
**Glass in building — Basic soda lime
silicate glass products —**

Part 1:
**Definitions and general physical and
mechanical properties**

*Verre dans la construction — Produits de base à partir de verre de
silicate sodocalcique —*

Partie 1: Définitions et propriétés physiques et mécaniques générales



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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 16293-1 was prepared by Technical Committee ISO/TC 160, *Glass in building*, Subcommittee SC 1, *Product considerations*.

ISO 16293 consists of the following parts, under the general title *Glass in building — Basic soda lime silicate glass products*:

— *Part 1: Definitions and general physical and mechanical properties*

A part 2 dealing with float glass is under preparation.

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Glass in building — Basic soda lime silicate glass products —

Part 1: Definitions and general physical and mechanical properties

1 Scope

This part of ISO 16293 defines and classifies basic soda-lime silicate glass products, indicates their chemical composition, their main physical and mechanical characteristics and defines their general quality criteria.

Specific dimensions and dimensional tolerances, description of faults, quality limits and designation for the product types are not included in this part of ISO 16293.

NOTE It is intended to include the specific dimensions and dimensional tolerances, description of faults, quality limits and designation for the product types in the future ISO 16293-2, which is specific to float glass.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 9050, *Glass in building — Determination of light transmittance, solar direct transmittance, total solar energy transmittance, ultraviolet transmittance and related glazing factors*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

float glass

flat, transparent, clear or tinted soda-lime silicate glass having parallel and polished faces obtained by continuous casting and flotation on a metal bath

4 Chemical composition

4.1 General

The basic glass products covered by this part of ISO 16293 are all manufactured from soda-lime silicate glass having a composition with the percent mass fraction of the major components within the following ranges:

- silicon dioxide (SiO₂) 69 % to 74 %;
- calcium oxide (CaO) 5 % to 14 %;
- sodium oxide (Na₂O) 10 % to 16 %;
- magnesium oxide (MgO) 0 % to 6 %;
- aluminium oxide (Al₂O₃) 0 % to 3 %;
- others 0 % to 5 %.

In addition to the above general composition, these glasses may also contain small quantities of other substances.

4.2 Tint

Body-tinted glass is obtained by the addition of suitable materials.

5 Physical and mechanical characteristics

5.1 General characteristics

Conventional numerical values for the physical and mechanical characteristics of basic glass products are given in Table 1. These values, for normal, annealed glass without any further toughening, are not precise requirements with which the glass shall strictly comply, but are the generally accepted figures for use in calculations where a high degree of accuracy is not required.

Table 1 — General characteristic values

Characteristic	Symbol	Numerical value and unit
Density (at 18 °C)	ρ	2 500 kg/m ³
Hardness		6 units (Mohs' scale)
Young's modulus (modulus of elasticity)	E	7×10^{10} Pa
Poisson's ratio	μ	0,2
Specific heat capacity	c	$0,85 \times 10^3$ J/(kg · K) (at 50 °C)
Average coefficient of linear expansion between 20 °C and 300 °C	α	9×10^{-6} K ⁻¹
Thermal conductivity	λ	1 W/(m · K)
Mean refractive index to visible radiation (380 nm to 780 nm)	n	1,5

5.2 Designation of clear glass

5.2.1 General

A glass product is designated as clear glass when it is not tinted and when the light transmittance of the glass material, unmodified by the possible presence of a coating, complies with 5.2.2.

In order to measure the light transmittance characteristics of glass to determine whether it can be designated as a clear glass, it is necessary, in some cases, to carry out a pre-treatment to eliminate the coatings on smooth surfaces without significantly modifying the thickness of the glass substrate.

The light transmittance of the glass substrate shall be measured with its surfaces in a polished condition. Measurement shall be in accordance with ISO 9050.

NOTE The light transmittance values given in 5.2.2 are not suitable for design. They are values used only for the designation of clear glass and exclude the effects of coatings. It is necessary to obtain the values of light transmittance used for design from the glass manufacturer.

5.2.2 Clear transparent glass

A transparent glass product is designated as clear glass when it is not tinted and when its light transmittance, after any necessary pre-treatment and rounded to the nearest 0,01, is greater than or equal to the value given in Table 2 for the nominal thickness of the glass product.

NOTE The limiting value given in Table 2 is appropriate provided that the measured thickness of the glass product is within the allowable tolerances for the nominal thickness of that product.

**Table 2 — Minimum light transmittance values
for designating a transparent glass product as clear glass**

Nominal thickness mm	Minimum value of light transmittance
2	0,89
3	0,88
4	0,87
5	0,86
6	0,85
8	0,83
10	0,81
12	0,79
15	0,76
19	0,72
25	0,67

5.3 Stability of physical and chemical characteristics

For basic glass products, the physical and chemical characteristics can be considered as remaining constant over time.

- a) Since glass is insensitive to photochemical effects, the spectral properties (transmission of light and solar energy) of the basic glass products are not modified by direct or indirect solar radiation.
- b) The surface of the glass used in building is virtually insensitive to attack from the environment.

6 General quality criteria and their evaluation

6.1 Optical quality

This criterion concerns the visibility of objects observed through the glass and only applies to transparent glass products.

The main faults that can affect the optical quality are distortion of the surface and lack of homogeneity in the body of the glass.

The optical quality shall be evaluated by means of a visual observation method.

6.2 Appearance

This criterion concerns the appearance of the product.

The visual quality can be affected by the presence of spot faults (bubbles, stones, etc.), linear/extended faults (scuff marks, scratches, lines, deposits, impressions, etc.).

Spot faults are evaluated by specifying numbers and dimensions.

Linear/extended faults are evaluated by visual observation.