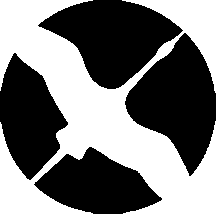
LIMITED LIABILITYCOMPANY

EXPO GLASS

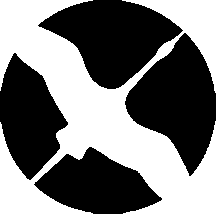


**STO**

37495380-003-

2016

COMPANY STANDARD



CLEAR SHEET GLASS

Technical specification

Vladimir

**2016**

Foreword

The goals and principles of standardization in the Russian Federation are established by the Federal Law dated December 27, 2002 No. 184-FZ «On Technical Regulation», and the rules for applying the standards of organizations are GOST R 1.4-2004 «Standardization in the Russian Federation. Standards of organizations.

Standard Information

1. DEVELOPED by Expo Glass Limited Liability Company (Expo Glass LLC)
2. APPROVED AND IMPLEMENTED BY Order of the Expo Glass Limited Liability Company dated August 24, 2016, No. OS -9
3. This standard is developed taking into account the basic regulatory provisions of GOST 111-2014 «Clear Sheet Glass. Technical Specification»
4. ORIGINAL ENACTMENT

This Standard may not be fully or partially reproduced, duplicated and distributed without the permission of the Expo Glass Limited Liability Company

Contents

1. Scope of application 1
2. [Normative references 1](#bookmark5)
3. [Terms and definitions 3](#bookmark6)
4. [Classification, main parameters and dimensions 3](#bookmark7)
5. [Technical requirements 5](#bookmark8)
   1. [Features 5](#bookmark9)
   2. [Marking, packaging 8](#bookmark12)
   3. [Safety and environmental requirements 9](#bookmark15)
6. [Acceptance rules 9](#bookmark16)
7. [Control Methods 12](#bookmark17)
   1. [Control of dimensions, deviations in size and shape 12](#bookmark18)
   2. [Optical distortion control 12](#bookmark19)
   3. [Defects control 12](#bookmark20)
   4. [Determination of the directional light transmittance 13](#bookmark22)
   5. [Determination of the residual internal stresses value 13](#bookmark23)
   6. Determination of water resistance 13
8. [Transport and storage 13](#bookmark24)
9. [Operating instructions 14](#bookmark25)
10. Manufacturer’s Warranty 15

Appendix А (informative) Physical characteristics of the clear sheet glass 16

COMPANY STANDARD

CLEAR SHEET GLASS

Technical specification

С1еаr Sheet Glass. Specifications

Date of implementation -**25.08.2016**

1 Scope of application

This standard applies to clear sheet glass (hereinafter referred to as glass) manufactured by Expo Glass LLC, intended for glazing translucent structures and manufacturing products for construction, technical and household purposes.

This standard can be used for conformity verification purposes.

1. Normative references

References to the following standards are used in this standard:

GOST 111—2014 Clear Sheet Glass. Technical specification

GOST 3519-91 Optical materials. Methods for the determination of birefringence

GOST 10134.1-82 Inorganic Glass and glass-crystalline materials. Methods for the determination of water resistance at 98°С

GOST 14192-96 Cargo marking

GOST 26302-93 Glass. Methods for the determination of light directional transmittance

and reflection factors

GOST 32361-2013 Glass and products from it. Defects. Terms and definitions

GOST 32529-2013 Glass and products from it. Acceptance rules

GOST 32530-2013 Glass and products from it. Marking, packaging, transportation, storage

GOST 32539-2013 Glass and products from it. Terms and definitions

GOST 32557-2013 Glass and products from it. Methods for controlling geometric parameters and appearance indicators

GOST 33003-2014 Glass and products from it. Methods for the determination of Optical Distortions

GOST 33004-2014 Glass and products from it. Features. Terms and definitions

GOST 33560-2015 Glass and products from it. Safety requirements for handling glass

GOST 33561-2015 Glass and products from it. Operating instructions

GOST ЕМ 410-2014 Glass and products from it. Methods for the determination of Optical Characteristics. Determination of light and solar characteristics

GOST 180 9385—2013 Glass and products from it. Hardness Test Method

Note — When using this standard, it is advisable to check the effect of reference standards in the public information system - on the official website of the Federal Agency for Technical Regulation and Metrology on the Internet or on the annually published information index "National Standards", which is published on as of January 1 of the current year, and according to the corresponding monthly published information indexes published in the current year. If the reference standard is replaced (amended), then when using this standard one should be guided by the replacing (amended) standard. If the reference standard is canceled without replacement, the provision in which the reference to it is given applies to the extent not affecting this reference.

