SPECIFICATIONS
FOR INSULATING GLAZING

November 2016
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1. Definition of product certification

Certification is an act whereby, through controls, a third party organization attests that a certified production site has put into place all of the necessary means to manufacture products with given characteristics, referred to as certified characteristics.

Any production centre holding a product certificate also holds the right to use the certification.

2. Specifications

These specifications are intended for purchasers and users in the construction sector. Their purpose is to inform them concerning:

- the certification program that CEKAL-certified insulating glazing production centres have committed to comply with
- the rules of installation and usage to create high quality structures using this glazing

Warning: this document does not claim to be exhaustive, nor can it replace texts drafted for the purposes of standards or regulations.

3. Definition of insulating glazing

Insulating glazing is an assembly made up of two or three glass panes (monolithic or laminated) separated by one or two spacers, and sealed around the edges to ensure its mechanical stability and its durability.

4. Certification program, called the certification regulation

The CEKAL certification is issued in conformity with the articles L.115-27 to L.115-33 and R.115-1 to R.115-3 of the French Consumer Code. Its regulation (“referential”) can be consulted at www.cekal.com. It includes in particular the Technical Regulations, composed of the following documents:

- the Certification Rules
- the Technical Requirements for insulating glazing

REMINDER

It is the users’ responsibility to verify, at www.cekal.com, (menu Regulation) that the reference indicated on the front page of the specifications corresponds to the latest document in force.
5. Certified production centre

A certified centre is an insulating glazing production unit that has received the authorization to use the certification for all or a portion of its production.

The usage authorization is granted:
- to a centre installed in a given location and identified by a number issued by CEKAL
- for a production performed in compliance with the content of its CEKAL product certificate.

6. Product certificate

The certificate attests to the certification usage authorization granted by CEKAL to a production centre. The certificate indicates:
- the company name
- the production centre address
- the production centre identification number attributed by CEKAL
- the period of validity of the certificate
- the scope of the products certified (double, triple glazing, types of glazing requiring specific monitoring, assembly processes)
- the marking sequence including the commercial brand name of the products

The use of CEKAL marking is only authorized for production centres holding a valid certificate. The list of the certified production centres can be consulted at www.cekal.com (menu Manufacturers).

7. Certified characteristics and performances

The CEKAL certification covers:
- resistance to humidity penetration
- thermal performance
- acoustic performance

REMINDER
The appearance of insulating glazing, covered by standard NF EN 1271-1, is not in the scope of the CEKAL certification.

8. Assembly system

The assembly system for glass panes in insulating glazing has the following purposes:
- to maintain the space between panes
- to resist humidity penetration into this space
- to maintain the gas concentration required between the panes

An assembly system is generally made of a spacer with desiccant, a butyl mastic sealant and a mastic sealant. The association of a type of spacer with a type of sealant is what defines an assembly process.

REMINDER
In the case of a non-conventional type of glazing or assembly process, the prior attribution of a technical notice (ATec), technical application document (DTA) or an equivalent assessment may be required before examining the certification application.

9. Insulating glazing constituents

CEKAL registers the constituents that the centres are authorized to use.

REMINDER
In the case of a non-conventional constituent, the prior attribution of a technical notice (ATec), technical application document (DTA) or an equivalent assessment may be required before examining the registration application.
1. Certified products

A product is considered certified if all of the following conditions are met:

- the centre holds a valid certificate (reissued every 6 months)
- the said product is covered by the scope of the certificate (double or triple glazing, type of glazing, assembly process)
- the production centre implements the controls stipulated in the Technical Regulations of the certification
- the product is made with authorized constituents that are compatible with each other
- the product is marked in compliance with the requirements of the Technical Regulations.

If any one of these conditions is not met, the product is not certified.

2. Marking on certified insulating glazing

The certified centres must mark all of their production in accordance with the marking sequence indicated below:

- the certified products must have the word “CEKAL” included in their marking sequence
- the products out of the scope of the certification must be marked, without the word “CEKAL”.

3. Marks on certified insulating glazing for installation purposes

The centres must:

- mark the position of the coating(s), or the surface that must be positioned on the outside
- mark the position of the glass components when the latter are hard to identify (tempered glazing, etc.)
- mark the reference angle for glazing weighing over 100 kg and for structural glazing
- mark the position of the breathers in the glazing containing them and indicate how to close these breathers to users.

