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APPLYING ‘DIRECT GLAZING’ IN WINDOWS UNDER AD 0801

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PROLOGUE

This protocol has been drawn up by SKH, in consultation with the NBvT (Dutch timber association), in order to provide clarity about the steps to be followed for the KOMO certification of wooden windows fitted with direct glazing in accordance with AD 0801.
In the case of direct glazing, the glass is glued into the wooden window, thus contributing to the strength and rigidity of the wooden window. This makes it possible to reduce the size of the wooden window. This document is drawn up, because this method of glazing requires specific requirements regarding the (quality of the) bonding. It is an interpretation document for the AD 0801 "wooden façade elements"

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1. INTRODUCTION

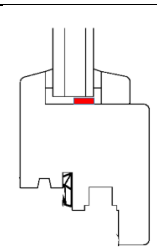
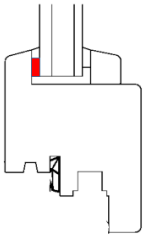
1.1 General

This protocol clarifies how it can be demonstrated that wooden windows fitted with "direct glazing" comply with the relevant performance requirements of the AD 0801. In the context of this protocol, direct glazing refers to the bonding of glass in a window through which the stiffness of the glass and the window work together. As a result of this it's possible to use smaller dimensions for the timber used to construct the windows.

Note:
In order to prevent injury, it must not be possible for the glass to come loose directly from the window as a result of errors in the application. To this end, a second "support" must be applied in the form of a mechanical fastening such as nailed glazing beads (minimum coverage 10 mm). Windows without glazing beads with glued glass are considered "structural glazing". Structural glazing in this application is not (yet) covered by this protocol.

1.2 Scope

This protocol relates to the implementation of direct glazing according to one of the following principles:

Edge bonding (Only allowed when using an adhesive, tape is not allowed)	Adhesive is applied at the glass edge around the whole glass. Glazing continues to be traditionally carried out in accordance with NPR 3577 or NEN 3576	
Longitudinal bonding (Allowed with an adhesive or tape, but when using tape an glazing sealant must be used.)	Adhesive is applied all around the glass on the outside sides of the glass, when necessary a glazing sealant is used. Glazing on the inside traditionally carried out in accordance with NPR 3577 or NEN 3576.	

If the method of direct glazing deviates from the above principles, additional tests may be necessary to demonstrate its durable application.

Direct glazing can be applied under concepts II+, III and IV as described in AD 0801 dated 31-10-2019.

1.3 KOMO® attest-with-product certificate (with KOMO process certificate)

If it has been demonstrated that the performance requirements of this protocol have been met, the attest-with-product certificate (with KOMO® process certificate), issued on the basis of the AD 0801, shall be supplemented by a tested system for direct glazing.

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2. THERMINOLOGY

In addition to Chapter 2 of AD 0801, the following term shall apply:

Direct glazing system	System on which direct glazing is carried out consisting of a combination of the adhesive or tape concerned, the paint system applied to the window and the type of wood from which the window is made in combination with the position of the bonding (edge or longitudinal bonding).

3. ADMISSION AND PERIODICAL ASSESSMENT

In accordance with Chapter 3 of AD 0801, the direct glazing system and its application shall be assessed in an admission assessment and during the periodical assessments.

4. PERFORMANCE REQUIREMENTS

The requirements relating to the Dutch Building Decree for wooden façade elements with windows fitted with direct glazing remain unchanged.

Note: The glazing system must meet the requirements for burglar resistance, external moisture resistance and air volume flow. Glazing carried out in accordance with the principles of NPR 3577 and/or section 12 of the KVT and SKH Publication 98-08 (burglar resistance) meet these requirements. In the case of glazing systems that deviate from the principles stated in the above guidelines, it must be demonstrated that the requirements are met.

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5. REQUIREMENTS PRODUCT SPECIFICATIONS

5.1 General

In addition to section 5.1 of AD 0801, the following applies with regard to the adhesive and tape:

Requirement
The adhesive or tape used in the direct glazing system must be shown to continuously meet the performance requirements as determined according to this protocol.

Method
An independent declaration of the adhesive and tyre must be available based on the principles described in section 1.4 and chapters 3, 5 and 6 of BRL 2801 "glazing sealant".

Admission assessment
It is assessed whether the applied adhesive and/or tape complies with the requirements.

KOMO® attest-with-product certificate
The KOMO® product certificate describes that the adhesive and/or tape as part of the direct glazing system complies with the requirements.

5.2 Glazing

In deviation from the requirements as stated in section 5.4.12 of AD 0801, the following performance requirements apply.

5.2.1 Durable bonding of the direct glazing system

The durable adhesion of any combination of the direct glazing system must be demonstrated.

Note: any combination refers to the combination of the specific adhesive or tape, the paint system and the wood specie.

Requirements
The tensile strength under load at 60°C and -20°C and after ageing (according to 2A/B and 3) is at least 50% of the tensile strength at 23°C and the adhesive failure of the adhesive is on average not more than 10% with a maximum of 25% per individual specimen. For a tape, only the tensile strength requirement shall apply[1]

[1] Note: Due to the high internal strength of the tape, a cohesive fracture is not to be expected and the fracture pattern will basically consist of adhesive fracture.

