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**Glass in building — Glass products for  
structural sealant glazing —**

Part 2:  
**Assembly rules**

*Verre dans la construction — Produits verriers pour vitrage extérieur  
collé*

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*Partie 2: Règles de pose*

ISO 28278-2:2010

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Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 28278-2 was prepared by Technical Committee ISO/TC 160, *Glass in building*, Subcommittee SC 2, *Use considerations*.

ISO 28278 consists of the following parts, under the general title *Glass in building — Glass products for structural sealant glazing*:

— Part 1: *Supported and unsupported monolithic and multiple glazing*

— Part 2: *Assembly rules*

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## Introduction

Structural sealant glazing, hereinafter referred to as SSG, is an assembly in which the glass products are fixed to the structural seal frame by means of a sealant.

The sealant must primarily be capable of withstanding the load actions applied to the glass products and transferred to the structural seal frame but can also function as a barrier against the passage of air and water through a building envelope.

Structural sealant glazing can be considered a product. It can also be considered an assembly method for glass into or onto a framework.

In the first consideration, the conditions are to be fulfilled by a manufacturer in order to place a complete structural sealant glazing and structural sealant glazing kit on the market, intended to be sold as one complete product in one (trade) transaction

In the second consideration, the framework, glass products, sealant and accessories, materials and components can be the subject of separate, independent (trade) transactions, independently ordered, and supplied on the construction site or in a workshop where an assembler only assembles the various materials and component elements and subsequently installs the construction, all in accordance with the conditions and under the responsibility of a designer.

Only when the design of a building can be such that the glass products should be installed directly in the building using a structural glazing technique, but under controlled environmental conditions as expressed in Clause 5 of this document, should this part of ISO 28278 apply.

This means that the assembler is only responsible for the assembly, not for the design. Assembly and design are two separate tasks with their own responsibilities.

However, in a number of countries, contractors have the duty to warn architects if there is a view that something in the design is wrong. An analogy would be the case where it is assumed that the assembler has the same duty towards the designer. In order to give the assembler a feeling of what the design considerations are, and at the same time to understand what information he or she requires from the designer, design guidance is given in this part of ISO 28278 in Annex C.

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# Glass in building — Glass products for structural sealant glazing —

## Part 2: Assembly rules

### 1 Scope

This part of ISO 28278 gives guidelines for the assembly and bonding of glass elements in a frame, window, door or curtain-walling construction, or directly into the building by means of structural bonding of the glass element into or onto the framework or directly into the building.

It gives the assembler information that enable him to organize his work and comply with requirements regarding quality control.

Quality control of the assembly process is of the highest importance. This part of ISO 28278 provides the minimum requirements for acceptable quality control of the process of structural sealant glazing (SSG) on a single project. The annexes contained at the end of this part of ISO 28278 provide the methods to ensure proper application and documentation for a safe and weatherproof glazing assembly product.

This process is intended to be applicable to most SSG projects. The project testing on metal substrates and glass products will determine proper surface preparation and installation instructions.

These rules do not apply to the adhesion or durability of the paint finishes or glass products. This is not intended to be a durability test requirement for the paint and glass products commonly used in the SSG process.

The structural, weatherproofing and sealant products which are commonly used in structural glazing applications are those based on organosiloxane, "silicone" polymers.

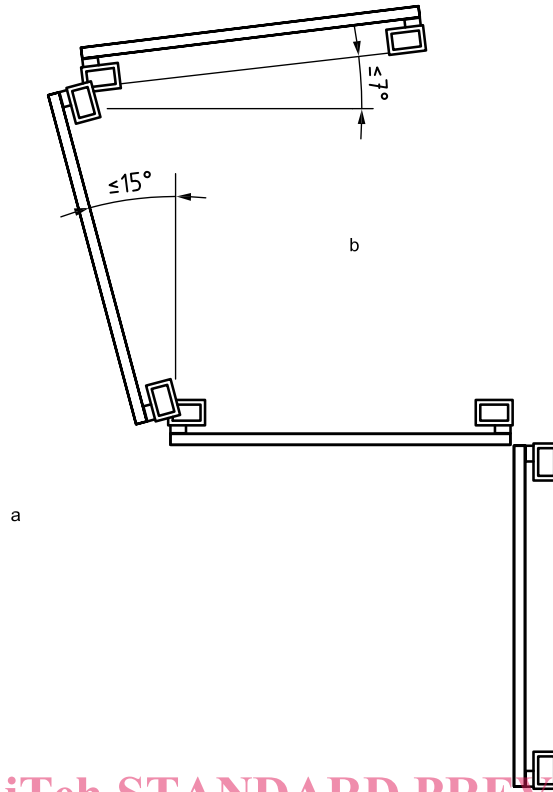
This part of ISO 28278 does not preclude the use of other sealant types, where these can demonstrate suitability for service according to this part of ISO 28278 and when they are used following the recommendations of the sealant manufacturer.

