

New standard on laminated glass for buildings  
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**Abstract**

New standard of CIS GOST 30826-2001 on laminated glass for the building purposes is presented in this paper. This standard joined into force recently.

This new interstate standard was developed and approved in 2001.

The standard makes the same technical requirements to all laminated glasses for buildings. These requirements ascertain possibility of using of these glasses in building and include: appearance factors, edge processing, thermal and water resistance, resistance to ultraviolet radiation, humidity resistance and optical distortions. Furthermore, laminated glasses for buildings in depending on the field of using can possess special properties such as: protective (safety during use, impact proof, bullet proof and explosion protective), fire proof, sound insulation, increased endurance etc.

Distinctive feature of this Russian standard in comparison with European standards is incorporation of all kinds of laminated building glass in one document. The standard contains classification of all laminated glasses in dependence of field of application, requirements and testing techniques for every type of laminated glass, guidelines for using. All these measures facilitate choice of right laminated glass for the specific project.

## **Introduction**

In this presentation we introduce new CIS GOST 30826-2001 standard “Laminated sheet building glass. Specifications”. This standard is implemented in Russia from January 01, 2003.

Last years in Russia demand on laminated building glass is increased significantly. Laminated glass has many advantages and may be increased mechanical strength, secure during exploitation (and don't break due to accidental strikes, don't drop-out in large sized pieces which can traumatize people), resistant to criminal force of the person (for example, hammering by hard items as axe, hammer, stone etc), resistant to fire-arms shots or impact from blast wave. New fields of glass application are appeared recently (at least in Russia) such as glass floors, sunroofs, interior walls. These applications have special requirements to the mechanical loads and fire resistance that are normal for the building constructions but they were not affected to the glass products early.

Expansion of these new fields rides on the one hand by opening of new banks, shops and passages with jewelers, electronics, photo and video, restaurants, casinos and others places of the same kind. On the other hand it rides from worsening of criminal situation in the country and growing concern for people safety indoors or near many-storied building.

### **The main text**

All above-stated thoughts suggest to necessity of development of new State standard for the laminated building glass. During this work we assume standards of CEN and ISO listed below as a basis:

EN 356 Glass in building - Security glazing - Testing and classification of resistance against manual attack

EN ISO 12543:1 Glass in building - Laminated glass and laminated safety glass - Part 1: Definitions and description of component parts (ISO 12543-1:1998)

EN ISO 12543:2 Glass in building - Laminated glass and laminated safety glass - Part 2: Laminated safety glass (ISO 12543-2:1998)

EN ISO 12543:3 Glass in building - Laminated glass and laminated safety glass - Part 3: Laminated glass (ISO 12543-3:1998)

EN ISO 12543:4 Glass in building - Laminated glass and laminated safety glass - Part 4: Test methods for durability (ISO 12543-4:1998)

EN ISO 12543:5 Glass in building - Laminated glass and laminated safety glass - Part 5: Dimensions and edge finishing (ISO 12543-5:1998)

EN ISO 12543:6 Glass in building - Laminated glass and laminated safety glass - Part 6: Appearance (ISO 12543-6:1998)

pr EN 12543:1998 Glass in building - Laminated glass and laminated safety glass - Part 7: Evaluation of conformity

pr EN ISO 14440 Glass in building - Specification for security glazing - Explosion-pressure-resistant glazing - Classification and test method (ISO/DIS 14440:1994)

As it can be seen every one from the CEN (ISO) standards affects only one field of application or requirements whereas Interstate standard consolidate all types of laminated glass in one document. Depending on the field and specificity of application determine in this standard classification of all kinds of laminated glass, requirements applied to every type of laminated glass and testing methods, instructions about its use. All this information lightens the work and allows customer or developer to make a right choice from variety of laminated glass types and to use that he need in fact.

Laminated glass for building is subdivided into types depending on purpose:

1. resistant to mechanical loads:
  - a. secure during use (resistant to soft body impact);
  - b. resistant to hard objects impact;
  - c. bulletproof;
  - d. explosion protective;
2. fire proof;
3. sound insulating;
4. frost-resisting;

5. laminated glass with special properties (for example, with radio-interference defense, biological protection, informational defense, increased endurance etc).

All laminated glasses for building are the subject of the same technical requirements similar to ISO and CEN standards which determine possibility of their using in building such as: appearance factors, requirements to edge working, ultraviolet radiation effect resistance, moisture resistance, optical distortions.

In addition every type of laminated glass has its own specific requirements. So secure or safety during exploitation glass is subdivided into 4 protection classes depending on resistance to soft body impact: SM1-SM4 (drop height: SM1 - 300 mm, SM2 - 700 mm, SM3 - 1200 mm and SM4 - 2000 mm). Methodology of the indicated requirements corresponds with American standard ANSI Z97.1-1984 and German standard DIN 52337. In ANSI Z97.1-1984 laminated glass is tested in accordance with protection classes with the next heights: 300 mm, 450 mm, 1200 mm. DIN 52337 describes testing with heights 300 mm, 700 mm, 1200 mm, i.e. DIN 52337 is closer to CIS standard than American standard. However no one in this standards have protective class with testing height 2000 mm, so our interstate standard lets test laminated glass with more strict requirements.

Laminated glass resistant to hard body impact is subdivided into protection classes identically to European standard EN 356 so we consider that there is no reason to examine it in detail.

Laminated explosion protective glass is subdivided into 14 protection classes depending on capability to absorb limiting value of blast wave specific impulse (dynamical load from blast wave) effecting on the glazing. There are taken into account charge mass

(kg), distance from the location of possible explosion (m), value of blast wave specific impulse (Pa/s), pressure of blast wave (kPa) during classification. Protection classes of laminated blast-proof glass K11 - K14 in GOST 30826-2001 entirely comply with classes ER1 – ER4 from prEN ISO 14440 “Glass in building - Specification for security glazing - Explosion-pressure-resistant glazing - Classification and test method (ISO/DIS 14440:1994)”.

Laminated bulletproof glass is subdivided into 9 protection classes depending on resistance to effect from certain types of weapon and ammunition mainly used on the territory of Russian Federation and CIS states. Classification takes into account appellation and index of the cartridge, bullet characteristics (core type, mass, g, velocity, m/s), firing distance.

Due to the fact that there are severe climatic conditions on the most part of the Russian territory, one more laminated glass type is included in standard. This is frost-resisting or frostproof glass. Laminated frost-resisting glass must sustain minimal calculated temperature at which it'll be used. Corresponding to its functions such glass is tested in climatic chamber at the temperature on five degrees below minimal calculated exploitation temperature.

Laminated sound insulation glass is subdivided into 5 classes depending on decrease of air noise from urban transport current. Subdivision principles for sound insulation glass coincide with prEN 12758-1 “Glass in building - Glazing and airborne sound insulation - Part 1: Definitions and determination of properties”.

Laminated fire proof glass is subdivided depending on resistance to fire influence during the time in minutes to integrity loss (E). One in limiting conditions in EN 357 “Glass in building - Fire resistant glazed elements with transparent or translucent glass products - Classification of fire resistance” is integrity loss too.

Hence we can see that this Interstate standard of CIS on laminated glass includes a lot of requirements which related to laminated glass used in construction industry. For the customer that means one thing – if he knows requirements to apply to glazing, he can find answer about all types of laminated glass in one standard GOST 30826-2001 “Laminated sheet building glass. Specifications”. And he doesn’t need to learn many normative documents to find all interesting information.