



EUROPEAN ASSESSMENT DOCUMENT

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SELF- SUPPORTING RIDGELIGHT

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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) 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

Kit, consisting of two roof windows (openable and/or fixed), each individually CE marked in accordance to EN 14351-1:2006+A1:2010, which are connected at the top by means of hardware. The kit consists of two roof windows with same frame width and height, where openable and fixed roof windows can be combined. The kits can be combined.

The kit does not contribute to the stiffness of the roof (racking).

The pitch of the roof windows can vary from 25-40 degrees, meaning that the angle between the roof windows can be from 100-130 degrees.

The profiles of the frame and casement are pultruded profiles consisting of 70% - 80% glass fiber and 30% - 20% polyurethane resin (by mass). Density: 1800 - 2200 kg/m³. The frame profiles of the fixed roof windows are identical. The frame profiles of the openable roof windows are identical as are the casement profiles. The openable roof windows are power operated. The maximum opening is 321- 700 mm depending on the size. The surface of the profiles are treated with UV protecting coat.

Hardware (brackets and bearings) are made of steel.

The glazing is a double or triple insulating glass unit.

An example of the kit is shown in Annex A.

The product is not fully covered by a harmonised European standard (hEN). The products covered by this EAD are assessed for structural applications (self-supporting) which is not covered by the harmonized standard EN 14351-1. Furthermore, the profiles of the frame consist of glass fibre reinforced resin, for which no harmonized assessment method exist in relation to structural applications.

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 self-supporting ridgelight is intended to provide ventilation and/or weather protection and daylight luminance to any enclosed or partially enclosed building or space.

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 ridgelight for the intended use of 25 years when installed in the works. 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 works¹.

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.

1.3 Specific terms used in this EAD

See EN 12519:2004

2 ESSENTIAL CHARACTERISTICS AND RELEVANT ASSESSMENT METHODS AND CRITERIA

2.1 Essential characteristics of the product

Table 1 shows how the performance of the self-supporting ridgetight is established in relation to the essential characteristics.

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	Method of verification and assessment	Type of expression of product performance
Basic Works Requirement 1: Mechanical resistance and stability			
1	Load bearing capacity of the kit	See 2.2.1	Level
	Load bearing capacity of the glazing		
	- Resistance to wind load	See 2.2.2	Class and description
	- Resistance to snow and permanent load	See 2.2.3	Description
Basic Works Requirement 2: Safety in case of fire			
2	Reaction to fire	See 2.2.4	Class
3	External fire performance	See 2.2.5	Class
Basic Works Requirement 3: Hygiene, health and the environment			
4	Watertightness	See 2.2.6	Class

¹ 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 working life indicated above.

No	Essential characteristic	Method of verification and assessment	Type of expression of product performance
Basic Works Requirement 4: Safety and accessibility in use			
5	Impact resistance	See 2.2.7	Class
6	Load bearing capacity of safety devices	See 2.2.8	Level
Basic Works Requirement 5: Protection against noise			
7	Acoustic performance	See 2.2.9	Level
Basic Works Requirement 6: Energy economy and heat retention			
8	Thermal transmittance	See 2.2.10	Level
9	Radiation properties	See 2.2.11	Level
10	Air permeability	See 2.2.12	Class
	Durability	See 2.2.13	Description

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

2.2.1 Load bearing capacity of the kit

The load bearing capacity of the kit (ultimate limit states and serviceability limit states/maximum relative deflection) shall be determined by means of calculations and tests.

The characteristic values will be based on short-term load tests at room temperature without influence of climatic or environmental factors.

NOTE: The determination of the design values are not covered by this EAD. They shall be calculated on a case by case by means of:

- Characteristics performance of profiles and connections
- EN 1990 (Eurocode 0)
- EN 1991-1-1 (self-weight), EN 1991-1-3 (snow loads), EN 1991-1-4 (wind actions)
- Common European magnification and reduction factors
- Nationally determined parameters

By default the principles laid down in ETAG 010, sub clauses 5.1.1.1 (General, Figure 1 and the principle for "Flat sheets in construction"), 6.3.1.1 and 6.3.1.2 must be applied.

Small-scale initial test in accordance with:

- a) Density- EN ISO 1183-1 (Method A (immersion))
- b) Glass % - EN ISO 1172 (Method B)
- c) Thermal expansion coefficients (axial and transverse) - ISO 11359-2

Small-scale (characterization) tests on frame profiles shall be carried out as follows:

- d) Tensile strength (parallel to the glass fiber) - EN ISO 527-5

- e) Compression strength (parallel to the glass fiber) - EN ISO 14126 (Sample specimen type: type B1, Loading fixture method: type 2 (end loading))
- f) Bending strength (parallel to the glass fiber) - EN ISO 14125 (Method A)
- g) E- modulus / flexural modulus (parallel to the glass fiber) - EN ISO 14125 (Method A)
- h) G-modulus - EN ISO 14129
- i) Shear strength - EN ISO 14130

For a) and b) the number of specimens in accordance with EN ISO 1172.