1. Terms and definitions

In this standard, the terms are used in accordance with GOST 32361, GOST 32539, GOST 33004, as well as the following term with the relevant definition:

* 1. clear sheet glass: Clear transparent sodium-calcium silicate glass made by horizontal extrusion without additional surface treatment, having the appearance of a flat rectangular sheet.

1. Classification, main parameters and dimensions
   1. Expo Glass LLC manufactures glass in accordance with the requirements of this standard according to the technological and design documentation approved in accordance with the procedure established by Expo Glass LLC.
   2. Glass depending on optical distortions, defects, limiting deviations in thickness and edge thickness difference is divided into grades М2, М3, М4, М7.

Note - Glass of grades М4, М7 hereof according to technical specifications corresponds to glass of grades М4, М7 GOST 111-2014.

* 1. Glass depending on the light directional transmittance factor is divided into glass:
* with standard light transmittance factor (clear glass);
* with increased light transmittance factor (highly transparent glass).
  1. Glass depending on the size category is divided into:
* fixed size glass (TR);
* free size glass (SVR).
  1. Nominal thickness, maximum deviations in the glass thickness and edge thickness difference of the glass sheet should correspond to the values ​​specified in table 1.

**Table**  1 — Nominal thickness, maximum deviations in the glass thickness and edge thickness difference of the glass sheet In millimeters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Nominal thickness | Maximum deviation in the thickness of the glass grade | | Edge thickness difference, maximum, glass grade | |
| М2, М3, М4 | М7 | М2, М3, М4 | М7 |
| Up to 1,5 inclusively | ±0,10 | ±0,10 | 0,10 | 0,10 |
| Above 1,5 up to 2,5 inclusively | ±0,20 | ±0,20 |
| Above 2,5 up to 3,5 inclusively | ±0,30 | 0,20 |
| Above 3,5 up to 4,5 inclusively | ±0,30 | ±0,40 | 0,15 | 0,30 |
| Above 4,5 up to 6,0 inclusively | 0,20 |

* 1. Maximum dimensional deviations in the length and width of the glass sheet should correspond to the values ​​specified in table 2.

**Table**  2 - Maximum dimensional deviations in the length and width of the glass sheet

In millimeters

|  |  |  |  |
| --- | --- | --- | --- |
| Nominal thickness | Maximum deviation in the length (width) of the glass | | |
| SVR | TR at the edge length | |
| up to 1500 inclusively | above 1500 |
| Up to 6 inclusively | ±4 | ±1 | ±2 |

* 1. Difference in the diagonals lengths of the glass sheet should not exceed the values ​​specified in table 3.

**Table**  3 - Difference in the diagonals lengths of the glass sheet

In millimeters

|  |  |  |  |
| --- | --- | --- | --- |
| Nominal thickness | Difference in the diagonals lengths of the glass | | |
| SVR | TR with the length of the diagonals | |
| up to 3000 inclusively | above 3000 |
| Up to 6 inclusively | 6 | 2 | 3 |

* 1. The total deviation from the flatness of the glass sheet for the grades М2, М3, М4 should not exceed 0,05% of the larger side length. For glass grade М7 the flatness deviation is not standardized.
  2. The requirements for deviation from the straightness of the edges and the rectangularity of the angles of the glass sheet if necessary are agreed with the customer and specified in the supply contract.
  3. The glass designation symbol shall contain:
* designations of the glass grade (М2, М3, М4, М7);
* letter designation (P) for highly transparent glass;
* size category (SVR, TR);
* thickness, length, width of glass in millimeters;
* designations of this standard.

By agreement with the customer, as well as during export-import operations, other symbols are allowed, the contents of which are stipulated in the supply agreements (contracts).

