



Swiss Hail Impact Protection Register (HSR)

## **CFIA Test Specification No. 01 Tiles and Concrete Roof Tiles**

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## Table of contents

1	Tiles.....	3
1.1	General information .....	3
1.2	Intended use .....	3
1.3	Test sample.....	3
1.3.1	Clay tiles, concrete tiles, glass tiles, metal tiles .....	3
1.3.2	Shaped tiles .....	3
1.4	Test set-up .....	3
1.5	Pre-storage of sample .....	3
1.5.1	Clay tiles, concrete tiles .....	3
1.5.2	Glass tiles, metal tiles .....	4
1.5.3	Shaped tiles .....	4
1.6	Pre-treatment of sample .....	4
1.6.1	Clay tiles, concrete tiles .....	4
1.6.2	Glass tiles.....	4
1.6.3	Metal tiles .....	4
1.6.4	Shaped tiles .....	4
1.7	Shot location and shot angle .....	4
1.7.1	Clay tiles, concrete tiles, glass tiles, metal tiles .....	4
1.7.2	Shaped tiles .....	5
1.8	Component function.....	5
1.8.1	Clay tiles, concrete tiles, metal tiles.....	5
1.8.2	Glass tiles.....	5
1.8.3	Shaped tiles .....	5
1.9	Damage criterion.....	6
1.9.1	Clay tiles, concrete tiles .....	6
1.9.2	Glass tiles.....	6
1.9.3	Metal tiles .....	6
1.9.4	Shaped tiles .....	6
1.10	Measuring technique.....	6
1.10.1	Clay tiles.....	6
1.10.2	Concrete tiles .....	7
1.10.3	Glass tiles.....	7
1.10.4	Metal tiles .....	7
1.10.5	Shaped tiles .....	7
1.11	Existing standards (not exhaustive) .....	7



## 1 Tiles

### 1.1 General information

The test specifications for the "Tiles" component category includes additional, component-specific provisions for the standard test, which are not governed by the general test specifications. These test specifications include tiles that require professionally installed units of  $> 5$  and  $\leq 30/\text{m}^2$ . The shaped tile is excluded from this limit. The Tiles component category includes:

- Clay tiles: Tiles with interlocks (interlocking tiles) and without interlocks (beaver tail tiles)
- Concrete tiles: Tiles with interlocks (interlocking tiles) and without interlocks (beaver tail tiles)
- Glass tiles: Tiles with interlocks (interlocking tiles) and without interlocks (beaver tail tiles)
- Metal tiles: tiles with interlocks (interlocking tiles) and tiled strips
- Shaped tiles: Special tiles for connections to ridge, vergeboard, eaves, gables, corners and roof area junctions. This group also includes antenna tiles, ventilating ridges, decorative ridge plates or other custom-made tile types

The following tile testing specifications always apply to clay, concrete, glass, metal and shaped tiles, unless reference to a different treatment type is made in any subsection.

### 1.2 Intended use

The tile can be installed as both a roof and a façade component.

### 1.3 Test sample

#### 1.3.1 Clay tiles, concrete tiles, glass tiles, metal tiles

The test sample consists of at least 3 rows with at least 4 tiles each. The tiles are installed as per manufacturer specifications with original attachment on the associated support system. The tile joint after installation is  $0.8 - 1 \text{ m}^2$ .

#### 1.3.2 Shaped tiles

Test sample set-up as per the manufacturer specifications, if possible in the joint.

### 1.4 Test set-up

The test sample is mounted on a tilting frame.

### 1.5 Pre-storage of sample

#### 1.5.1 Clay tiles, concrete tiles

The test sample must be at least 28 days old.



#### 1.5.2 Glass tiles, metal tiles

None

#### 1.5.3 Shaped tiles

Pre-storage of sample is necessary depending on the construction material (1.5.1, 1.5.2).

### 1.6 Pre-treatment of sample

#### 1.6.1 Clay tiles, concrete tiles

The tile surface is wet using a damp sponge three times at intervals of 30 s, then shot at after 1 to 2 minutes.

#### 1.6.2 Glass tiles

The glass surface is moistened before the shot.

#### 1.6.3 Metal tiles

None

#### 1.6.4 Shaped tiles

Pre-treatment of Sample is necessary depending on the construction material (1.6.1, 1.6.2, 1.6.3).

### 1.7 Shot location and shot angle

#### 1.7.1 Clay tiles, concrete tiles, glass tiles, metal tiles

The tiles are shot at in the following locations (Figure 1):

- Corner with 1/5 projectile diameter distance from the outer edge (Figure 1)
- Middle (Figure 1)

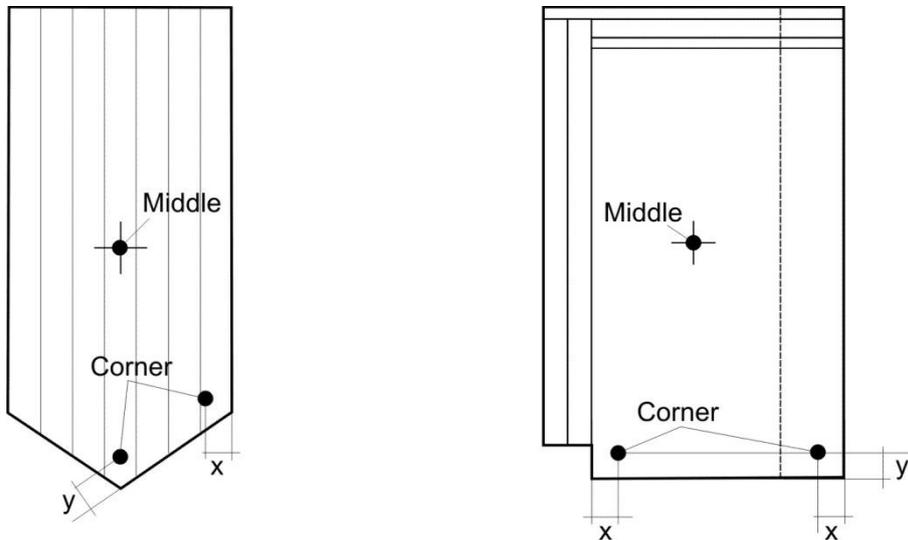


Abbildung 1 Shot locations in the plan for the tile without interlocks (left) and the interlocking tile (right),  $x = y: 1/5$  projectile diameter, dimensions in millimetres

