



## EUROPEAN ASSESSMENT DOCUMENT

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# ROOFLIGHT WITH BONDED OR MECHANICALLY FASTENED COVER GLASS

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This European Assessment Document (EAD) has been developed taking into account up-to-date technical and scientific knowledge at the time of issue and is published in accordance with the relevant provisions of Regulation (EU) No 305/2011 as a basis for the preparation and issuing of European Technical Assessments (ETA).

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## 1 SCOPE OF THE EAD

### 1.1 Description of the construction product

The product is a rooflight for curb mounted installation into a roof. The outer part of the top unit is a toughened glass (this cover glass can be curved or flat), which by means of silicone adhesive or mechanical fastening is retained to the top unit, a surface treated aluminum frame. The cover glass has as a design element an opaque (typically black) soiling (masking rim) around the edges. In the base unit, and below the top unit, is placed an insulation glass unit for thermal insulation purposes. The product can be made as both fixed or openable. Openable variants are hinged in the base unit below the insulation glass unit.

Curved cover glass is toughened and fulfils the mechanical strength according to EN12150-1:2015 clause 9.4 with minimum 75 N/mm<sup>2</sup>.

The rooflight with bonded or mechanically fastened cover glass is not fully covered by a harmonized European standard, since EN1873:2014+A1:2016 does not cover rooflights with cover glass or bonding. EN14351-1:2006+A2:2016 deals with glass products, but not bonding of cover glass, therefore is EN14351-1 used for assessment of all technical characteristics except for bonding of the cover glass where relevant clauses of ETAG002 are used. For U-value are the relevant clauses in EN1873:2014+A1:2016 are used since the market for rooflights is based on expressing U-value in relation to the developed area.

When in this EAD using the term Rooflight it refers to Rooflight with bonded or mechanically fastened cover glass.

See Annex A for drawings of the rooflights.

Concerning product packaging, transport, storage, maintenance, replacement and repair it is the responsibility of the manufacturer to undertake the appropriate measures and to advise his clients on the transport, storage, maintenance, replacement and repair of the product, as he considers necessary.

It is assumed that the product will be installed according to the manufacturer's instructions or (in absence of such instructions) according to the usual practice of the building professionals.

Relevant manufacturer's stipulations having influence on the performance of the product covered by this European Assessment Document, shall be considered for the determination of the performance and detailed in the ETA.

### 1.2 Information on the intended use(s) of the construction product

#### 1.2.1 Intended use(s)

The rooflight with bonded or mechanically fastened cover glass is intended to provide daylighting and/or ventilation through roofs with an inclination of 0° up to and including 15°.

The design for retention of the bonded cover glass is of a type where the self-weight of the cover glass is always transferred mechanically to the sealant support frame and from there to the structure. The structural seal transfers all other actions, and no devices are used to reduce danger in the event of bond failure (corresponding to a Type II according to ETAG 002, part 1, table1).

### 1.2.2 Working life/Durability

The assessment methods included or referred to in this EAD have been written based on the manufacturer's request to take into account a working life of the rooflight for the intended use of 25 years (For parts subject to wear: The assumed service life for gaskets is 5 years). These provisions are based upon the current state of the art and the available knowledge and experience.

When assessing the product, the intended use as foreseen by the manufacturer shall be taken into account. The real working life may be, in normal use conditions, considerably longer without major degradation affecting the basic requirements for works<sup>1</sup>.

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by EOTA when drafting this EAD nor by the Technical Assessment Body issuing an ETA based on this EAD, but are regarded only as a means for expressing the expected economically reasonable working life of the product.

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<sup>1</sup> The real working life of a product incorporated in a specific works depends on the environmental conditions to which that works is subject, as well as on the particular conditions of the design, execution, use and maintenance of that works. Therefore, it cannot be excluded that in certain cases the real working life of the product may also be shorter than the assumed working life.

## 2 ESSENTIAL CHARACTERISTICS AND RELEVANT ASSESSMENT METHODS AND CRITERIA

### 2.1 Essential characteristics of the product

Table 1 shows how the performance of the rooflight with bonded or mechanically fastened cover glass is established in relation to the essential characteristics.