Mandatory marking on the certified glazing

<table>
<thead>
<tr>
<th>Brand or company name</th>
<th>Manufacturing reference</th>
<th>Production site</th>
<th>Usage indicators</th>
<th>Performance indicators (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSULATING G</td>
<td>PERIOD (1)</td>
<td>CEKAL 999</td>
<td></td>
<td>U_g 1.1</td>
</tr>
</tbody>
</table>

(1) or address of the manufacturer’s website, and a product identification number
(2) the marking of thermal and acoustic performances is optional
PRODUCTION TESTS AND CONTROL

The periodic controls cover the main steps in the double and triple glazing manufacturing process, i.e.:

- constituent reception
- glass pane preparation (cutting, edge trimming, washing, drying, etc.)
- positioning of the “spacer system” incorporating its desiccant on the glass panes
- gas filling and pressing
- mastic sealant coating
- storage, packaging and delivery

Receiving and maintaining the authorization to use the certification are subject to compliance with all of the following controls.

1. Internal controls performed by production centres

These controls concern:

- the choice of authorized constituents and compliance with their characteristics
- manufacturing quality (cutting, edge trimming, glass washing, butyl deposit, pressing of the panes, mastic sealant coating, storage, etc.)
- the characteristics of the finished products (flatness, dimensions, resistance to humidity, gas filling, etc.)

The results of these controls are recorded and archived.

2. External controls performed by MVBs

Twice a year, CEKAL has MVBs (Measurement and Verification Bodies) inspect the certified production centres to verify the following elements:

- overall manufacturing quality
- quality of the finished products
- conformity and traceability of internal controls
- marking conformity

During these visits, the MVB takes glazing samples for tests in its laboratory.

REMINDER

The constituents used to manufacture the certified glazing are also regularly controlled by third party organizations recognized by CEKAL.

The dimensional tolerances can be found in the Technical Requirements at www.cekal.com. The compliance with these tolerances is controlled internally and with verifications during the inspection visits.
The customer is solely responsible for the choice of the glazing composition in accordance with the expected performances, the installation context and the usage conditions. He must comply with the reference texts and standards, including these specifications.

The elements described below must in particular be taken into account to validate the composition of glazing subjected to thermal and mechanical loads.

1. Conditions related to the insulating glazing itself
   - height and width
   - thickness and type of spacer
   - position of the coating(s)
   - type of air or gas space
   - type of glass components (laminated, tempered, etc.)
   - thickness of the glass components
   - energy characteristics of the glass components

2. Conditions related to building design and the location of the insulating glazing
   - presence of blinds or other shading elements
   - presence of heating elements near the glazing
   - summer and winter temperatures in the facilities
   - inclination, height with respect to the ground
   - facade orientation
   - location (in main portion, in corners)
   - presence of masks, cast shadows, slab nosing, load-bearing walls

3. Conditions related to regional data at the installation location
   - minimum and maximum temperatures
   - wind pressure and snow load
   - solar flux
   - location in a seismic zone

REMINDER
Volatile Organic Compounds (VOCs)
The glazing is likely to be labeled to indicate its VOC classification.

4. Most frequent load factors
   - type of installation (number of sides free)
   - heating/cooling of air or gas space
   - relative pressure in this space with respect to that of the outdoor air
   - temperature gradients between the portions of the glass components exposed to the sun and those not exposed
   - variations in the atmospheric pressure linked to altitude changes (manufacturing site, transport and installation location)
   - pressurization and depressurization stress due to wind
   - snow loads
   - own weight
   - possible operating loads
   - stress during storage, transport, handling

Taking into account all of this data makes it possible to define the glazing composition:
   - thickness, dimensions and type of glass components
   - thickness and type of air or gas space
   - thickness and type of spacer
   - type and height of mastic sealant
The certified production centres may provide assistance in defining the glazing according to the needs expressed by the customer (see § D). This assistance with the definition of the glazing cannot replace the mechanical and thermal studies that the customers must perform or have performed.