Supports to be taken into consideration shall be only metallic substrates, uncoated glass, coated glass and ceramic frit enamelled glass.

This part of ISO 28278 relates to SSG systems for use in façades and roofs, or parts of them, with glazing with slopes as shown in Figure 1.

Façades with an inclination of less than 15° from the vertical are considered vertical façades.

If the slope to the outer side has an inclination above 50°, the glass is considered unsupported glass.



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**Key**

- a Outer side.
- b Inner side.

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**Figure 1 — Slopes and glass positions**

**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 4892-2, *Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc lamps*

ISO 8339, *Building construction — Sealants — Determination of tensile properties (Extension to break)*

ISO 11600, *Building construction — Jointing products — Classification and requirements for sealants*

ISO 28278-1:—<sup>1)</sup>, *Glass in Building — Glass products for structural sealant glazing — Part 1: Supported and unsupported monolithic and multiple glazing*

ASTM C794, *Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants*

EN 28339, *Building construction. Jointing products. Sealants. Determination of tensile properties*

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1) To be published.



### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 28278-1 and the following apply.

#### 3.1

##### **structural bonding**

assembly of glass elements into or onto a window, door or curtain-walling framework by means of a structural seal

#### 3.2

##### **structural seal**

joint of elastic structural sealant extruded between glass element or glass and framework which is, when cured, of adequate transverse cross-section to transfer appropriate forces applied on the glass to the structural seal support frame

#### 3.3

##### **structural sealant**

elastic sealant used for making a structural seal

#### 3.4

##### **cohesion failure**

failure occurring in the matter

#### 3.5

##### **adhesive failure**

failure occurring on the bonding surface

#### 3.6

##### **initial cure**

stage in the curing where sealant has appropriate cohesive strength to resist different levels of action

#### 3.7

##### **creep factor**

shear design stress under permanent static load

#### 3.8

##### **type testing**

determination of the performance of a product (characteristic, durability), on the basis of either actual tests or other procedures (such as conventional, standardized, tabulated or general accepted values, standardized or recognized calculation methods, test reports when made available), in accordance with, and demonstrating compliance with, this part of ISO 28278

#### 3.9

##### **test report**

document that covers the results of tests undertaken on a representative sample of the product from production or on a prototype design of the product

#### 3.10

##### **product description**

document that details the relevant parameters for defining a product that complies with the standard

NOTE It includes specific reference(s) to characteristics that are modified by the production process and by raw materials.

#### 3.11

##### **significant change**

variation in performance beyond the permitted tolerance for the characteristic

### 3.12

#### **glazing assembly manufacturer**

manufacturer who assembles, bonds and seals the different components

## 4 Requirements

### 4.1 Environmental conditions

The assembly of the glass elements into or onto the window, door or curtain-walling framework or directly in the building or construction shall take place under the following controlled environmental conditions:

- the temperature of the surface of the frame and of the glass and of the close environment shall be not less than 5 °C and not more than 40 °C;
- for a given temperature, the %RH value shall be inferior to the value corresponding to the dew point on the support to the seal;
- the environment in the vicinity of the assembly shall be dust-free;
- glass elements stored and installed vertically are securely fixed until the sealant has reached a cure level that meets design requirements.

### 4.2 Conformity of the work with the design

It shall be ensured that the work is executed as foreseen by the design so that, in particular:

- curing of the various seals proceeds as foreseen by the design;
- after curing, the characteristic performances, including durability are deemed to satisfy the design requirements;
- assembled units that meet the design loads at the time of installation are installed on the building;
- a full record of quality control documentation for the entire project shall be maintained;
- the design shall conform to Annex C.

## 5 Assembly/bonding

The assembly manual shall be used for instruction by both the assembly and control personnel and will be a part of the assembly control documentation.

The assembly manual shall make reference to the design of the work and detail the assembly procedures, in particular what is related to:

- the component materials and products, trade name, generic type, marking and labelling;
- the cleaning and preparation materials, trade name, generic type, marking and labelling;
- the installations, equipment and tools for transport, storage, cleaning, use of primers, other preparation work of bonding surfaces, mixing sealant components, extrusion of sealant;
- the cleaning process of the seal bonding surfaces;

- information concerning the compatibility with:
  - various materials and components such as paint finishes, metal coatings, setting blocks, spacers, etc.;
  - cleaning products;
- where applicable, the process for use of primers;
- the positioning of glass and framework before extrusion of sealant, including the application of glazing blocks (see ISO 28278-1), anti-adhesive film and backer rod;
- the extrusion of sealant;
- the waiting time to obtain initial cure and the transport and storage conditions just after initial cure;
- the waiting time to obtain further curing and the final installation of the work;
- the finishing processes such as removal of temporary fixing means and application of weather seals;
- the control of adhesion before achievement.