For c) the number of samples is 3 in each direction in accordance with ISO 11359-2.

For d) to i) five tests at room temperature for every characteristic

For all tests a) to i) the test specimens are cut from the frame profile of the openable window

The characteristic properties shall be expressed in MPa and be determined by means of EN 1990, Table D1 (V_x unknown). The test results shall be given in the ETA.

The ability of the hardware as well its fixation to the profiles to withstand the reactions at the supports (top and bottom) shall be determined by means of tests, as shown in Annex B. The test specimen shall be tested at room temperature and be installed in accordance with the manufacturer's instructions. Minimum five tests at room temperature shall be carried out. The characteristic strength shall be expressed in kN and be determined by means of EN 1990, Table D1 (V_x unknown). The test results shall be given in the ETA.

At least five full-scale tests in worst-case configuration (25° roof pitch, largest openable windows, snow and self-weight) in room temperature shall be carried out. The load bearing capacity in kN/m² shall be determined by means of EN 1990, Table D1 (V_x unknown) and given in the ETA.

The calculated characteristic load bearing capacity, without nationally determined magnification and reduction parameters (e.g.: duration, aging/environment, temperature) of typical applications will be given in the ETA. The calculation process will be demonstrated by means of an example.

2.2.2 Resistance to wind load

The roof window shall be tested and the results shall be expressed in accordance with EN 14351-1:2006+A1:2010, 4.2.

Description of the composition of the glazing shall be provided, see EN 14351-1:2006+A1:2010, 4.2.

2.2.3 Resistance to snow and permanent load

Description of the composition of the glazing shall be provided, see EN 14351-1:2006+A1:2010, 4.3.

2.2.4 Reaction to fire

The roof windows shall be tested, using the test method(s) relevant for the corresponding reaction to fire class, in order to be classified according to EN 13501-1. Further information is provided in EN 14351-1:2006+A1:2010, 4.4.1.

The brackets and bearings used as hardware and made of steel are considered to fulfil the requirements of EC decision 96/603/EC (as amended) and therefore classified as A1 without the need for testing

2.2.5 External fire performance

The roof windows shall be tested using the test method relevant for the corresponding external fire performance roof class, in order to be classified according to EN 13501-5. EN TS 1187 T1 and T4 shall be used as basis for classification in accordance with EN 13501-5

2.2.6 Water tightness

The roof windows shall be tested in accordance with EN 14351-1:2006+A1:2010, 4.5.

The test result shall be expressed in accordance with EN 14351-1:2006+A1:2010, 4.5 (non - shielded).

2.2.7 Impact resistance

The roof windows shall be tested in accordance with EN 14351-1:2006+A1:2010, 4.7.

The test result shall be expressed in accordance with EN 14351-1:2006+A1:2010, 4.7.

2.2.8 Load bearing capacity of safety devices

The load bearing capacity of safety devices of the roof windows shall be tested in accordance with EN 14351-1:2006+A1:2010, 4.8.

The result shall be expressed in accordance with EN 14351-1:2006+A1:2010, 4.8.

2.2.9 Acoustic performance

The acoustic performance of the roof windows shall be determined in accordance with EN 14351-1:2006+A1:2010, 4.11.

The result shall be expressed in accordance with EN 14351-1:2006+A1:2010, 4.11.

2.2.10 Thermal transmittance

The thermal transmittance of the roof windows shall be determined in accordance with EN 14351-1:2006+A1:2010, 4.12.

The result shall be expressed in accordance with EN 14351-1:2006+A1:2010, 4.12.

2.2.11 Radiation properties

The radiation properties of the roof windows shall be determined in accordance with EN 14351-1:2006+A1:2010, 4.13.

The results shall be expressed in accordance with EN 14351-1:2006+A1:2010, 4.13.

2.2.12 Air permeability

The air permeability of the roof windows shall be determined in accordance with EN 14351-1:2006+A1:2010, 4.14.

The result shall be expressed in accordance with EN 14351-1:2006+A1:2010, 4.14.

2.2.13 Durability

The durability of the roof windows shall be ensured as described in EN 14351-1:2006+A1:2010, 4.15.

The durability of the load bearing capacity of the kit is covered by the design values, see 2.2.1.