The tests performed by the certified production centres are limited to verifications under internal loads (under the effect of temperature and altitude variation), without taking into account loads created by wind, snow or operation.

1. Conventional verification conditions

In the absence of elements specific to the project, the certified production centres apply the following conventional conditions for double and triple glazing:

- sealant system height: 10 mm
- glazing position: 90° with respect to the horizontal
- external summer temperature: 35°C
- internal summer temperature: 25°C
- no solar protection
- solar flux: 800 W/m²
- internal surface exchange coefficient $h_{ci}$: 3.6 W/(m²·K)
- external surface exchange coefficient $h_{ce}$: 8 W/(m²·K)
- altitude difference (between manufacturing and installation locations): 300 m

2. Conventional limits

The conventional limits for the marking of certified insulating glazing are defined in CEKAL’s Technical Requirements for insulating glazing.

3. Special verifications

If the information has been brought to their attention by the customer, the production centres perform specific verifications for certain types of glazing intended for special usages:

- glazing used at or having to travel through an altitude different from that of the manufacturing location by more than 300 m
- glazing installed with support on 2 or 3 sides, or installed as structural glazing whose stress in the mastic sealants must be calculated as per CSTB* manual No. 3488 V2 to define the height of these sealants
- (…)

4. Reference documents

- CEKAL Technical Requirements for insulating glazing
- Standard P78-470 (draft)
- NF DTU 39 P2
- CSTB* manual 3242
- CSTB* manual 3488 V2

* French Scientific and Technical Centre for Building
RULES FOR INSTALLATION AND USAGE

The reference documents to be taken into account are, among others, the national standards in force concerning:

- Glass products and their installation, in particular NF DTU 39 for France
- Joinery (design, characteristics and installation), in particular standard XP 20-650-2 and NF DTU 33 for France

For non-conventional structures, the following reference documents must be taken into account:

- Technical application notices (ATec) or technical application documents (DTA) for glazing, joinery, joined facades, etc.
- the European Assessment Document (EAD) or European Technical Assessment (ETA) related to structural glazing kits
- the general design, manufacturing and installation conditions for insulating glazing, structural glazing and point-fixed glazing subject to an ATec or DTA of the CSTB (or their equivalent)
- the Technical Experimentation Assessments (ATex) for glazing, joinery, facades, etc.
- the professional recommendations established while awaiting a standard
- authorized technical documents issued by recognized experts or institutes.

These specifications recall the main rules of good practice contained in the reference documents to which customers must refer.

1. Specific usages of certified insulating glazing

Certified insulating glazing is designed to be used, in accordance with the indications in the reference documents, as:

- Glazing installed with (a) free edge(s), vertically or sloped (NF DTU 39)
- Glazing with a bearing point system
- Structural glazing
- Point-fixed glazing
- Renovation glazing

The following paragraphs recall certain important requirements contained in the reference documents that must be referred to. These usages must be specified at the time of the order.

1.1 Glazing installed with (a) free edge(s), with or without a bearing point system

The mastic sealants in this glazing must resists UV rays. Its CEKAL marking includes the indicator E.

1.2 Sloped glazing

Glazing is referred to as sloped in terms of its installation if the angle towards the interior or the exterior is greater than 15° with respect to the vertical. The NF DTU 39 does not allow rooftop installation if the slope angle is below 5° with respect to the horizontal.

1.3 Structural glazing

The mastic sealants in this glazing must resists UV rays and higher mechanical loads. Its CEKAL marking includes the indicator V.

1.4 Point-fixed glazing

The mastic sealants in this glazing must resists UV rays. Its CEKAL marking includes the indicator E.

For this type of installation, where the glazing is maintained with mechanical fasteners, the indications of the ATec, ATex or their equivalent must be referred to.

1.5 Renovation glazing

This glazing, whose marking includes the indicator R, is installed in a glazing channel in a PVC profile, making it possible to integrate it in old joinery once the old glazing has been removed. The installation conditions for the new glazing must be adapted to the existing joinery (thickness, weight, drainage, etc.).
2. Maintenance

In general, the glazing must not be subjected to any actions that might jeopardize its performances during subsequent maintenance operations. Moreover, the glazing must be washed and cleaned at least twice a year or in accordance with the maintenance instructions sent by the production centre.

