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**SWISS**  
**HAIL IMPACT PROTECTION REGISTER**  
**HSR**

**APIB Test Specification No. 07**  
**Fibre-Cement**

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## Table of contents

<b>7 Fibre-cement building products</b>	<b>4</b>
7.1 General information	4
7.2 Intended use	4
7.3 Test specimen	4
7.3.1 Fibre-cement board-type products	4
7.3.2 Fibre-cement slate-type products	4
7.4 Test set-up	4
7.5 Specimen storage prior to testing (conditioning)	4
7.6 Specimen treatment before testing	4
7.7 Target area and angle of impact	5
7.7.1 Fibre-Cement board-type products	5
7.8 Component function	9
7.9 Damage criterion	9
7.10 Measuring method	9
7.11 Existing standards and regulations (not exhaustive)	9

## **7 Fibre-cement building products**

### **7.1 General information**

The test specifications for the "Fibre-cement" component category include additional, component-specific provisions for the standard test, which are not governed by the general test specifications. This test specification covers products that are flat or profiled (e.g., corrugated, trapezoidal or other shapes), which contain  $\leq 30$  units/m<sup>2</sup> if professionally installed. For installations  $>30$  units/m<sup>2</sup> the test specification "shingle" is valid. This test specification covers

- Fibre-cement board-type products: Large-size components - 5 units or less cover a 1 squared-meter area, when installed correctly.
- Fibre-cement slate-type products: Small-size components - more than 5 units cover a 1 squared-meter area, when installed correctly.

The following test provisions always apply to all fibre-cement board-type and fibre-cement slate-type products referred to above, unless reference to a different protocol is made in any sub-paragraph.

### **7.2 Intended use**

The test specifications cover fibre-cement board-type products and slate-type products having flat or profiled shapes for use on façades and on roofs.

### **7.3 Test specimen**

#### **7.3.1 Fibre-cement board-type products**

The test specimen consists of at least 2 single pieces. They are fastened to the appropriate test specimen support frame with fasteners used in practice according to the manufacturer's installation instructions. Generally the size of the completed test specimen is 0.8 - 1 m<sup>2</sup>.

#### **7.3.2 Fibre-cement slate-type products**

Slate-type products are mounted in at least 3 rows, each having at least 4 slates. They are fastened to the appropriate test specimen support frame with fasteners used in practice according to the manufacturer's installation instructions. Generally the size of the completed test specimen is 0.8 - 1 m<sup>2</sup>.

### **7.4 Test set-up**

The test specimen is installed on a frame.

### **7.5 Specimen storage prior to testing (conditioning)**

The test specimen must be 28 days old and stored under the test conditions for at least 3 days.

### **7.6 Specimen treatment before testing**

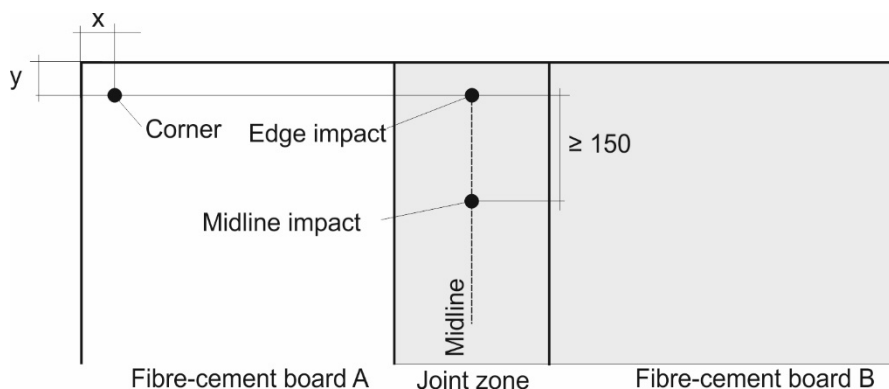
The specimen surface is wetted using a damp sponge three times at intervals of 30 s, then impacted after 1 to 2 min.