Note. All undated references to standards or to EAD's in this chapter are to be understood as references to the dated versions listed in clause 4

Table 1 Essential characteristics of the product and methods and criteria for assessing the performance of the product in relation to those essential characteristics

No.	Essential characteristic	Assessment method	Type of expression of product performance (level, class, description)
<b>Basic Works Requirement 2: Safety in case of fire</b>			
1	Reaction to fire	2.2.1	Class
2	External fire performance of roofs	2.2.2	Class
<b>Basic Works Requirement 3: Hygiene, health and the environment</b>			
3	Watertightness	2.2.3	Level
<b>Basic Works Requirement 4: Safety in use</b>			
4	Resistance to wind load	2.2.4	Class
5	Resistance to snow load and permanent load	2.2.5	Description
6	Impact resistance	2.2.6	Class
7	Bonding of cover glass	2.2.7	Level
<b>Basic Works Requirement 5: Protection against noise</b>			
8	Airborne sound insulation	2.2.8	Level
<b>Basic Works Requirement 6: Energy economy and heat retention</b>			
9	Thermal Transmittance	2.2.9	Level
10	Total solar energy transmittance, g-value	2.2.10	Level
11	Light transmittance of translucent part, $\tau_v$	2.2.11	Level
12	Frame factor	2.2.12	Level
13	Air permeability	2.2.13	Level
<b>Durability</b>			
14	Durability	2.2.14	Description

## **2.2 Methods and criteria for assessing and classification of the performance of the product in relation to essential characteristics of the product**

This chapter is intended to provide instructions for TABs. Therefore, the use of wordings such as “shall be stated in the ETA” or “it has to be given in the ETA” shall be understood only as such instructions for TABs on how results of assessments shall be presented in the ETA. Such wordings do not impose any obligations for the manufacturer and the TAB shall not carry out the assessment of the performance in relation to a given essential characteristic when the manufacturer does not wish to declare this performance in the Declaration of Performance.

### **2.2.1 Reaction to fire**

The main elements of the rooflight with bonded or mechanically fastened cover glass shall be tested and classified using EC Delegated Regulation 2016/364/EU and EN 13501-1 as described in EN14351-1, taking EC Decision 96/603/EC, amended by EC Decision 2000/605/EC and into account. The class is given in the ETA.

### **2.2.2 External fire performance**

The rooflight with bonded or mechanically fastened cover glass shall be tested and classified according EN14351-1 using the relevant method in EN13501-5. The class is given in the ETA.

### **2.2.3 Watertightness**

The watertightness of the rooflight with bonded or mechanically fastened cover glass shall be tested and classified according EN14351-1 using the test method EN 1027 and classification method EN12208. The class is given in the ETA.

### **2.2.4 Resistance to wind load**

The resistance to wind load of the rooflight with bonded or mechanically fastened cover glass shall be tested and classified according EN14351-1 using the test method in EN 12211 and classification method EN 12210. The class is given in the ETA.

### **2.2.5 Resistance to snow load and permanent load**

The resistance to snow load of the rooflight with bonded or mechanically fastened cover glass shall be expressed through description of thickness and type of glazing. The type and thickness of the glass is given in the ETA.

### **2.2.6 Impact resistance**

The impact resistance of the rooflight with bonded or mechanically fastened cover glass shall be tested and classified according EN14351-1 using EN 13049. The class is given in the ETA.

### **2.2.7 Bonding of cover glass**

#### **2.2.7.1 Residual mechanical strength after artificial ageing**

The following tests in ETAG 002 shall be used: immersion in water at high temperature without solar radiation, humidity and NaCl atmosphere, humidity and SO<sub>2</sub> atmosphere, cleaning products (taken from ETAG 002 clause 5.1.4.2.1, 5.1.4.2.2, 5.1.4.2.3 and 5.1.4.2.4).

The procedure for evaluating the tests and the requirements for fulfilling them with a positive result, are described in ETAG 002 clause 6.1.4.2.1, 6.1.4.2.2, 6.1.4.2.3 and 6.1.4.2.4. If the requirements are fulfilled the bonding has passed the artificial ageing test and this is given the ETA.