3. Most frequent potential damage factors

- Insulating glazing should never be subjected to subsequent transformations or additions (glued film, glued Georgian bars, etc.)
- Stored glazing must be protected from humidity and the sun (risk of thermal breakage) and be placed on supports that induce no shear stress in the mastic sealants.
- Double glazing installed or transported at an altitude different from that of the manufacturing location by more than 900 m must be pre-balanced in the plant or balanced on the construction site in accordance with the recommendations of the production centre.
- Triple glazing installed or transported at an altitude different from that of the manufacturing location by more than 300 m must be pre-balanced in the plant in accordance with the recommendations of the production centre.
- Glazing must be installed in dry and drained joinery.
- All products used for caulking and wedging must be compatible with the glazing constituents and must not hinder glazing channel drainage.
- Glazing must not be subjected to aggressive runoff water or projections that could attack its internal or external surfaces, due to the architectural layout.
- Maintaining the glazing in its glazing bead must not generate excessive compressive stress.

PERFORMANCES WITHIN THE SCOPE OF THE INSULATING GLAZING CERTIFICATION

The glazing is intended to be incorporated in structures that may be required to meet requirements that are more or less rigorous in terms of:

- light transmission
- thermal insulation
- solar contribution
- acoustic insulation
- fire protection
- protection from falling, collision and impact
- aggression resistance
- aspect
...

In compliance with the requirements of the Construction Product Regulation (CPR), the Declaration of Performance (DoP) is supplied by the production centre.

CEKAL certifies the thermal and acoustic performances of insulating glazing.
1. Thermal performances

The Technical Regulations of the certification authorize the production centres to mark the following on the certified glazing:

- the value of the conventional $U_g$ thermal transmittance coefficient
- TR followed by a digit, standing for “Thermally Reinforced”, for the certified glazing whose $U_g$ coefficient is less than or equal to 2 W/(m²·K), according to the following table.

<table>
<thead>
<tr>
<th>$U_g$ ≤ 2 W/(m²·K)</th>
<th>TR1</th>
<th>TR2</th>
<th>TR3</th>
<th>TR4</th>
<th>TR5</th>
<th>TR6</th>
<th>TR7</th>
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<td>$U_g$ 1.8</td>
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</tr>
<tr>
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</tr>
</tbody>
</table>

The conventional $U_g$ thermal transmittance coefficient is determined by the production centre as per standard EN 673, taking into account

- the thickness of the space between glass panes
- the glazing with low emissivity coatings used
- the type and concentration of the gas filling the spaces between glass panes

The $U_g$ coefficient expresses the thermal transmittance of the glazing in its main portion in conventional exchange conditions on a vertical wall.

It should be noted that the frame and the type of spacer play an important role in the calculation of the $U_w$ (thermal transmittance coefficient of the window).

2. Acoustic performances

The Technical Regulations of the certification authorize production centres to mark an acoustic class on the certified glazing.

The CEKAL acoustic classes (AR1 to AR6) were defined on the basis of the conventional transmission loss indicator ($R_A, tr$) based on measurements performed in a laboratory as per EN ISO 140.

The acoustic class of the glazing has a conventional nature enabling the comparison of glazing performances.

The overall performance of the window or facade depends on:

- glazing dimension
- type of joinery
- ventilation elements
- other elements constituting the facade

REMINDER

The installation direction of the insulating glazing does not influence acoustic performance.
1. Solar control

Insulating glazing equipped with a low emissivity and sun control coating combines thermal performance (see § G1) with the control of solar and light contributions.

2. Protection from falling, collision and impact

The standard EN 12600 enables the classification of glazing based on the pendulum test. This classification determines the type of breakage of the glass and the maximum level of load that the product was able to resist.

Three main families can be distinguished:
- annealed float glass
- laminated glass
- tempered glass

3. Aggression resistance

- Glazing resisting manual attacks as per standard EN 356:
  - vandalism: P1A, P2A, P3A, P4A and P5A (ball impact tests)
  - break-in: P6B, P7B and P8B (axe and hammer tests)
- Glazing resistant to firearms as per standard EN 1063:
  - BR1, BR2, BR3, BR4, BR5, BR6 and BR7 for bullets from handguns and rifles
  - SG1 and SG2 for bullets from hunting rifles

Explosion-resistant glazing as per standard EN 13541: ER1, ER2, ER3 and ER4

The installation must be adapted to the desired performance.

