

8.2 Initial inspection

During the initial assessment, the certification body assesses whether the company in question meets the requirements presented in this AD. A report is compiled of the initial assessment and on the basis of this, the KOMO® quality declaration may or may not be issued under certain conditions.

8.3 Nature and frequency of the periodical assessment

The certification body assesses two times a year (if possible without notification), whether the products meet the technical specifications and whether the production is in accordance with the specifications laid down by the producer and agreed to by the certification body and whether the internal quality control system of the producer meets the requirements as established in section 7.

A written report is drafted of these assessments.

The Board of Experts, can change the frequency of the assessment on the basis of arguments. Companies that are ISO 9001 certified and have stated the development and production of adhesives in the scope must be visited 1 x per year.

Once every three years a sample of every KOMO® certified adhesive must be taken by the certification body so that further research can be done by an external laboratory. Depending on the sustainability class (classes I, II+ or II), the research is carried out according to the table below.

Table 5 Minimal shear strength in N/mm² for sustainability classes I, II+ and II after assessment according to EN 302-1, "close contact glue line".

Sustainability Class	Treatment according to EN 302-1	Requirement: minimal shear strength in (N/mm ²)
I	A5	8.0
II / II+	A3	8.0

Additional samples may be taken if necessary. The costs for such research are for the account of the certificate holder.

8.4 Sanctions policy

The sanctions policy (sanctions to be taken by the certification body in case of non-conformities) must be included in the in section 9.1 mentioned procedure of the certification body or in a specific separate document.

9 REQUIREMENTS FOR THE CERTIFICATION BODY

9.1 General

The certification body must have a procedure in which the general rules are established that are used for certification. In particular, these are:

- The general rules for carrying out the initial assessment, according to:
 - The way in which manufacturers are informed about the processing of an application;
 - The execution of the assessment;
 - The decision as a result of the assessment that took place.
- The general rules regarding the execution of assessment and the assessment aspects used;
- The measures that the certification body shall take with non-conformities;
- The rules upon termination of a certificate;
- The option of lodging an appeal against decisions or measures of the certifying body.

9.2 Certification staff

The staff involved in the certification process can be divided into:

- Inspector: charged with carrying out the external assessment;
- Initial inspector: charged with carrying out the initial assessment and assessing the reports of inspectors/lab technicians;
- Assessor: in charge of the assessment of the investigator of the initial inspection and the inspector and decisions that need to be made concerning the necessity of taking corrective measures
- Decision-maker: charged with taking decisions on the basis of the initial inspection carried out, the continuation of certification on the basis of the inspections carried out.

9.3 Qualification requirements

Employees involved in the qualification process must be demonstrably qualified for performing the necessary activities. In regard to the education and expertise/experience, the following qualification requirements apply:

Table 6 Qualification requirements for certification staff

Certification staff	Education	Knowledge and Experience
Inspector Initial inspector	Bachelor level	• Production and application of adhesives; • Training for ISO 9001 auditor • Two years of experience in the adhesives industry or equivalent.
Assessor	Bachelor level	• Chemical background or similar; • Production and application of adhesives; • At least 2 years of management experience in the adhesive industry or equivalent.
Decision-maker	Bachelor level	• Management experience or equivalent; • Certification or equivalent; • Accreditation criteria or equivalent; • Knowledge of relevant certification systems.

Certification staff must be demonstrably qualified through testing of education and experience to meet the requirements stated above. If qualification takes place on the basis of different criteria, this must be established in writing.

9.4 Reports on the initial- and certification assessment

The results of the initial type testing and certification assessment are reported by the certification body in a report/file. This report or file needs to comply with the following:

- **Completeness;** the report or file includes comments on all requirements as mentioned in this assessment directive;
- **Traceability;** the findings on which the comments are based should be traceable.

The decision maker who decides on the publication of the KOMO® -product certificate needs to make his decision based upon the findings and conclusions made in this report/file.

9.5 Decision on the KOMO® -product certificate

The decision on the publication and/or imposing sanctions and/or suspension and/or termination of the KOMO® -product certificate need to be made by a therefore sanctioned decision maker, who was not involved in the certification assessment. Based upon the assessment the decision maker decides whether the KOMO® - product certificate shall be granted or additional information and/or research is needed before publication. The decision needs to be traceable.

9.6 Reporting to the Board of Experts

The certification body reports at least once a year about the certification activities carried out. This report must address the following issues:

- Changes in the number of certificates (new/expired);
- Number of assessments carried out in relation to the determined frequency;
- Results of the assessments.

10**LIST OF STATED DOCUMENTS**

NEN-EN-ISO/IEC 17020:	Conformity assessment - Requirements for the operation of various types of bodies performing inspection
NEN-EN-ISO/IEC 17021-1:	Conformity assessment - Requirements for bodies providing audit and certification of management systems - Part 1: Requirements
NEN-EN-ISO/IEC 17025:	General requirements for the competence of testing and calibration laboratories
NEN-EN-ISO/IEC 17065:	Conformity assessment - Requirements for bodies certifying products, processes and services
EN-EN-ISO 9001: 2015	Quality management systems - Requirements
NEN-EN 1995-1-1+C1+A1: 2011/NB:2013 nl	National Annex to NEN-EN 1995-1-1+C1+A1 Eurocode 5: Design of timber structures - Part 1-1: General - Common rules and rules for buildings (includes NEN-EN 1995-1-1+C1+A1/C1:2012)
NEN-EN 15425:2017	Adhesives - One component polyurethane (PUR) for load-bearing timber structures - Classification and performance requirements
NEN-EN 16254:2013+A1 2016	Adhesives - Emulsion polymerized isocyanate (EPI) for load-bearing timber structures - Classification and performance requirements
NEN-EN 301:2017	Adhesives, phenolic and aminoplastic, for load-bearing timber structures - Classification and performance requirements
NEN-EN 302-1:2013	Adhesives for load-bearing timber structures - Test methods - Part 1: Determination of longitudinal tensile shear strength
NEN-EN 302-2:2017	Adhesives for load-bearing timber structures - Test methods - Part 2: Determination of resistance to delamination
NEN-EN 302-3:2017	Adhesives for load-bearing timber structures - Test methods - Part 3: Determination of the effect of acid damage to wood fibres by temperature and humidity cycling on the transverse tensile strength
NEN-EN 302-4:2013	Adhesives for load-bearing timber structures - Test methods - Part 4: Determination of the effects of wood shrinkage on the shear strength
NEN-EN 302-8:2017	Adhesives for load-bearing timber structures - Test methods - Part 8: Static load test of multiple bond line specimens in compression shear
NEN-EN 15416-3:2017+A1:2019	Adhesives for load bearing timber structures other than phenolic and aminoplastic - Test methods - Part 3: Creep deformation test at cyclic climate conditions with specimens loaded in bending shear
NEN-EN 923:2016	Adhesives – Terms and definitions