#### **2.2.7.2 Initial mechanical strength of the bonding**

For following tests in ETAG 002 shall be used: Tension rupture and Shear rupture (taken from ETAG 002 clause 5.1.4.1.1 and 5.1.4.1.2). The level of performance is given in the ETA in accordance with ETAG 002.

### 2.2.8 Airborne sound insulation

The airborne sound insulation performance of the rooflight with bonded or mechanically fastened cover glass shall be tested and classified according EN14351-1 with the test methods to EN ISO 10140-1 and EN ISO 10140-2 and expressed according to EN ISO 717-1 and described in the ETA. The test specimen is installed in a vertical position between the test chambers.

### 2.2.9 Thermal Transmittance

The thermal transmittance of the curb mounted rooflight with bonded or mechanically fastened cover glass shall be tested and classified according EN1873:2014+A1:2016 using test method EN ISO12567-2 (reference method) or calculation method in accordance with EN ISO10077-1 and EN ISO10077-2 together with EN673 and ISO15099 using minimum 2 significant figures.

The thermal transmittance shall be based on the developed area for a product with a reference size as specified in EN1873:2014+A1:2016 Annex D 5.2.2.

The thermal transmittance and the developed area for the reference size shall be expressed in the ETA.

### 2.2.10 Total solar energy transmittance, g-value

The total solar energy transmittance of the rooflight with bonded or mechanically fastened cover glass shall be tested and classified according EN14351-1 using EN 410 and given in the ETA.

### 2.2.11 Light transmittance of translucent part, $\tau_v$

The light transmittance of translucent part shall be tested and classified according EN14351-1 using EN 410 and given in the ETA.

### 2.2.12 Frame factor

The frame factor for the rooflight with bonded or mechanically fastened cover glass is calculated as:

$$\text{Frame factor} = 1 - (\text{daylight area/roof opening for reference size}),$$

where the roof opening is the reference size in EN1873:2014+A1:2016 Annex D 5.2.2 and the daylight area is represented by the transparent area seen from the inside. The frame factor shall be given in the ETA.

### 2.2.13 Air permeability

The air permeability of the rooflight with bonded or mechanically fastened cover glass shall be tested and classified according EN14351-1 using test method EN 1026 and classification EN12207 and given in the ETA.

### 2.2.14 Durability

The durability of the rooflight with bonded or mechanically fastened cover glass shall be ensured as described below and be described in the ETA.

The manufacturer can provide information about maintenance and the replaceable parts.

The durability of certain characteristics shall be ensured in accordance with section 4.15.2 of EN 14351-1 excluding the “ability to release”, and with the following precisions and addition:

- watertightness and air permeability: as described in section 4.15.2 of EN 14351-1.
- thermal transmittance: As described in 4.15.2 of EN 14351-1 with the following addition; IGUs fulfilling EN1279-5 shall be deemed to meet the durability requirement.
- mechanical strength of the bonding: The durability of this characteristic is accessed as described in clause 2.2.7.1



### 3 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE

#### 3.1 System(s) of assessment and verification of constancy of performance to be applied

For the products covered by this EAD the applicable European legal act are: Decision 96/582/EC and 98/436/EC.

Bonding of cover glass is subject to AVCP level 1 and other technical characteristics are subject to AVCP 3, except for uses subject to regulations on reaction to fire.

For uses subject to regulations on reaction to fire the applicable AVCP systems regarding reaction to fire are 1, or 3, or 4 depending on the conditions defined in the said Decision.

#### 3.2 Tasks of the manufacturer

The corner stones of the actions to be undertaken by the manufacturer of the rooflight in the procedure of assessment and verification of constancy of performance are laid down in Table 2.