An example of the designation symbol for М4 glass grade with free sizes with a thickness of 4 mm, a length of 2500 mm, a width of 3210 mm:

М4-SVR-4х2500х3210 STO 37495380-003-2016

An example of the designation symbol for М2 glass grade, highly transparent, fixed sizes with a thickness of 6 mm, a length of 1800 mm, a width of 1200 mm:

М2(P)-TR-6><1800х 1200 STO 37495380-003-2016

1. Technical requirements
   1. Features
      1. In terms of optical distortion, the glass shall comply with the requirements specified in table4.

**Table**  4 — Glass Optical Distortion

|  |  |
| --- | --- |
| Glass Grade | Optical Distortion Value in transmitted light when using a «brick wall» screen, minimum |
| М2, М3, М4 | 45° |
| М7 | Not standardized |

* + 1. Destructive glass defects are not permitted.

By the number and size of non-destructive defects, the glass must meet the requirements specified in table5. The distance between the standardized defects must be at least 500 mm.

**Table 5 —** Number and size of non-destructive defects **for glass**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Glass Grade | Local defects (except for chips, protrusions, broken angles) | | | | Linear defects | |
| Size , mm | Quantity, pcs., maximum, per one glass sheet, with area, m2 | | |
| up to 5 inclusively | above 5 up to 10 inclusively | above 10 | Size,  mm | Quantity, pcs., per one glass sheet |
| М2 | Up to 1,0 inclusively | Not standardized | | | Up to 30,0 inclusively | In total with local defects, maximum 2 |
| Above 1,0 up to 6,0 | 3 | 5 | 6 |
| Above 6,0 | 0 | 0 | 0 | Above 30 | 0 |
| М3 | Up to 1,0 inclusively | Not standardized | | | Up to 30,0 inclusively | In total with local defects, maximum 2 |
| Above 1,0 up to 6,0 | 5 | 7 | 8 |
| Above 6,0 | 0 | 0 | 0 | Above 30 | 0 |
| М4 | Up to 1,0 inclusively | Not standardized | | | Up to 30,0 inclusively | In total with local defects, maximum 2 |
| Above 1,0 up to 6,0 | 10 | 15 | 20 |
| Above 6,0 | 0 | 0 | 0 | Above 30 | 0 |
| М7 | Not standardized | | | | | |
| Notes:   1. It is allowed, in agreement with the customer, to establish additional requirements for defects. 2. Classification, terms and definitions of the defects are given in GOST 32361. | | | | | | |

Chips, protrusions, broken angles are not allowed for SVR glass size larger than maximum deviations along the length (width) of the glass specified in Table 2, for TR glass, they are not allowed.

By agreement with the customer, the edge of TR glass can be processed. If necessary, the requirements for edge processing are established in the supply contract.

* + 1. Light directional transmittance factor for the glass shall meet the values ​​specified in table6.

**Table**  6 — Light directional transmittance factor for glass

|  |  |  |
| --- | --- | --- |
| Nominal glass thickness, mm | Light directional transmittance factor, minimum | |
| clear glass | highly transparent glass |
| Up to 2 inclusively | 0,90 | 0,92 |
| Above 2 up to 3 inclusively | 0,89 |
| Above 3 up to 4 inclusively | 0,88 |
| Above 4 up to 5 inclusively | 0,91 |
| Above 5 up to 6 inclusively | 0,87 |

* + 1. The value of the residual internal stresses of the glass, characterized by the difference in the path of the rays during birefringence, must comply with the requirements specified in table7.

**Table 7 —** Value of the residual internal stresses of the glass

|  |  |
| --- | --- |
| Nominal glass thickness, mm | Difference in the rays path during birefringence (the value of the residual internal stresses of the glass), nm/cm, maximum |
| Up to 2 inclusively | 30 |
| Above 2 up to 3 inclusively | 40 |
| Above 3 up to 4 inclusively | 50 |
| Above 4 up to 5 inclusively | 60 |
| Above 5 up to 6 inclusively | 70 |

* + 1. Water resistance of the glass should not be lower than class 4/98 as per GOST 10134.1.
    2. Reference values ​​of the glass physical characteristics, the requirements for which are not regulated by this standard, are given in Appendix А.
  1. Marking, packaging
     1. Marking
        1. Glass is generally not marked. If necessary, by agreement with the customer, requirements for glass marking can be established in the supply agreement.
        2. A label is attached to each unit of transport packaging indicating:
* name and trademark of Expo Glass LLC;
* name and / or designation symbol, and / or trademark of the glass;
* glass sizes, mm;
* quantity of the glass sheets, pcs., and/or m2;
* identification data, allowing you to determine the glass date shipment and / or manufacture date;
* additional information (if necessary).