Only the middle tiles are shot at. Several tests can be performed on one tile. The shot angle is  $90^\circ$  for the roof and  $45^\circ$  for the façade. Any other vulnerabilities that exist must also be tested (refer to Part A).

### 1.7.2 Shaped tiles

Shot location as per the general test specifications. The specifications require the weakest point on the component, the so-called critical shot location, to be shot at. The shot angle is  $90^\circ$  for tiles on the roof and  $45^\circ$  for those on the façade.

## 1.8 Component function

### 1.8.1 Clay tiles, concrete tiles, metal tiles

The component is tested for watertightness and appearance.

### 1.8.2 Glass tiles

The component is tested for watertightness, light transmission and appearance.

### 1.8.3 Shaped tiles

The component function must be determined according to the purpose of the shaped tile. Watertightness, light transmission, light shielding, mechanics and appearance are possible component functions. The general test specifications contain further information.



## 1.9 Damage criterion

### 1.9.1 Clay tiles, concrete tiles

**Watertightness:** The tile remains waterproof provided it is free of cracks or breaks. If there is one or more cracks or breaks in the component, the tile is damaged regarding the watertightness function.

**Appearance:** The tile is not damaged regarding appearance if there is chipping of  $\leq 1 \text{ cm}^2$ . With chipping of more than  $> 1 \text{ cm}^2$  the tile is damaged.

### 1.9.2 Glass tiles

**Watertightness:** The tile remains waterproof provided it is free of cracks or breaks. If there is one or more cracks or breaks in the component, the tile is damaged regarding the watertightness function.

**Light transmission:** The "light transmission" function for glass tiles is met as long as there are no surface changes or internal cracks. If there are surface changes or cracks, the component is considered to be damaged regarding the light transmission function.

**Appearance:** The tile is undamaged regarding appearance provided it has no chipping of more than  $1 \text{ cm}^2$  and no cracks. If there is chipping of more than  $1 \text{ cm}^2$  or any crack, the tile is damaged.

### 1.9.3 Metal tiles

**Watertightness:** The tile remains waterproof provided it is free of deformation. The metal tile is considered to be undamaged if the edges or corners are raised or lowered from the normal position by less than 5 mm. If the deformation is 5 mm or more, the metal tile is considered to be damaged regarding watertightness.

**Appearance:** The tile is undamaged regarding appearance provided no dent is visible.

### 1.9.4 Shaped tiles

The damage criterion must be determined according to the component function.

## 1.10 Measuring technique

### 1.10.1 Clay tiles

**Watertightness:** If no crack or fracture is visible to the naked eye (test sample - tester distance of no more than 0.5 m), the watertightness of tiles is examined using the ring test. In this test, the tile is tapped using a small hammer (or a suitable metal object). A cracked tile has a tonal change (a change in both volume and tone) in comparison to a tile that is intact. A cracked tile has a dull, short tone, whereas an intact tile has a bright, longer tone.

**Appearance:** A length measurement is used to measure chipping.



#### 1.10.2 Concrete tiles

**Watertightness:** A magnifying glass with 6-fold magnification is used to search for cracks. If no cracks are detected, the test sample must be wet to make any cracks visible as a result of the delayed evaporation of the water in the cracks. If no cracks are visible, the ring test is performed (1.10.1). The presence of a fracture is inspected visually (test sample - tester distance of no more than 0.5 m).

**Appearance:** A length measurement is used to measure chipping.

#### 1.10.3 Glass tiles

**Watertightness:** The watertightness function is tested by searching for cracks or fractures in the glass with the naked eye (specimen - test sample distance of no more than 0.5 m).

**Light transmission:** Surface changes on the glass are searched for using the naked eye (specimen - test sample distance of no more than 0.5 m).

**Appearance:** Cracks are searched for using the naked eye (specimen - test sample distance of no more than 0.5 m). A length measurement is used to determine the chipping surface area.

#### 1.10.4 Metal tiles

**Watertightness:** A length measurement is used to detect deformation.

**Appearance:** Tile appearance is inspected visually in daylight or artificial light without glare at a distance of 5 m from the object.

#### 1.10.5 Shaped tiles

The measuring technique must be determined according to the Damage Criterion.

### 1.11 Existing standards (not exhaustive)

- SIA 232 (2000): Sloping roofs.
- SIA 233 (2000): Clad outer walls.
- SIA 234 (1997): Plumbing work: Sloping roofs and clad outer walls. Performance and dimensions.
- SN EN 1024, SIA 232.104 (1997): Clay roof tiles for overlapping installation - determining geometrical characteristics.
- SN EN 1304, SIA 232.105 (2005): Roof tiles and shaped tiles - terms and product requirements.
- SN EN 539-1: Clay roofing tiles for overlapping installation - determining physical characteristics - Part 1: Watertightness testing (SIA 234.007)