
Guidelines for SINTEF Technical Approval for

Wooden windows

1. General information about SINTEF Technical Approval

General information about SINTEF Technical Approval procedures is available at <http://www.sintefcertification.no/en-us/PortalPage.aspx?pageid=180>

2. Properties to be included in the approval and how the properties are determined

In table 1 the properties that are obligatory to document in a SINTEF Technical Approval for wooden windows are listed, and also which approval requirements that apply. "Approval requirements" means the minimum accepted performance or class per property. For some given properties, however, the only criteria is that a measured or calculated value is declared.

In table 2 the properties that are voluntary to document are listed. These properties can be included in a SINTEF Technical Approval provided that they are satisfactorily documented.

Table 1: Approval requirements for wooden windows – obligatory properties

Property	Test standard	Classification standard	Minimum requirements
Air permeability	EN 1026	EN 12207	Class 4
Water tightness	EN 1027	EN 12208	Class 9A (no observable leakage up to 600 Pa)
Resistance to wind load	EN 12211	EN 12210	Class 3C 600 Pa, curvature < 1/300)
Load-bearing capacity of safety devices ((ex. safety catch)	EN 14351-1, clause 4.8 (cf. EN 14609)		Windows provided with safety devices shall be able to withstand 350 N for 60 s. State as "Passed".
Operating force ^{*)}	EN 12046-1	EN 13115	Class 1
Insulation against outdoor noise	EN ISO 10140-2 (EN 140-3)	EN 717-1	Declared based on measurement or simplified calculation according to EN 14351-1, Annex B.
U-value window, U _w	EN ISO 12567-1 EN ISO 10077-1 EN ISO 10077-2 ISO 15099		Documented by measurement or calculation for the most common type of sealed glazing unit and for the most common sizes of the window.
U-value frame/sash U _f	EN ISO 12567-1 EN ISO 10077-2		Documented by measurement or calculation where the sealed glazing unit is replaced with an EPS plate.
U-value sealed glazing unit, U _g	EN 673 ISO 15099		Declaration of performance from the manufacture can be used as documentation for U _g . If this is not available, U _g can be documented by measurement or calculation.
Temperature factor ^{*)} (designing conditions)	EN ISO 12567-1 EN ISO 10077-2 ISO 15099		Temperature factor ≥ 0,6

Radiation properties given by solar factor (g) and value for light transmittance (τ_v)	EN 410 EN 13363- 1 EN 13363- 1		Measured or calculated value is declared.
Water repelling treatment, alternatively wood with high amount of core wood (kjerneved).			To ensure that the window can withstand a limited period of storage at the building site and a limited amount of rain without this leading to detrimental moistening of the wood. A "self-declaration" regarding this is obtained from the producer.
* The temperature factor requirements apply for the transition glass frame/sash. Note: The factor is calculated for Norwegian design outdoor climate corresponding to an outdoor temperature $T_u = -17\text{ °C}$, and an indoor temperature $T_i = 22\text{ °C}$. ** Obligatory for doors and windowdoors. Voluntary for windows.			

In addition to requirements for the properties of the complete window, the following requirements relating to the window components also have to be satisfied:

- Hardware shall have satisfactory protection from corrosion, class 3 in accordance with NS-EN 1670.
- Adhesives shall be water resistant and satisfy the requirements of clause D4 in accordance with EN 204
- Properties for suitability when used shall be documented for weather seals and glazing gaskets
- U-value and radiation properties of the sealed glazing units shall be documented.
- Properties for suitability when used shall be documented for sealing compounds.
- Slit ventilators shall be tested for air passage in both open and closed positions. In closed position the air passage shall not exceed 2,4 m³/h when an outside positive pressure of 600 Pa is applied. In open position the air passage is measured when an outdoor positive pressure of 0 Pa, 5 Pa and 10 is applied.
- The wood quality shall satisfy requirements stated in EN 14220 *Timber and wood-based materials in external windows, external door leaves and external doorframes – Requirements and specifications*.
- The sash-/ frame profiles are to be executed in a way that provide for the precipitation to run off at the external side. Parts/ surfaces of horizontal profiles that can be exposed to precipitation shall have a minimum slope 1:8
- The insulating glass unit shall normally be mounted in the sash according to recommendations given in SINTEF Building Research Design Guides (Byggforskserien). This traditional way of mounting the glass is tested in Norwegian climate with regard to draining from the glazing rebate, and also airing to ensure dehydration of moisture. If this is not the case it must be documented that the durability of the window is not less than if mounted as stated above. The traditional mounting of the glass as given in SINTEF Building Research Design Guides is tested in Norwegian climate with regard to draining from the glazing rebate .