## 7.7 Target area and angle of impact

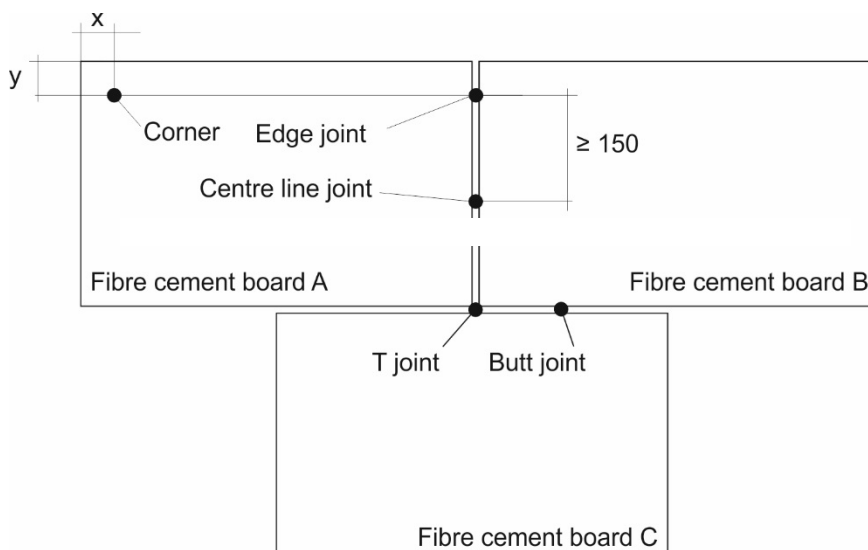
### 7.7.1 Fibre-Cement board-type products

A flat fibre-cement board-type specimen is impacted at following locations (Overlapping joint, Fig. 1; butt joint, Fig. 2):

- Corner: distance to the specimen edge being 1/5 of the projectile diameter (Fig. 1, Fig. 2)
- Centre line of the joint zone away from the specimen edge: the distance being at least 75 mm from the edge or at least 150 mm from the centre-line joint zone target area located near the specimen edge (Fig. 1, Fig. 2)
- Centre line of the joint zone near the specimen edge: the distance to the edge being 1/5 of the projectile diameter (Fig. 1, Fig. 2)
- T-Joint (only present with butt joint specimens; Fig. 2)



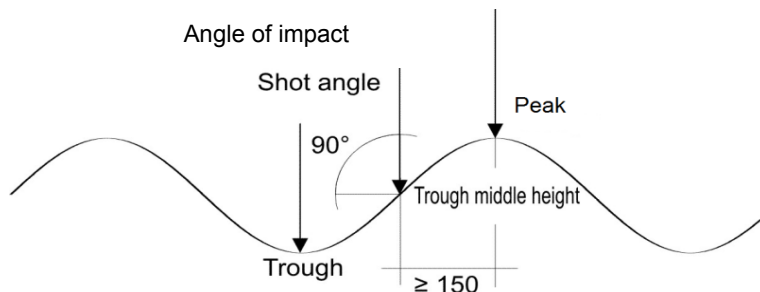
**Figure 1** Plan view of target areas for board-type specimens having an overlapping: a corner, the centre line of the joint zone near an edge, and the centre line of the joint zone away from the edge ( $x=y:1/5$  projectile diameter, dimensions in millimetres)



**Figure 2** Plan view of target areas for board-type specimens having a butt joint: a corner, the centre line of the joint zone near an edge, and the centre line of the joint zone away from the edge, and a T-joint ( $x=y:1/5$  projectile diameter, dimensions in millimetres)

Profiled (i.e., corrugated) fibre-cement products used as a roof covering are impacted at the following locations (Fig. 1, Fig. 2, Fig. 3):

- Corner: the distance to the specimen edge being 1/5 of the projectile diameter (Fig. 1, Fig. 2)
- Centre line of the joint zone away from the specimen edge: the distance being at least 75 mm from the edge or at least 150 mm from the centre-line joint zone target area located near the specimen edge (Fig. 1, Fig. 2)
- Centre line of the joint zone near the specimen edge: the distance to the edge being 1/5 of the projectile diameter (Fig. 1, Fig. 2)
- Trough (Fig. 3)
- Trough middle height (Fig. 3)
- Peak (Fig. 3)

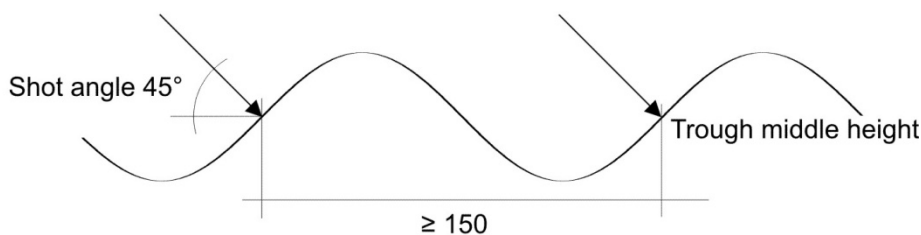


**Figure 3** Target areas and angle of impact for corrugated fibre-cement board-type panels used as a roof covering; in cross section (dimensions in millimetres)

Profiled fibre-cement board-type specimens used for façades are impacted differently depending on the intended installation orientation (horizontal, diagonal, or vertical arrangement of the contour direction).