4. Fire resistance

The reports concerning the tests performed on the joinery assemblies or complete façade or glass systems should be referred to.

Glazing fire resistance can be improved through:
- the use of specific types of glass
- heat-resistant assembly constituents (mastic sealant, spacer)
- installation quality and type of frame
GLOSSARY

Acoustic interlayer
Interlayer significantly contributing to glazing noise attenuation (classification criterion as per the mechanical impedance test).

Acoustic performance
Aptitude of a glazing to limit noise transmission. The overall acoustic performance of a glazing is expressed using the acoustic transmission loss indicator $R_w (C ; C tr)$ measured in the laboratory in accordance with Standard EN ISO 140 and assessed using the procedures indicated in Standard EN 717-1.

Air or gas space
Volume of dehydrated air or argon gas (or krypton) enclosed between the glass components of insulating glazing.

Annealed float glass
Glass that has been neither tempered nor heat hardened. The annealing of float glass, a controlled cooling process, allows the elimination of the residual stress in the glass and is an integral part of the float glass manufacturing process.

Article 1792-4 of the French Civil Code
The manufacturer of a structure, a portion of a structure or an element of equipment (…) is jointly liable for the obligations stipulated in articles 1792, 1792-2 and 1792-3 (…). For the application of this article, the following are considered to be equivalent to manufacturers:
- anyone who imports a structure, a portion of a structure or an element of equipment manufactured abroad;
- anyone who presents it as his own work by affixing to it his name, trademark or any other distinctive sign

Assembly process (CEKAL)
Association of a type of sealant with a type of spacer.

ATec
French abbreviation for a Technical Notice issued by the CCFAT (Commission in charge of issuing the Technical Notices), upon request from an industrialist, concerning an innovative product or construction system, after examination of the application by the CSTB and its presentation to the Specialized Group No. 6, “Window and glazing components”.

ATEx
French abbreviation for a Technical Experimentation Assessment issued by a small committee of experts (CSTB chairman and secretariat), upon request from a Technical Inspection Agency, concerning an innovative construction system and for a specific construction project, after examination of the application by the Technical Inspector.

Balanced glazing
The presence of valves makes it possible to balance the internal and external glazing pressures at the installation site when it is at an altitude different from that of the manufacturing site (>900 m for double glazing; >300 m for triple glazing).

Breather
Valve in the spacer making it possible to balance internal and external glazing pressures during installation.

Butyl sealant
Product, generally made of polyisobutylene (butyl), ensuring the sealing of the space contained between the panes in insulating glazing to protect it from water vapor or gas.

Certification program (CEKAL)
Set of documents defining the product certification system.

Coated glass or glazing
Basic glass upon which one or several solid thin layers of inorganic materials are deposited using several types of deposit methods, in order to modify one or several of its properties.

Constituents
Components included in the composition of the insulating glazing (e.g.: glass pane, spacer, desiccant, mastic sealant, etc.).

Construction Product Regulation (CPR)
European regulation imposing compliance with the harmonized European standards for all of the construction products they concern, and defining the methods to inform customers (Declaration of Performance – DoP).

Consumer Code
French code grouping together the legislative measures related to consumers’ rights.

CSTB
French Scientific and Technical Centre for Building. Secretariat of the Specialized Group No. 6 for “Bay window and glazing components” (for the DTA and ATec).

CSTB manual 3242
“Climatic conditions to be considered for the calculation of maximum and minimum glazing temperatures.”

CSTB manual 3488 V2

Declaration of Performance (DoP)
When a construction project is covered by a harmonized standard or has been the object of a European technical assessment, the manufacturer issues a performance declaration for this product when it is put on the market.

Desiccant
Product, usually of the “molecular sieve” type, incorporated into the insulating glazing spacer to ensure the dehydration of the air or gas space.

Double or triple glazing
See Insulating glazing.