Table 2: Approval requirements for wooden windows – voluntary properties

Property	Test standard	Classification standard	Minimum requirements
Repeated opening and closing	EN 1191	EN 12400	Class 3 (20.000 cycles)
Mechanical stability	EN 14608 EN 14609	NS-EN 13115	Class 2
Fire properties (combustibility and resistance)	EN 1364-1 EN 14600	EN 13501-2 EN14600	According to requirements given in the building code.
Burglary protection	EN 1628	NS-EN 1627	

Properties regarding fire- and burglary safety are of current interest for custom fabrications. It is emphasized that windows used in fire classified building parts, i.e. facades and partition walls, shall have a certification or approval where the fire properties in particular are evaluated.

The profiles of wooden windows with aluminium sheeting shall be evaluated in order to determine if condensation or rain water can accumulate on horizontal surfaces. Based on the evaluation testing according to EN 13420 *Windows - Behaviour between different climates - Test method* can be required.

Minimum requirements apply to the finished surface of windows supplied with finished surface treatment.

In table 3 guidelines regarding aggravating requirements for particular properties for windows in passive house (NS 3700) are listed.

Tabell 3: Guidelines for aggravating "requirements" for particular properties given in Table 1 for wooden windows for use in passive houses (NS3700).

Property	Test standard	Classification standard	Minimum requirements or recommended min. requirement
Air permeability	EN 1026	EN 12207	Max. air leakage at 50 Pa: 0,5 m ³ /m ² h ¹ Max. air leakage at 600 Pa: 2,6 m ³ /m ² h
U-value window, U _w **)	EN ISO 12567-1 EN ISO 10077 EN 673		Documented by measurement or calculation for the most common type of sealed glazing unit and for windows with external frame measurement 1,2 m x 1,2 m and 1,23 m x 1,48 m.
Temperature factor***)	EN ISO 12567-1 EN ISO 10077-2 ISO 15099		Temperature factor ≥ 0,6
Radiation properties given by solar factor (g) and value for light transmittance (τ _v)	EN 410 EN 13363- 1 EN 13363- 1		Measured or calculated value is declared The required radiation properties is determined by the buildings design and placement.
<p>* Provided a relatively large compartment model this amount to approx. 0,03 at the leakage number</p> <p>** the U-value requirement in NS 3700 applies to the average U-value of the total window area of the building. (In order to fulfil the requirement in NS 3700 preliminary calculations show that the U-value for a window with external frame measurement 1,2 m x 1,2 m should be ≤ 0,80 W/m²K)</p> <p>*** The temperature factor requirement applies for the transition glass/ bottom sash/ bottom frame. Note: The factor is calculated for Norwegian design outdoor climate corresponding to an outdoor temperature T_u = -17 °C, and an indoor temperature T_i = 22 °C.</p>			

In the approval document it can be stated which performances of the product that are suited for buildings constructed in accordance with NS 3700.

Environmental properties

All products having a SINTEF Technical Approval (TG) shall have been evaluated with respect to environmental impact. Requirements concerning material and product properties related to impact on the environment is available at; <http://www.sintefcertification.no/en-us/PortalPage.aspx?pageid=180>

Special conditions for use and installation

Written descriptions shall follow the product and the descriptions shall include necessary information regarding reception, storing, handling and installation of the product and also how the product is protected during the building period.

Methods for inserting the window into timber framework and concrete/ masonry walls shall be given in the installation specifications. The installation specifications can point out preaccepted solutions stated in the guidance to the relevant technical regulation, predocumented solutions given in SINTEF Building Research Design Guides or other solutions that are documented by testing. Ways of adjustment shall also be described. Each delivery shall include a specification of the maintenance routine, or a relevant link to the home site of the manufacturer (ex. www.vindusfabrik.no/vedlikehold).

3. Description of the manufacturer's factory production control

As a basis for the approval SINTEF must receive a copy of the description of the manufacturer's control plan for the product. This may be the relevant part of the manufacturer's quality control system for the product, or other documentation describing the manufacturer's factory production control. The person responsible for the factory production control shall be identified.

The control plan shall as a minimum describe the controls performed for:

- Incoming materials
- The production process
- Finished product
- Marking and storage

including the control frequency, how the controls are performed and by whom.

The factory production control description shall also include what measures are taken when faults are observed in the production or in the product.

4. Supervisory production control

The production shall be subject to a supervisory product and production control performed by an independent body. General description of how the supervisory product and production control are performed is available at; <http://www.sintefcertification.no/en-us/PortalPage.aspx?pageid=180>

One factory visits is carried out annually. In addition, every second year testing of the properties air permeability and water tightness is executed at random samples at each product that is covered by the approval.

5. Application for SINTEF Technical Approval and project management

Information regarding application and project management for SINTEF Technical Approval is available at; <http://www.sintefcertification.no/en-us/PortalPage.aspx?pageid=180>

The execution of the window design must be documented in detail. Therefore it is normally required that the applicant submit the following supporting documentation:

- Detailed drawings of sections of the frame/ sash profiles
- Detailed drawings of corner connections in frame and sash
- Detailed specifications of all incoming materials and components.

6. More information

Further information about SINTEF Technical Approval can be found on www.sintefcertification.no.