A profiled fibre-cement board-type specimen with a horizontal or diagonal installation orientation is impacted as follows (Fig.1, Fig. 2, Fig. 4):

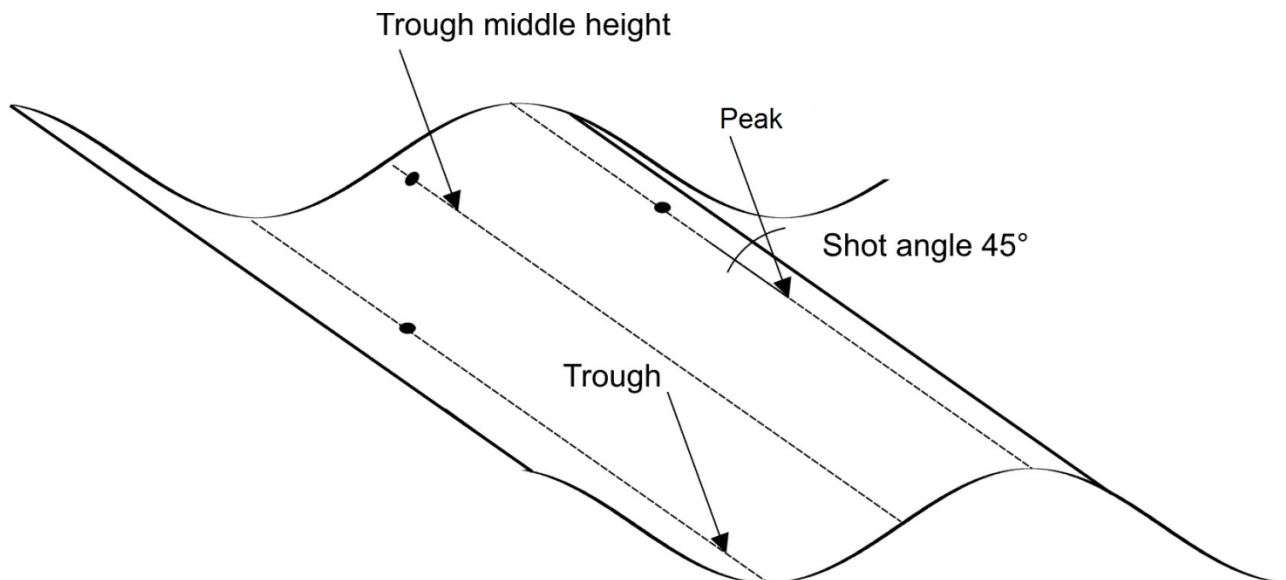
- Corner: the distance to the specimen edge being 1/5 of the projectile diameter (Fig. 1, Fig. 2)
- Centre line of the joint zone away from the specimen edge: the distance being at least 75 mm from the edge or at least 150 mm from the centre-line joint zone target area located near the specimen edge (Fig. 1, Fig. 2)
- Centre line of the joint zone near the specimen edge: the distance to the edge being 1/5 of the projectile diameter (Fig. 1, Fig. 2)
- Trough middle height (Fig. 4)



**Figure 4** Target areas and angle of impact for profiled fibre-cement board-type products or for fibre-cement slate-type products used as a façade component mounted in a horizontal or diagonal orientation (dimensions in millimetres)

A profiled fibre-cement board-type specimen with a vertical installation orientation is impacted as follows (Fig. 1, Fig. 2):

- Corner: the distance to the specimen edge being 1/5 of the projectile diameter (Fig. 1, Fig. 2)
- Centre line of the joint zone away from the specimen edge: the distance being at least 75 mm from the edge or at least 150 mm from the centre-line joint zone target area located near the specimen edge (Fig. 1, Fig. 2)
- Centre line of the joint zone near the specimen edge: the distance to the edge being 1/5 of the projectile diameter (Fig. 1, Fig. 2)
- Trough (Fig. 5)
- Trough middle height (Fig. 5)
- Peak close to the fastener (Fig. 5)



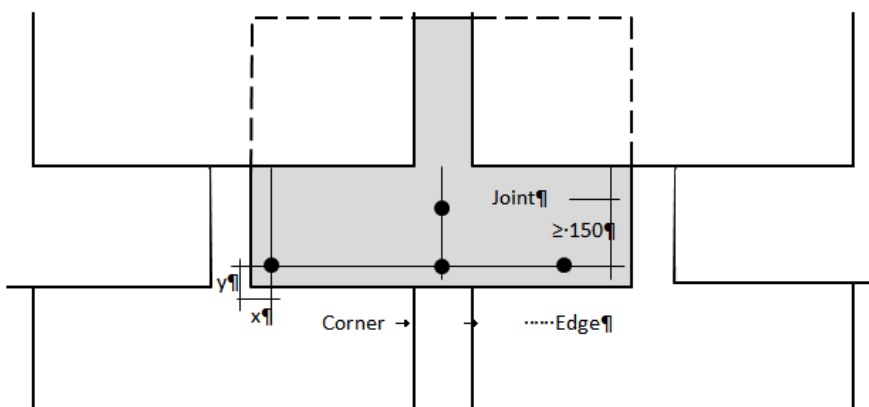
**Figure 5** Target areas and angle of impact for a profiled fibre-cement board-type product or profiled fibre-cement slate-type product mounted on the façade in a vertical corrugation orientation

Several tests can be performed on one test specimen. The distance between target areas must be at least 150 mm. The angle of impact is 90° for specimens used on roof and is 45° for those used on façades. Any other critical target areas that exist must also be tested (refer to Part A).