The label and inscriptions on it must be made in such a way as to ensure the safety of marking during the glass transportation and storage in the package.

* + - 1. Transport marking is performed in accordance with GOST 14192 with the application of the handling signs: «Fragile. Caution», «Top», «Protect from moisture».
    1. Packaging

Glass is packaged in accordance with the requirements established in the supply agreement, in compliance with the rules specified in section 5 of GOST 32530.

5.3 Safety and environmental requirements

1. Glass does not contain any harmful substances, is non-combustible, fire-explosion-safe and environmentally friendly product.
2. Industrial glass wastes are disposed by their industrial recycling.
3. To ensure safety when handling glass, the requirements of GOST 33560 should be observed.
4. Acceptance rules
   1. Glass prior to shipment, transfer or sale to the customer shall be accepted in order to certify its compliance with the requirements established by this standard.
   2. The Technical Control Department (OTK) of Expo Glass LLC carries out acceptance. Acceptance is allowed jointly with representatives of the customer and / or a third party.
   3. Glass shall be accepted in batches. A batch is considered a number of glass sheets with the same grade and thickness, drawn up by one quality document in accordance with 6.2.4.
      1. Check of the glass batch for compliance with the requirements as per 4.5-4.9 (dimensions, shape), 5.1.2 (defects) is carried out according to a two-stage control plan in accordance with table 8.

**Table 8 —** Glass conformity control plan for size, shape and defects

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Batch size, pcs. | Control plan step | Sampling volume, pcs. | Total Sampling volume, pcs. | Acceptance number | Rejection number |
| Up to 90 inclusively | 1 | 3 | 3 | 0 | 2 |
| 2 | 3 | 6 | 1 | 2 |
| Above 90 » 150 » | 1 | 5 | 5 | 0 | 2 |
| 2 | 5 | 10 | 1 | 2 |
| » 150 » 280 » | 1 | 8 | 8 | 0 | 2 |
| 2 | 8 | 16 | 1 | 2 |
| » 280 »500 » | 1 | 13 | 13 | 0 | 3 |
| 2 | 13 | 26 | 3 | 4 |
| » 500 » 1200 » | 1 | 20 | 20 | 1 | 4 |
| 2 | 20 | 40 | 4 | 5 |
| » 1200 » 3200 » | 1 | 32 | 32 | 2 | 5 |
| 2 | 32 | 64 | 6 | 7 |
| » 3200 | 1 | 50 | 50 | 3 | 7 |
| 2 | 50 | 100 | 8 | 9 |

* + 1. Verification of the glass batch for compliance with the requirements of 5.1.1

(Glass Optical Distortions), 5.1.3 (Light Directional Transmittance Factor),

1. (Residual Internal Stresses), 5.1.5 (Water Resistance) is carried out according to a two-stage control plan in accordance with table 9.

**Table**  9 — Glass conformance control plan for optical distortions, internal stresses and water resistance

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Batch size, pcs. | Control plan step | Sampling volume, pcs. | Total Sampling volume, pcs. | Acceptance number | Rejection number |
| Up to 500 inclusively | 1 | 3 | 3 | 0 | 2 |
| 2 | 3 | 6 | 1 | 2 |
| Above 500 » 3200 » | 1 | 5 | 5 | 0 | 2 |
| 2 | 5 | 10 | 1 | 2 |
| » 3200 | 1 | 8 | 8 | 0 | 2 |
| 2 | 8 | 16 | 1 | 2 |

* + 1. The batch is considered to comply with the requirements of this standard and accept if the number of non-conforming glass sheets in the first sampling is less than or equal to the acceptance number for the first step of the control plan.

The batch is considered not complying with the requirements of this standard and is rejected if the number of non-conforming glass sheets is greater than or equal to the rejection number for the first step of the control plan.

* + 1. If the number of non-conforming glass sheets in the first sampling is greater than the acceptance one, but less than the rejection number for the first stage of the control plan, the second sampling is made with the volume specified in tables 8 and 9 for the second stage of the control plan.