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 98/600/EC and Decision 98/436/EC

The system is: 3

In addition, with regard to reaction to fire for products covered by this EAD the applicable European legal act is: Decision 98/600/EC and Decision 98/436/EC

The system is: 3

System 1 as indicated in the above decision for reaction to fire does not apply, since there is not a clearly identifiable stage in the production process, which results in an improvement of the reaction to fire classification.

3.2 Tasks of the manufacturer

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

3.3 Tasks of the notified body

See R 568/2014.

Table 2 Control plan for the manufacturer; corner stones

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
Factory production control (FPC) including testing of samples taken at the factory in accordance with a prescribed test plan					
1	Incoming materials The components shall be delivered with certificates 3.1 according to EN 10204. The manufacturer shall document the date of the manufacturing of components for every delivery	The manufacturer shall document the date of delivery and the date of the manufacturing of the components		Every delivery	Every delivery
2	Density of the frame profiles	By means of measuring the mass of sample and relate to the average Area of cross section multiplied by length of sample	$\geq 2.2.1$ a) -5 %	1	Per 3 hours production time
3	Dimensions of the profiles and the hardware	Tested and shall fulfil the requirements of a given profile and hardware list			At start up and thereafter every 3 hours of production time
4	Weight per meter	Tested and shall fulfil the requirements of a given profile and hardware list			At start up and thereafter every 7 production days
5	Density of the frame profiles	EN ISO 1183-1 (Room temperature)	$\geq 2.2.1$ a) -5%	1	Per 5 th batch of side frame profile, and minimum twice a month
6	Bending strength (parallel to the glass fibre)	EN ISO 14125 (Room temperature)	$\bar{x} - s \cdot 2.33$ $\geq 2.2.1$ f) -5%	5	Per 5 th batch of side frame profile, and minimum twice a month
7	Glass % of the frame profiles	EN ISO 1172	$\geq 2.2.1$ b) -5%	2 or 3	Per 5 th batch of side frame profile, and minimum twice a month
8	Reaction to fire (class A1, A2, B,C, D or E)	EN ISO 1182 or EN ISO 1716 and EN 13823 and EN 11925-2 as relevant	2.2.2	1	once per two years

4 REFERENCE DOCUMENTS

As far as no edition date is given in the list of standards thereafter, the standard in its current version at the time of issuing the European Technical Assessment, is of relevance.

EN 14351-1:2006+A1:2010

Windows and doors -- Product standard, performance characteristics -- Part 1: Windows and external pedestrian doorsets without resistance to fire and/or smoke leakage characteristics

EN ISO 1183-1

Plastics -- Methods for determining the density of non-cellular plastics Part 1: Immersion method, liquid pycnometer method and titration method

EN ISO 1172

Textile-glass-reinforced plastics -- Prepregs, moulding compounds and laminates --Determination of the textile-glass and mineral-filler content -- Calcination methods

EN ISO 527-5

Plastics - Determination of tensile properties -- Part 5: Test conditions for unidirectional fibre-reinforced plastic composites

EN ISO 14126

Fibre-reinforced plastic composites -- Determination of compressive properties in the in-plane direction

EN ISO 14125

Fibre-reinforced plastic composites -- Determination of flexural properties

EN ISO 14129

Fibre-reinforced plastic composites -- Determination of the in-plane shear stress/shear strain response, including the in-plane shear modulus and strength, by the plus or minus 45 degree tension test method

EN ISO 14130

Fibre-reinforced plastic composites -- Determination of apparent interlaminar shear strength by short-beam method

EN 1990

Eurocode -- Basis of structural design

EN 1991-1-1

Eurocode 1: Actions on structures - Part 1-1: General actions - Densities, self-weight, imposed loads for buildings

EN 1991-1-3

Eurocode 1 - Actions on structures - Part 1-3: General actions - Snow loads

EN 1991-1-4

Eurocode 1: Actions on structures - Part 1-4: General actions - Wind actions

ETAG 010

Guideline for European technical Approval For Self-Supporting Translucent Roof Kits