DTA
French abbreviation for a Technical Application Document issued by a group of experts, upon request from an industrialist, concerning a product that is the subject of a harmonized standard, after examination of the application by the Specialized Group No. 6, “Window and glazing components” (CSTB secretariat).

Enamelled glass
Tempered glass upon which enamels are uniformly deposited using spraying or roller techniques.
Energy characteristics
Energy characteristics are divided in 2 parts:
- Energy Transmission, ET (rt): direct transmission of solar energy through the glazing.
- Energy Reflection, ER and E’R (r and p’r): direct reflection of the solar energy on the 2 surfaces of the glass (coated and non-coated).

European Assessment Document (EAD)
A product that is not covered or only partially covered by a harmonized standard may be the subject of a European Assessment Document adopted by the EOTA.

European Technical Assessment (ETA)
A product that is not covered or only partially covered by a harmonized standard may be the subject of a European Technical Assessment issued by a member of the EOTA.

EVA (EVA Interlayer)
Ethylene Vinyl Acetate

Free (side or edge)
Glazing with at least one edge that is not inserted in the glazing channel in the joinery.

French Civil Code
A set of rules determining the status of persons (Book I), of property (Book II), and of the relationships between private individuals (Books III and IV).

Glazing composition
Example for insulating glazing: 4-16-4
The first 2 digits indicate the thickness of the 2 glass panes, in mm. The 2 other digits indicate the thickness of the 2 glass panes, in mm.

Example for a laminated PVB glazing: 44.2
The first 2 digits indicate the thickness of the 2 glass panes, in mm. The last digit indicates the number of PVB films, in this case 2 x 0.38 mm, i.e. 0.76 mm.

Harmonized standard
Product standard whose application by the manufacturer is required to be able to prove compliance with the European Construction Product Regulation (CPR).

HST tempered glazing or glass (TG)
Tempered glazing that has undergone a “heat soak” treatment to reduce the risk of spontaneous breakage.

Insulating glazing (IG)
A distinction is made between double glazing and triple glazing:
- Double glazing
Glazing composed of 2 glass panes (of which 1 is usually coated), separated by 1 spacer.
- Triple glazing
Glazing composed of 3 glass panes (of which 2 are usually coated), separated by 2 spacers.

Interlayer
Film made of synthetic material used to assemble glass panes and manufacture laminated glazing.

Ionomer (ionomer interlayer)
Ethylene co-polymer (ionic cross-linking).

Laminated glazing or glass (LG)
Glazing composed of 2 or several glass panes assembled together with one or several interlayer films made of synthetic materials (such as PVB, ionomer, EVA, etc.).

Light transmission (LT or tL)
Percentage of luminous flux transmitted directly through the glass wall.

Low emissivity coating
A metallic oxide coating deposited on the glass pane to limit the transmission of rays in the infrared domain and to limit energy losses. The emissivity value is taken into account in the Ug calculation.

Mastic sealant
Product usually formulated from polysulfide, polyurethane, silicone or hot-melt, ensuring mechanical strength and completing the tightness around the edges of the insulating glazing.

MVBs – Measurement and Verification Bodies
These bodies carry out the inspection visits and tests required in the framework of the CEKAL certification.

Non-conventional (assembly process, system or constituent)
An unusual assembly process, system or constituent for which CEKAL requires a Technical Notice (ATec) or Technical Application Document (DTA) prior to examining a certification application.

Patterned glass
Glass with a raised, decorative motif.

Point-fixed glazing
Installation technique for the glazing making up the external envelope of a building (facade or roof), using glass products that generally have drill holes in the corners and are mechanically fastened to the bearing structure.

Pre-balanced glazing
Pressurizing or depressurizing the air or gas space on the manufacturing site to naturally rebalance glazing intended for installation at an altitude different from that of the manufacturing site (> 900 m).

Psi (Ψ)
Linear thermal transmittance coefficient that depends on the elements located in the environment near the glazing edges (value generally calculated).

Reference angle
Angle of support for installation in the frame. During manufacturing this angle is indicated on insulating glazing weighing over 100 kg.

Renovation glazing
Insulating glazing incorporated into a plastic profile enabling its installation in an old glazing channel.

Rigid interlayer
Interlayer allowing laminated glazing to withstand a higher mechanical load.