The batch is considered to comply with the requirements of this standard and it is accepted if the number of non-conforming glass sheets in the first and the second sampling is less than or equal to the acceptance number for the second step of the control plan.

The batch is considered not complying with the requirements of this standard and it is rejected if the number of non-conforming glass sheets in the first and the second sampling is greater than or equal to the rejection number for the second step of the control plan.

* 1. Each batch of glass is accompanied by a quality certificate, in which they indicate:
* name, trademark and address of Expo Glass LLC;
* name and designation of the glass;
* quantity of the glass sheets, pcs., and m2;
* quantity of packaging units, pcs., and their identification data;
* mark of acceptance (OTK stamp and signature of the OTK inspector who carried out the acceptance);
* number and date of the document compilation;
* additional information (if necessary).

Note - If one shipment contains several batches of glass (differing in grade or nominal glass thickness), it is allowed to issue a single quality passport for the delivery.

* 1. Glass inspection by the customer and the third party is carried out in accordance with GOST 32529.

1. Control Methods
   1. Control of dimensions, deviations in size and shape

Thickness, length, width, deviations in thickness, length, width, edge thickness difference, diagonal length difference, total deviation from flatness, deviation from straightness of edges, rectangular angles are controlled according to GOST 32557 (sections 8-13).

A sheet of glass is considered to have passed control if the dimensions, deviations in size and shape comply with 4.5—4.9.

* 1. Optical distortion control

Optical distortions in transmitted light are controlled according to GOST 33003 (section 6).

A glass sheet is considered to have passed control if the optical distortion value complies with 5.1.1.

* 1. Defects control

Defects are controlled according to GOST 32557 (section 19).

During control procedure, the inspection is carried out in transmitted light on one side of the glass sheet.

A sheet of glass is considered to have passed control if the defect quantity and dimensions comply with 5.1.2.

* 1. Determination of the directional light transmittance

Light directional transmittance factor is determined as per GOST ЕЫ 410. It is allowed to determine the light directional transmittance factor as per GOST 26302.

Tests are carried out on the finished product (a glass sheet) or a sample cut from it.

Glass is considered to pass the test if the light directional transmittance factor is in accordance with 5.1.3.

* 1. Determination of the residual internal stresses value

The value of the residual internal stresses, characterized by the difference in the path of the rays during birefringence, is determined according to GOST 3519.

During the test, the glass sample is placed so that a ray of light passes through the transparent ends of the sample parallel to the facets.

Glass is considered to pass the test if the value of the residual internal stresses is in accordance with 5.1.4.

* 1. Determination of water resistance

The water resistance of the glass is determined according to GOST 10134.1.

The glass is considered to pass the test if the water resistance is in accordance with 5.1.5.

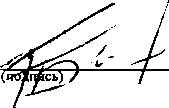
1. Transport and storage
   1. Glass is transported and stored in accordance with the rules established by GOST 32530.
   2. During glass transportation, loading, unloading and storage, measures should be taken to ensure its protection against mechanical and thermal influences, atmospheric precipitation, direct sunlight, moisture and aggressive substances.
   3. The glass storage room should not contain materials and substances that could cause its damage (acids, alkalis, salts, organic solvents, paints, varnishes, mortars, etc.).
2. Operating instructions
   1. In order to ensure the most efficient and safe use of glass, decrease the risk of its destruction and increase the service life, the requirements of GOST 33561 should be observed.
   2. The rules for the glass products manufacture and the glass installation into translucent structures are established in the regulatory (design) documentation for these products (structures).
   3. When designing products and glazing using glass in accordance with this standard, strength calculations are carried out taking into account the shape, size and methods of fastening the products, as well as the calculated values ​​and combinations of loads determined for specific operating conditions in accordance with applicable building codes and rules and design assignment.

In the calculations, the permissible deflection of the glass is taken no more than 1/250 of the short side. It is allowed, upon agreement of the products and glazing manufacturer with their customer, to apply other requirements for deflection.

1. Expo Glass LLC guarantees the glass compliance with the requirements of this standard if the rules for operation, packaging, transportation and storage are observed.
2. The warranty period for the glass storage is one year from the date of shipment from the warehouse of Expo Glass LLC.