EN 13501-1

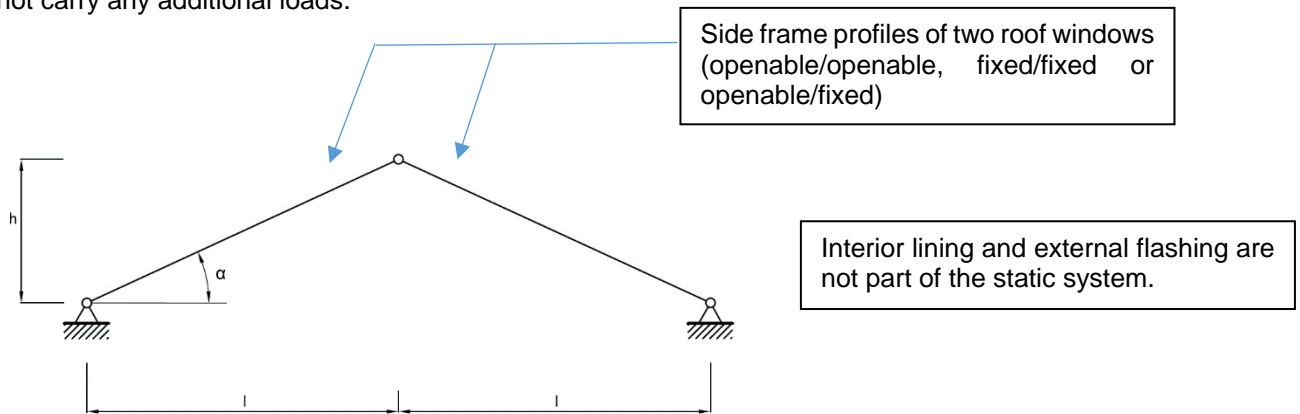
Fire classification of construction products and building elements -- Part 1: Classification using test data from reaction to fire tests

EN 13501-5

Fire classification of construction products and building elements -- Part 5: Classification using data from external fire exposure to roofs tests

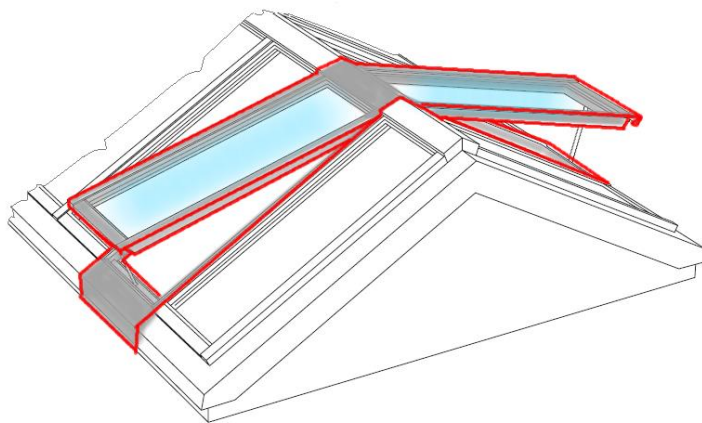
ANNEX A DESCRIPTION OF THE CONSTRUCTION PRODUCT

Description of the static system of the kit. The glass panes apart from their self-weight, snow and wind do not carry any additional loads.