**Table 2 Control plan for the manufacturer; corner stones**

No	Subject/type of control ( <i>product, raw/constituent material, component - indicating characteristic concerned</i> )	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
<b>Factory production control (FPC)</b>					
1	Incoming materials, e.g. - Bonding material Supplier certificate  - Curved cover glass, Bending strength of glass  - Aluminium frame Surface treatment	According to relevant specification or standard, e.g. EN 12150 for the cover glass	According to relevant specification or standard, e.g. EN 12150 for the cover glass  Cover glass minimum 75N/mm <sup>2</sup>	According to relevant specification or standard, e.g. EN 12150 for the cover glass	According to relevant specification or standard, e.g. EN 12150 for the cover glass
2	Instructions on e.g.: - type and quality of all materials and components incorporated in the elements - overall dimensions of prefabricated elements - tolerances of geometry - surface treatments when relevant - markings for correct position and installation in the works - packaging and transport protection	According to relevant standard or specification	According to relevant standard or specification	One sample	Every delivery

No	Subject/type of control (product, raw/constituent material, component - indicating characteristic concerned)	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
3	Reaction to fire	Main components as defined in annex H2 in EN 14351-1 and in accordance with relevant standard or specification	According to relevant standard or specification	According to control plan	According to control plan
4	Bonding	See ETAG 002	Initial tensile strength at +23° according to ETAG 002 minimum 0,48 N/mm <sup>2</sup>	According to control plan	According to control plan
			Strength after ageing according to ETAG 002 $\Delta X_{\text{mean}} \geq 0,75$ according ETAG 002	According to control plan	

### 3.3 Tasks of the notified body

The cornerstones of the actions to be undertaken by the notified body in the procedure of assessment and verification of constancy of performance for rooflight with bonded cover glass are laid down in Table 3.

The intervention of the notified body under AVCP system 1 is only necessary for the bonding when the cover glass is bonded and for reaction to fire for products for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g. an addition of fire retardants or a limiting of organic material).

In this case the cornerstones of the tasks to be undertaken by the notified body under AVCP system 1 are laid down in Table 3.

**Table 3 Control plan for the notified body; cornerstones**

Subject/type of control ( <i>product, raw/constituent material, component - indicating characteristic concerned</i> )	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
<b>Initial inspection of the manufacturing plant and of factory production control</b>				
Initial inspection of the manufacturing plant and of factory production control carried out by the manufacturer regarding the constancy of performance related to the bonding of the cover glass and to reaction to fire and taking into account productions stages limiting of organic material and/or the addition of fire retardants.	As defined in control plan	As defined in control plan	As defined in control plan	According to the control plan
<b>Continuous surveillance, assessment and evaluation of factory production control</b>				
Continuous surveillance, assessment and evaluation of the factory production control carried out by the manufacturer regarding the constancy of performance related to the bonding of the cover glass and reaction to fire and taking into account productions stages limiting of organic material and/or the addition of fire retardants.	As defined in control plan	As defined in control plan	As defined in control plan	According to the control plan

## 4 REFERENCE DOCUMENTS

EN14351-1:2006 +A2:2016	Windows and doors - Product standard, performance characteristics - Part 1: Windows and external pedestrian doorsets without resistance to fire and/or smoke leakage characteristics
ETAG002:2013	Guideline for European technical approval for structural sealant glazing kits (SSGK)
EN1873:2014 +A1:2016	Prefabricated accessories for roofing - Individual rooflights of plastics – Product specification and test methods
EN13501-1:2018	Fire classification of construction products and building elements - Part 1: Classification using test data from fire reaction to fire tests
EN13501-5:2016	Fire classification of construction products and building elements - Part 5: Classification using data from external fire exposure to roofs tests
EN1027:2016	Windows and doors - Watertightness - Test method
EN12208:2001	Windows and doors - Watertightness – Classification
EN12211:2012	Windows and doors – Resistance to wind load – Test method
EN12210:2016	Windows and doors – Resistance to wind load – Classification
EN1026:2016	Windows and doors – Air permeability – Test method
EN12207:2016	Windows and doors – Air permeability – Classification
EN ISO12567-2:2006	Thermal performance of windows and doors – Determination of thermal transmittance by hot box method – Part 2: Roof windows and other projecting windows
EN ISO10077-1:2017	Thermal performance of windows, doors and shutters – Calculation of thermal transmittance – Part 1: General
EN ISO10077-2:2017	Thermal performance of windows, doors and shutters – Calculation of thermal transmittance – Part 2: Numerical method for frames
EN13049:2003	Windows – Soft and heavy body impact – Test method, safety requirements and classification
EN410:2011	Glass in building – Determination of luminous and solar characteristics of glazing
EN ISO10140-1:2016	Acoustics - Laboratory measurement of sound insulation of building elements - Part 1: Application rules for specific products
EN ISO10140-2:2010	Acoustics - Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation
EN ISO10140-4:2010	Acoustics - Laboratory measurement of sound insulation of building elements - Part 4: Measurement procedures and requirements
EN ISO717-1:2013	Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation - Amendment 1: Rounding rules related to single number ratings and single number quantities
ISO15099:2003	Thermal performance of windows, doors and shading devices — Detailed calculations
EN12150-1:2015+ A1:2019	Glass in building – Thermally toughened soda lime silicate safety glass – Part 1: Definition and description