Responsible executive for the development of

STO 37495380-003-2016



G.N.Bezukladnov

Quality Director

(position)

**Appendix** А (informative)

Physical characteristics of clear sheet glass

А.1 Reference values ​​for the physical characteristics of the clear sheet glass are given in table А. 1.

**Table А.1 -** physical characteristics of **clear sheet glass**

|  |  |
| --- | --- |
| **Characteristic Name** | **Reference value** |
| Density (at 18 °С) | 2500 kg/m3 |
| Knoop hardness number NK 0,1/20\* | 6 |
| Compressive Strength | 700-900 MPa |
| Tensile Strength | 30 MPa |
| Flexural strength for design | 15 MPa |
| Elastic modulus (Young's modulus) | 7хЮ10 Pa |
| Poisson's ratio | 0,2 |
| Softening point | 600 °С |
| The linear expansion temperature coefficient (in the temperature range from minus 40 °С up to 300 °С) | (7-9)х10‘6 К'1 |
| Thermal resistance | 40 °С |
| Thermal Conductivity Factor | 1 W/(m К) |
| Specific heat capacity | 720 J/(kg К) |
| Heat transfer Factor | 5,8 W/(m2 К) |
| Emission factor | 0,837 |
| Refractive index | 1,5 |
| Directional light reflection factor | 0,08 |
| \* As per GOST 180 9385. | |

UDK 666.151:006.354 OKS 81.040.20

81.040.30

Keywords: clear sheet glass, characteristics, acceptance rules, packaging, control methods, transportation, storage

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**CONCLUSION No. 19-2016**

of the STO 37495380-003-2016 project expert evaluation

In accordance with the appeal of Expo Glass LLC (contract No. 03145 dated 04.08.2016), an expert evaluation was carried out for the draft of the company standard STO 37495380-003-2016 “Clear Sheet Glass. Technical specifications” (hereinafter referred to as the STO project).

The purpose of the expert evaluation: determination of the project compliance with the requirements of the existing regulatory documents in the field of glass and glass products.

During the expert evaluation, the following documents were used:

• Federal Law dated December 27, 2002 No. 184-FZ “On Technical Regulation”

• Federal Law dated June 29, 2015 No. 162-FZ “On Standardization in the Russian Federation”

• GOST R 1.4-2004 Standardization in the Russian Federation. Standards of organizations. General Provisions

• GOST 111-2014 Clear sheet glass. Technical specifications

• GOST 32361-2013 Glass and products from it. Defects. Terms and Definitions

• GOST 32529-2013 Glass and products from it. Acceptance rules

• GOST 32530-2013 Glass and products from it. Marking, packaging, transportation, storage

• GOST 32539-2013 Glass and products from it. Terms and definitions

• GOST 32557-2013 Glass and products from it. Methods for controlling geometric parameters and appearance indicators

• GOST 33003-2014 Glass and products from it. Methods for the determination of optical distortions

* GOST 33004-2014 Glass and products from it. Features. Terms and definitions
* GOST 33560-20151’ Glass and products from it. Safety requirements for glass handling
* GOST 33561-2015 п Glass and products from it. Operating instructions

Effective since 01.04.2017.

Based on the results of the expert evaluation, a new version of the STO project was prepared, which is given in the appendix to this conclusion. This version contains a minimum set of requirements and is intended for use in launching the products into manufacture and at the initial stage of mass production. Subsequently, during the adjustment of technological and organizational processes, as the actual quality indicators (characteristics) of the manufactured products are determined, the rules for the organization of its control, acceptance, storage, shipment, etc. are established, modifications can be made to the STO. Changes may relate to any requirements and sections of the STO. In particular, glass grades can be added or excluded, requirements for the specifications can be precised (based on the results of the finished products tests), as well as the acceptance rules (in accordance with how glass is actually accepted at the factory), packaging rules (indicating packaging methods used at the factory) etc. It should be borne in mind that according to GOST 1.4 “the organization’s standards should not establish requirements, parameters, characteristics and other indicators that contradict national standards”.

Attachment: Project STO 37495380-003-2016 on 19 sheets.

A.G.Chesnokov

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E.A.Cheremkhina

Researcher

 Blue Stamp of JSC Glass Institute *Registered in the registration book of the JSC Glass Institute August 23,2016*

1. [↑](#footnote-ref-1)