### 7.7.2 Fibre-Cement slate-type products

A flat fibre-cement slate-type specimen is impacted at the exposed tab (i.e., the lower part of a slate that is not covered by adjoining slates). The following locations are impacted (Fig. 6):

- Near-edge impact: the distance from the specimen edge is 1/5 of the diameter to the projectile (Fig. 6)
- Corner impact: the distance from the specimen edge is 1/5 the diameter to the projectile (Fig. 6)
- Joint of subjacent slates (Fig. 6)



**Figure 6** Plan view of target areas for slate-type fibre-cement specimens with an installation pattern as shown in this example, ( $x=y$ : 1/5 of projectile diameter)

Profiled fibre-cement slate-type specimens used for façades are impacted in different ways depending on the intended installation orientation (mounting position (horizontal, diagonal, or vertical arrangement of the contour direction)).

A profiled fibre-cement slate-type specimen with a horizontal or diagonal installation orientation is impacted as follows (Fig. 4, Fig. 6):

- Near-edge impact: the distance from the specimen edge is 1/5 the diameter of the projectile (Fig. 6)
- Corner impact: the distance from the specimen edge is 1/5 the diameter to the projectile (Fig. 6)
- Joint of subjacent slates (Fig. 6)
- Centre line of the joint zone away from the specimen edge: the distance being at least 75 mm from the edge or at least 150 mm from the centre-line joint zone target area located near the specimen edge (Fig. 1, Fig. 2)

A profiled fibre-cement slate-type specimen with a vertical installation orientation direction is impacted as follows (Fig. 5, Fig. 6):

- Near-edge impact: the distance from the specimen edge is 1/5 the diameter of the projectile (Fig. 6)
- Corner impact: the distance from the specimen edge is 1/5 the diameter to the projectile (Fig. 6)



- Joint of subjacent slates (Fig. 6)
- Centre line of the joint zone away from the specimen edge: the distance being at least 75 mm from the edge or at least 150 mm from the centre-line joint zone target area located near the specimen edge (Fig. 1, Fig. 2)
- Trough (Fig. 5)
- Trough middle height (Fig. 5)
- Peak close to the fastener (Fig. 5)

Only the centre slate-type units of the completed specimen are impacted. Several tests can be performed on one test specimen. The distance between target areas must be at least 150 mm. The angle of impact is 90° for specimens used on roofs and 45° for those used on façades. Any other critical target areas that exist must also be tested (refer to Part A).

## 7.8 Component function

The component is tested for watertightness and appearance.

## 7.9 Damage criterion

**Watertightness:** Watertightness is assessed for cracks and fractures in the test specimen. If the test specimen has no cracks or fractures/punctures, the fibre-cement specimen is considered to be undamaged regarding watertightness. If the test specimen is cracked or fractured/punctured, it is considered to be damaged with respect to watertightness.

**Appearance:** Fibre-cement board-type and slate-type specimens fulfil the appearance function as long as no indents, no fragmentation >1 cm<sup>2</sup>, and no flaking >1 cm<sup>2</sup> are visible. If any indents, fragments or flaking are visible, the fibre-cement specimen appearance is considered to be damaged.

## 7.10 Measuring method

**Watertightness:** Cracks are detected using a magnifying lense with 6x magnification. If no cracks are visible using the magnifying lense, the test specimen should be wetted; the visibility of possible cracks will be amplified because of delayed evaporation of the water in them. The presence of a crack or fracture is visually checked. (The distance between the specimen and the examiner is no more than 0.5 m.)

**Appearance:** The appearance of fibre-cement board-type or slate-type specimens is visually inspected at any light condition and at any angle at a distance of 5 m from the test specimen.

## 7.11 Existing standards and regulations (not exhaustive)

- SIA 232 (2000): Geneigte Dächer (Sloped roofs)
- SIA 233 (2000): Bekleidete Aussenwände.
- SIA 232.601, SN EN 492 (2004): Faserzement-Dachplatten und dazugehörige Formteile - Produktspezifikation und Prüfverfahren (Fibre-cement roof slates and proper fittings – Product specification and testing procedures)
- SIA 232.603, SN EN 12467 (2004): Faserzement-Tafeln - Produktspezifikation und Prüfverfahren (Fibre-cement boards – Product specification and testing procedures)