**ANNEX A ILLUSTRATIONS OF THE CONSTRUCTION PRODUCT**



Figure 1: Product with bonded cover glass seen from outside

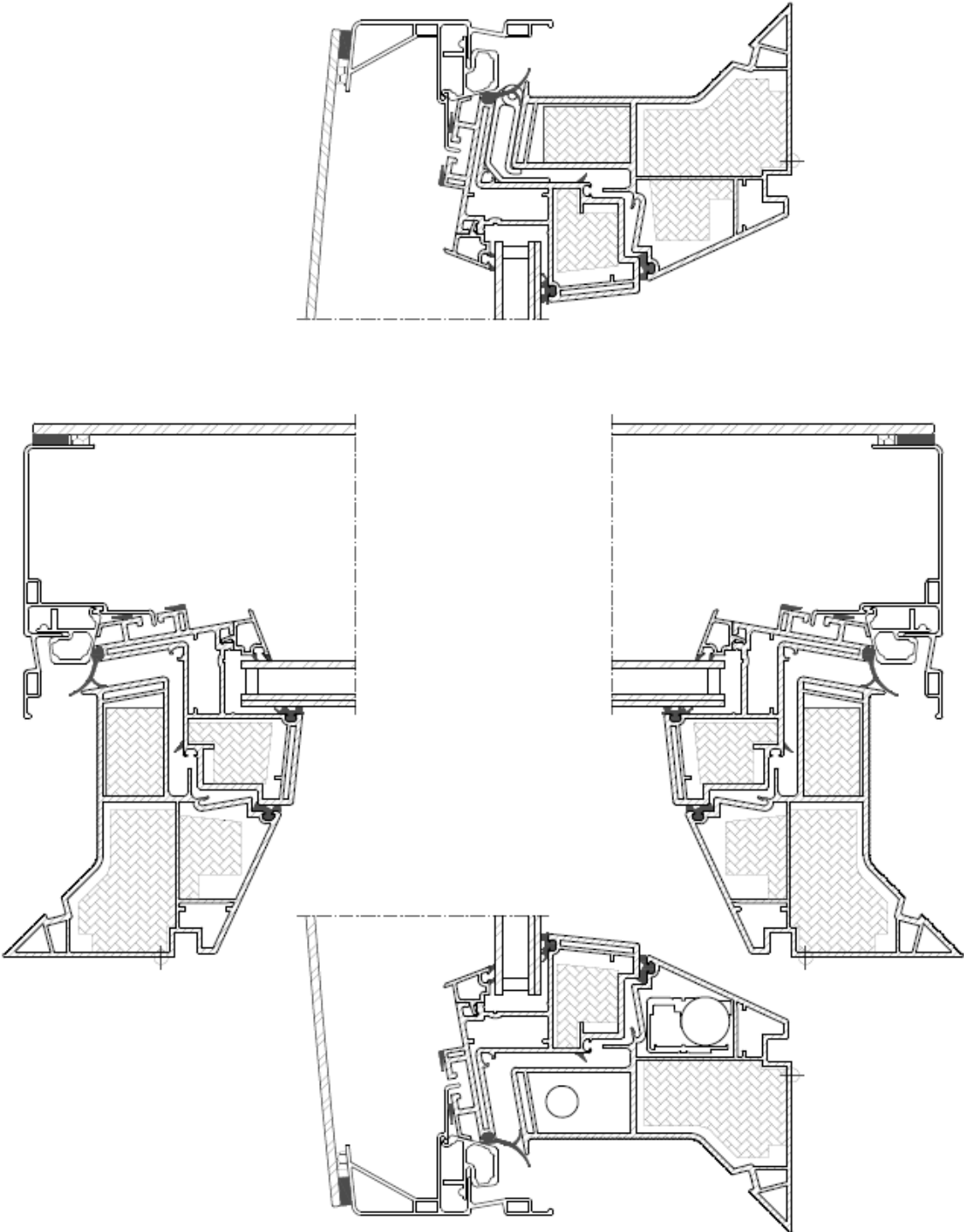


Figure 2: Principle sectional views of version with bonded cover glass