The assembly manual shall also contain control and testing requirements and conditions, which may be by full description or by reference to this part of ISO 28278.

The designer shall specify that the sealant conforms to Annex B of 28278-1:—<sup>2)</sup>.

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## 6 Assembly/bonding control ISO 28278-2:2010

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### 6.1 Assembly/bonding control requirements ISO 28278-2:2010

#### 6.1.1 General

An assembler operating under a quality management system such as ISO 9001 or equivalent (when required by an independent laboratory), in which the quality procedures refer to 6.1.3, has the benefit of presumption of compliance with this part of ISO 28278. If not, the following clauses shall be applied.

#### 6.1.2 Organization

##### 6.1.2.1 Responsibility and authority

The responsibility, authority and interrelation of all personnel who manage, perform and verify work affecting conformity shall be defined, particularly with regard to personnel who need the organizational freedom and authority to:

- a) initiate action to prevent the occurrence of non-conforming assembly;
- b) identify and record any assembly non-conformities.

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2) To be published.

### 6.1.2.2 Management representative for assembly control

The glazing assembly manufacturer shall appoint a management representative who, irrespective of other responsibilities, shall have defined authority and responsibility for ensuring that the requirements of this part of ISO 28278 are implemented and maintained.

### 6.1.2.3 Management review

The assembly control system shall be reviewed at appropriate intervals by the manufacturer's management to ensure its continuing suitability and effectiveness. Records of such reviews shall be maintained so that the assembly process is carried out in accordance with the contract documents.

## 6.1.3 Assembly — Quality assurance system

### 6.1.3.1 General

The glazing assembly manufacturer shall establish and maintain a documented system as a means of ensuring that the assembly conforms to this part of ISO 28278. The following requirements shall be fulfilled.

### 6.1.3.2 Personnel

The glazing assembly manufacturer shall appoint personnel for the inspections and assembly control tests that will be carried out before (e.g. incoming materials), during and after assembly.

### 6.1.3.3 Documentation

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The glazing assembly manufacturer's documentation and procedures shall be relevant to the assembly and assembly control, and shall be described adequately in a manual containing the following elements:

- a) the objective, responsibilities and authorities of the management with regard to assembly/bonding conformity;
- b) the procedures for specifying and verifying the incoming materials (see also the assembly manual);
- c) the manufacturing (see the assembly manual), production control and other techniques, processes and systematic actions that will be used;
- d) the inspections that will be carried out before production, the inspection tests during and after production, and the frequency with which they will be carried out.

### 6.1.3.4 Test equipment

The calibration of the test equipment necessary for assembly control shall be documented at the beginning of the project as part of the required documentation and the test equipment shall be calibrated according to the schedule recommended by the test equipment manufacturer.

### 6.1.3.5 Inspection and testing

Subclause 6.2 designates the inspections and tests by means of tables. The requirements and records are compulsory. The test methods are recommended and therefore only given as information. The frequencies are also recommended and therefore given as information, except when designated otherwise.

Testing and inspection of the glazing assembly process are required so that a full documentation of the project is maintained.

If another testing scheme is used, it shall be described in detail in the quality manual and submitted as part of the contract documents.

Annexes A, B, D, and E and 6.2 describe the tests referred to in this clause as recommendations.

#### 6.1.3.6 Quality contracts

Inspections and tests on incoming materials (the material control section of Table 1) can be reduced on the basis of quality contracts between the supplier and the designer, on condition that the contract refers to the appropriate tables in 6.2.

Quality contracts shall include the possibility of the supplier being audited.

Quality records shall be made available by suppliers for evaluation by the glazing assembly manufacturer representative for all materials supplied on the project.

### 6.2 Inspection and testing tables for assembling glass elements into or onto the framework with structural sealant

The tables consist of three sections:

- section 1: Material control
- section 2: Assembly control
- section 3: Final control

The tables do not pretend to be exhaustive. The designer, assembler, and material suppliers can complete them. The tables can require something that is non-existent in some designs. In such a case, the inspection or test row shall be ignored and in other cases a row shall be added.

When an assembly process is such that one or more of the listed inspections or tests are not applicable or physically not possible, the concerned inspection or test shall be ignored and an alternative shall be determined and documented.

The inspections or tests on incoming materials and component products shall be carried out as soon as possible. In the case of non-conforming materials, action shall be taken so that non-conforming assembly is not performed.

The required records in the tables hereafter can include any document such as order documents, production documents, log books, etc., as described in the quality procedures and associated documentation. However, records shall indicate non delivery or batch identification. When no record is required, this requirement is only valid if there is no negative result. In the case of a negative result, a record shall always be made.

Adjustments of machinery and equipment used for assembly are periodically checked against defined parameters for optimal results.

The assembler shall fulfil the requirements in Clause 4 of this part of ISO 28278.