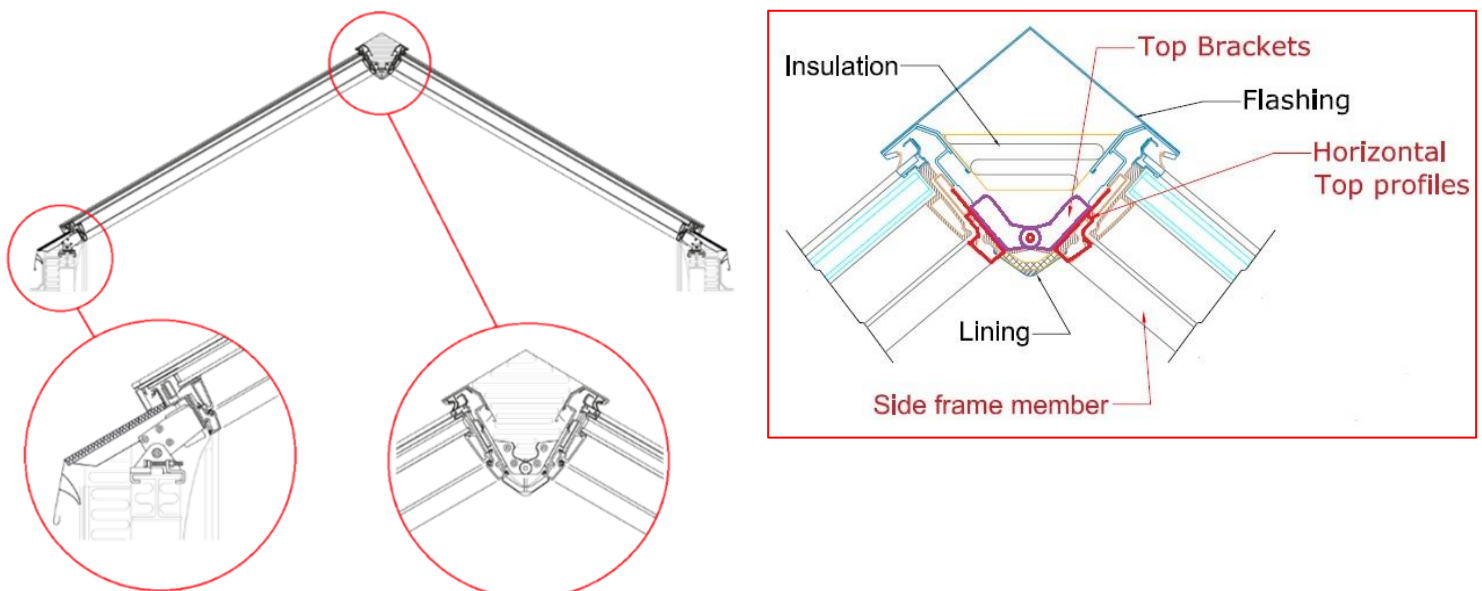


Principle build-up of the kit.

The outer frame dimensions of the roof windows are identical and is symmetric around the longitudinal axis



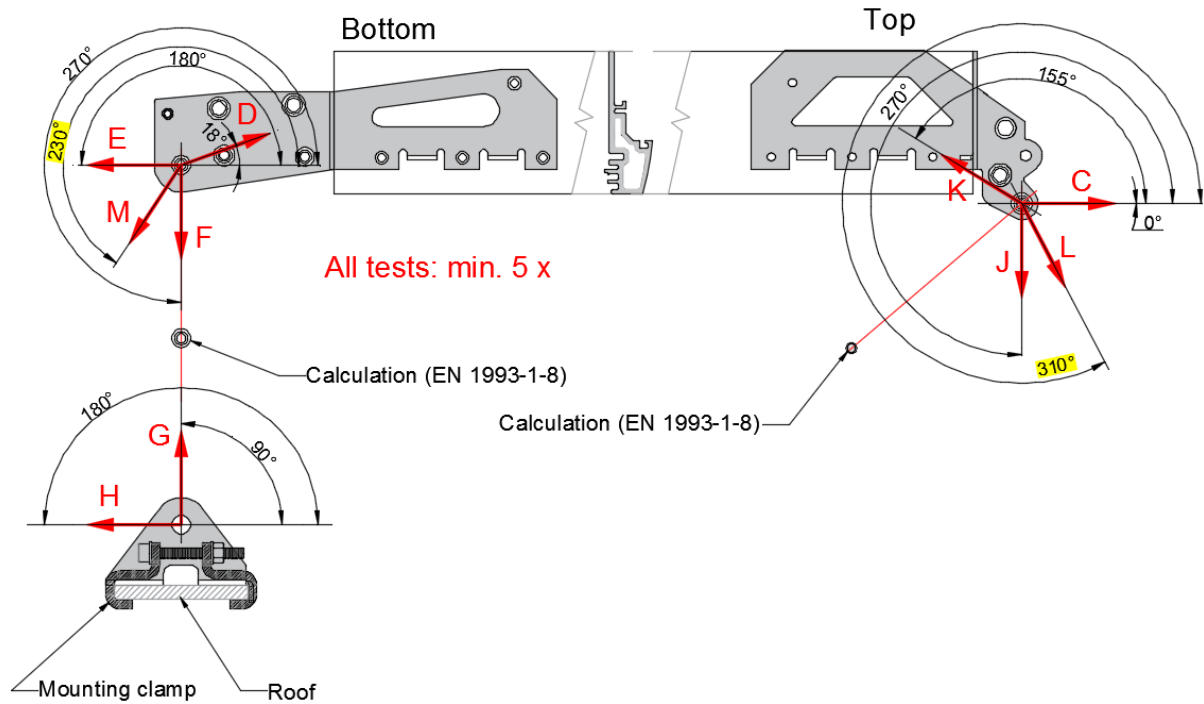
The marked details shows the external flashings and internal linings. There is no loadbearing beam in top in the longitudinal direction of the kit.



ANNEX B TEST OF HARDWARE AND ITS FIXATION TO THE PROFILES

Arrows are indicating pulling (force) directions.

The pulling (force) directions are based on an analysis of normal load combinations considering also unequal load distributions. Based on this analysis the below test regime constitutes the worst case scenarios.



Test directions:

C, E, G, H

D, K

F, J, L, M

Test methods:

Hydraulic test bench

Full-scale test, loading by means of sandbags

One roof window (1000 mm x 2400 mm) horizontally installed, upside down supported at each corners, loading by means of sandbags