Figure 3: Product with mechanical fastened cover glass seen from outside

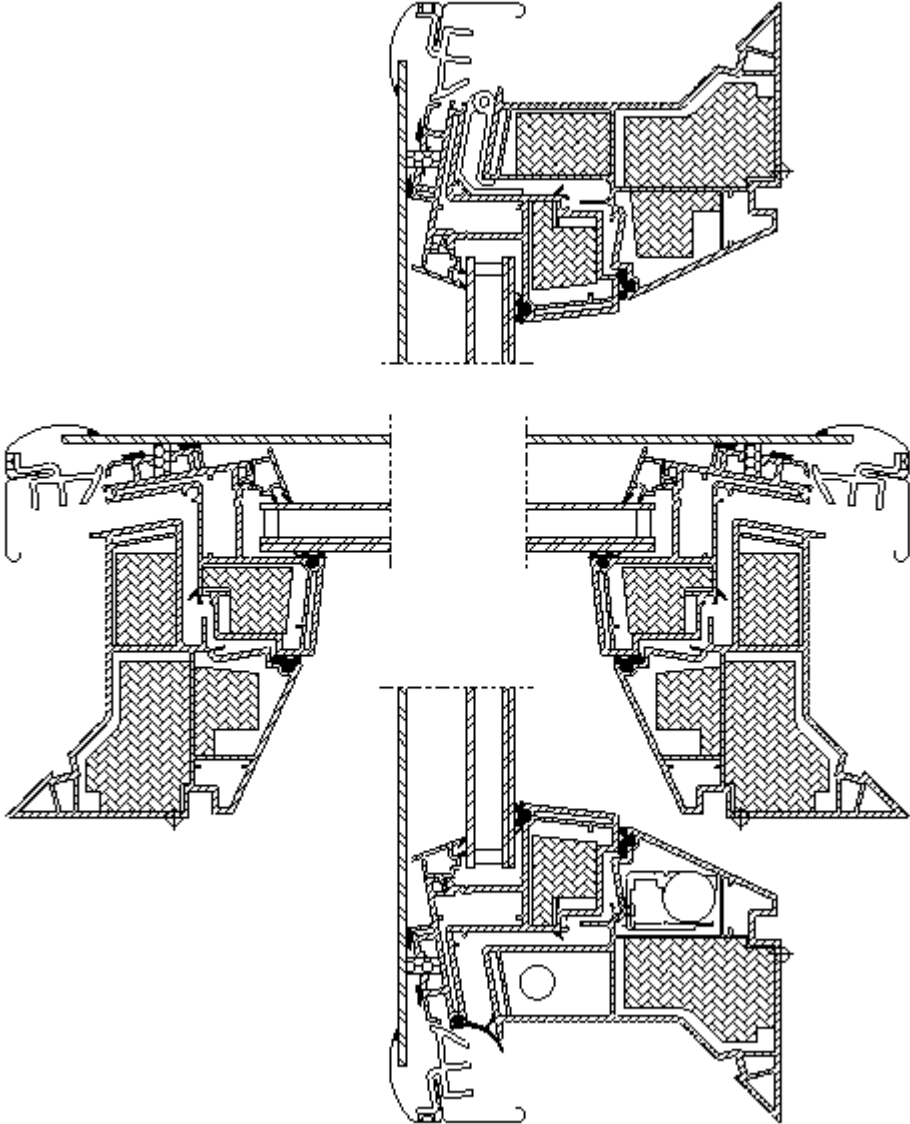


Figure 4: Principle sectional views of version with mechanical fastened cover glass