Screen-printed glass
Tempered glass upon which enamels have been deposited in the form of (a) partial or total motif(s) using a screen or digital printing.

Solar contribution
The energy transmission coefficient (solar factor) characterizes the solar contribution, i.e. the total quantity of solar energy transmitted through the glazing. A low solar factor will avoid internal overheating in buildings exposed to the sun. It is expressed in % and symbolized by the letter “g”.

Solar factor
see Solar contribution.
Spacer
Profile used in insulating glazing assembly to ensure the spacing of the glass panes at a certain distance.

Standard interlayer
An interlayer that can be clear, translucent or colored, and is not identified as acoustic or rigid.

Standard NF DTU 33
“Construction work – Curtain facades.”

Standard NF DTU 39
“Construction work – Work with glass and mirrors.”

Standard NF EN ISO 140
“Acoustics – Measurement of sound insulation in buildings and of building elements.”

Standard NF EN 356

Standard NF EN 410
“Glass in building – Determination of luminous and solar characteristics of glazing.”

Standard NF EN 572
“Glass in building – Basic soda lime silicate glass products.”

Standard NF EN 673
“Glass in building - Determination of thermal transmittance (U value) – Calculation method.”

Standard NF EN 1063
“Glass in building – Security glazing - Testing and classification of resistance against bullets attack.”

Standard NF EN 1096
“Glass in building – Coated glass.”

Standard NF EN 1279
“Glass in building – Insulating glass units.”

Standard NF EN 12150
“Glass in building – Thermally toughened soda lime silicate safety glass.”

Standard NF EN ISO 12543
“Glass in building – Laminated glass and laminated safety glass.”

Standard NF EN 12600
“Glass in building – Pendulum test – Impact test method and classification for flat glass.”

Standard NF EN 13022
“Glass in building – Structural sealant glazing.”

Standard NF EN 13541

Standard NF EN 14179
“Glass in building – Heat-soaked thermally-toughened soda lime silicate safety glass.”

Standard NF EN 14449

Standard NF P78-470 (DRAFT)
“Glass in construction – calculation of insulating glazing component temperatures and stresses in sealant.”

Standard XP P20-650
“Windows, French doors, fixed frames and joinery assemblies – Installation of mineral glazing in the workshop.”

Structural glazing
Installation technique for insulating glazing making up the external envelope of a building, involving gluing onto a frame.

Technical Regulations (of the CEKAL certification)
Set of documents defining the certification requirements, composed of the following texts:
- the certification Rules defining the overall framework for the certification,
- the Technical Requirements for insulating glazing, laminated glazing and tempered glazing that make up the technical “referential” of the certification for each product category.

Tempered glazing or glass (TG)
Glass in which a permanent superficial compressive stress is created through a controlled heating and cooling process, to improve its resistance to mechanical and thermal stress. If it breaks, this glass is fragmented into a large number of small pieces whose edges are generally not very sharp.

Thermal breakage
Glazing breakage caused by a thermal shock (resulting from a temperature difference between two zones on the surface of the glazing).

Thermal performance
Aptitude of a glazing to limit the thermal exchanges between outside and inside. The thermal insulation performance of a glazing is characterized by $U_g$.

Triple glazing
Insulating glazing composed of 3 glass panes (of which at least 2 are coated with low emissivity coating), separated by two spacers.

Types of glazing (CEKAL)
Certain types of glazing are automatically included in the scope of the CEKAL certificate. Other so-called “specific” types of glazing may be subject to an additional issuance after an inspection on site and/or test. Page 2 of the certificate indicates the types of glazing that are automatically included and those considered “specific”.

$U_g$
The thermal insulation performance of a glazing is characterized by the $U_g$ value. The $U_g$ coefficient expresses the thermal transmittance of the glazing in its main portion $W/(m^2.K)$. The lower the value, the better the performance.

$U_w$
Thermal performance of the window, notably taking into account the $U_g$ coefficient of the insulating glazing and the thermal performance $U_f$ of the frame.

VIR
French abbreviation for Reinforced Insulating Glazing

Volatile Organic Compounds (VOC)
Additional information is available at the following address:

“Warm-edge” spacer
Spacer with “low” thermal conductivity creating the effect of a “warm edge.”