Method
After the test pieces have been conditioned in standard climate at 20 (±2) °C and 65 (±5)% RH (or optionally 23 (±2) °C and 50 (±5)% RH) for 7 days, the tensile strength for edge and/or longitudinal bonding shall be determined according to the following determination method as indicated in ift-RICHTLINION VE-08/4 (März 2017):

1 Edge- and longitudinal bonding;
Tensile strength after 24 (±4) hours conditioning at 60 (±3) °C, 23 (±3) °C and after 24 (±4) hours conditioning at -20 (±3) °C.

2A Edge bonding;
Tensile strength after ageing for 500 (±4) hours at a temperature of 60 (±3) °C in accordance with section 5.1.4.2.1 of ETAG 002 (without the water load specified in ETAG 002)

2B Longitudinal bonding:
Tensile strength, in accordance with section 5.1.4.2.1 of ETAG 002 (without the water load specified in ETAG 002), after ageing for 500 (±4) hours at a temperature of 60 (±3) °C and a UV load of 50 W/m^2 on the test surface.

3 Longitudinal bonding without the use of a glazing sealant;
Tensile strength after exposing the samples to water and detergents according to section 5.1.4.2.4 of ETAG 002, where the following modifications apply:

- Prior to testing, the end grain of the wooden test pieces are sealed with an end grain sealer in accordance with SKH Publication 07-01;
- The prescribed load consists of immersion for 15 minutes in water with 1% market-conforming detergent at a temperature of 45 (±3) °C where the pH value of the solution must be less than 7 (must be measured and recorded);
- Following the samples are conditioned for 23.75 hours in standard climate at 20 (±2) °C and 65 (±5)% RH (or optionally 23 (±2) °C and 50 (±5)% RH);
- this cycle is repeated 19 times, during which the weekends can be bridged by means of conditioning in the chosen standard climate, the course of the procedure is recorded;
- after completion of the procedure described above, wooden samples are conditioned for 7 days in the chosen standard climate.

Note:

- *In order to limit the number of tests, the combination of one adhesive or tape and wood specie with the different paint systems can be tested for tensile strength according to point 1, after which ageing according to point 2A/B or 3 is only carried out on the 3 paint systems with the lowest tensile values.*
- *As an alternative to the above method of determination, the following method can be used:*

  Tensile strength after 24 (±4) hours of conditioning at 60 (±3) °C, 23 (±3) °C and after 24 (±4) hours of conditioning at -20 (±3) °C on a glass or metal substrate. This test assesses, independently of the substrate, whether the adhesive system meets the limits of tensile strength at load at 60 (±3) °C and -20 (±3) °C of at least 50% of the tensile strength at 23 (±3) °C at 100% cohesive failure, supplemented by the following;
  Peel test according to DIN 54457 on each combination after ageing according to the following cycle:
  - *7 days conditioning at 60 (±3) °C and 95 (±5)% RH followed by,*
  - *7 days conditioning at 60 (±3) °C (dry) followed by,*
  - *1 day of conditioning at -20 (±3) °C followed by,*
  - *7 days conditioning at 60 (±3) °C and 95 (±5)% RH.*

Admission assessment
It is assessed whether the direct glazing system complies with requirements and what approval conditions apply to it.

KOMO® attest-with-product certificate
The KOMO® product certificate part describes the direct glazing system and states that it complies with the requirements.

5.2.2 Strength and dimensions windows

The strength of each combination of the direct glazing system must be demonstrated in relation to the maximum allowed window size.

Requirements
After testing the window according NEN-EN 14608 according class 4 of NEN-EN 13115 and the maximum allowable load of the windows in accordance with NEN-EN 14609, loss of adhesion or cracking of the adhesive/tape is not permitted and the deformation is maximum 1/200 x the smallest dimension of the open window.

Method
To determine the strength of windows in relation to the maximum allowable window size, the resistance to racking needs to be determined according NEN-EN 14608 and the resistance to static torsion according NEN-EN 1460. The tests must be carried out on windows in the maximum size and glass weight to be carried out.
After testing the resistance to static torsion in accordance with NEN-EN 14609, the registered load and displacement must be checked against the maximum limiting value (MLV) and the useful limiting value (ULT), taking into account the applicable loads, EN 1991-1-4 for wind pressure, load factors (EN 1990) and applicable material and modification factors for glass (NEN 2608).

Note: The determination of resistance to racking and to static torsion can also be tested on a smaller window, after which the maximum size to be carried out and the applicable glass weight of the windows is determined mathematically.

Admission assessment
An assessment is made as to whether the direct glazing system complies with the requirements and what approval conditions apply.

KOMO® attest-with-product certificate
The KOMO® product certificate part describes the direct glazing system and states the maximum window size and the maximum applicable glass weight.

5.2.3 Compatibility of the materials

For the direct glazing system, the compatibility of the materials (in particular the adhesive/tape with the edge seal of the glass and the glazing sealant on the adhesive/tape when bonded along the edge) must be demonstrated.

Requirements
The materials used must be compatible with each other in such a way that the functional properties of the direct glazing system are not affected.

Method
The mutual compatibility of the materials used can be demonstrated by means of Part 3 "Compatibility" of the ift guideline VE-08/04 or by a method as agreed between the parties who supplied the materials for the direct glazing system.

Admission assessment
It is assessed whether the direct glazing system has been shown to be compatible with the materials used.

KOMO® attest-with-product certificate
The KOMO® product certificate part describes the direct glazing system and states that it complies with the requirements.