



Hail Register (HR)

## ACFI Test Specifications No. 00b General Part B

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The most up-to-date version of this document can be found on the internet at

[www.hagelregister.ch](http://www.hagelregister.ch)

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## **0.1. Content of test report**

The test report must include at least the following information:

### 0.1.1 The test requested

- The test request
- The name of the entity making the test request
- Commercial name of the tested building component

### 0.1.2 Date of test

- Delivery date of the test component
- Inspection date of the test component

### 0.1.3 Test personnel

- Name of the individual performing the test
- Name of the test institute
- Signature of the individual performing the test and that of another individual who is jointly responsible for the test result

### 0.1.4 Normative basics

- Test specification (version and date of issue)
- Collection of Decisions (date/version)

### 0.1.5 Test equipment

- List of the test equipment used, specifically:
- Details on the hail test equipment
- Details on the orientation/alignment of the hail gun
- Details on the speed measurement equipment used for calculation of the projectile velocity
- Details on the analytical balance used for determination of the projectile weight
- Details on the equipment used to inspect for damage to tested components

### 0.1.6 Projectile

- Details on the projectile, specifically:
- Storage temperature (of ice)
- Date of ice production (week of the calendar)
- Form of the projectile such as sphere or Teton
- Nominal diameter of the projectile
- If the details above are unsatisfactory for providing a clear description of the projectile, additional specifications must be stated



#### 0.1.7 Test specimens

- The test report must include a detailed description of the test specimen and its construction. Important factors are:
  - Dimensions of the test specimen (length, width, and thickness)
  - Material composition
  - The construction (cross section) of the test specimen must be described and measured. Critical target areas; i.e., points suspected of having weak hail resistance, must be specifically stated.
  - The surface and colour of the test specimen (colours according to supplier colour chart)
  - Type of application (façade or roof)
  - Age of test specimen

#### 0.1.8 Test set-up

- Detailed description of the test set-up
- Possible deviations of the supplier's installation instructions
- Description of the specimen substructure

#### 0.1.9 Execution

- The report must describe how the test was performed. The following points must be clarified in detail:
  - Duration of preconditioning of the test specimen and the test conditions
  - Specimen treatment prior to testing
  - Impact angle
  - Well-defined marking of the target locations according to the component specific test specification. Impact locations which are not mentioned in the component specific test specification must be stated in the test report.
  - Test conditions

#### 0.1.10 Results

- The part of the test report containing the results must provide in detail:
  - Projectile velocity, projectile mass, and the corresponding energy from each shot made during the test
  - The hail resistance class achieved for each tested component function. The report shall include a remark that the hail resistance is definitely determined by the group of experts of the ACFI-commission Elementary Protection Register (FER)

#### 0.1.11 Annex

- Detailed description of the hail impact protocol unless detailed descriptions are otherwise given in the test report
- Photo documentation illustrating the test specimen, its set-up, the hail impact locations and the hail damage. The photos must be provided with a precise and descriptive caption.
- Plans and descriptions of the test specimen
- Material data sheets



#### 0.1.12 Extended range of component application

- The report should include information on the potential of applying the test results obtained from the specific test specimen to variants of the tested product (e.g., variations in surfaces, colors, dimensions).

### **0.2 Final provisions**

#### 0.2.1 Limit of registry validity

For an ACFI classification, the test report must be less than 3 years old. Registrations of classification are only accepted on the basis of existing test specifications.

The recognition, ACFI Hail Protection of the Association of Cantonal Fire Insurance Companies (ACFI), has a validity of five years.



### 0.3 Glossary

<b>Recognition of ACFI hail protection</b>	The recognition, ACFI Hail protection, is certified by the Association of Cantonal Fire Insurance Companies (ACFI). The certificate is valid for a material or building component and its duration is five years. It can be extended.
<b>Impact velocity</b>	The velocity of the projectile on impact.
<b>Component</b>	The component is an element of the building envelope, which consists of one or more materials.
<b>Component function</b>	The component fulfils one or more functions, such as watertightness. The component functions must be defined for the given component.
<b>Component category</b>	Components are grouped into categories. For example, wired glass, float glass, toughened safety glass (TSG) and laminated safety glass (LSG) components belong to the "glazing" component category.
<b>Collection of Decisions</b>	Decisions about hail testing taken by the technical body (FER) are published in the FER Collection of decisions. The Collection is part of the test specifications and must be taken into account.
<b>Projectile trajectory</b>	The projectile trajectory is the result of the alignment of the test apparatus.
<b>Target area</b>	The target area is the point on the specimen that is impacted by the projectile. The target area is mentioned in the relevant component-specific test specification.
<b>Angle of impact</b>	The angle of impact is defined as the angle between the projectile trajectory and the support plane of the test specimen. The angle of impact is 90° for roof components and 45° for façade components.
<b>Roof</b>	The roof includes all building elements that are arranged horizontally or at an angle of up to < 80° from the horizontal.
<b>Façade</b>	The façade includes all building elements with a surface that is vertical or that deviates by ± 10° from the vertical.
<b>Functionality</b>	In the ACFI certificate, only the functionality "Appearance" and the term "Functionality" are stated. Functionality encompasses the component functions "Watertightness," "Light transmission," "Light screening," and "Mechanical performance."
<b>Expert opinion</b>	An expert opinion contains a concise statement about the measures to be taken, if an applicant re-quires an extension of the ACFI hail protection certificate. It must be issued by a recognized test institute.



<b>Hail impact resistance</b>	The hail impact resistance, HIR X, states that the building component or material resists free of damage an impact of a hail stone (ice ball) having a diameter of X cm.
<b>Hail impact resistance class</b>	The impacted component is classified in the hail resistance class where it is not damaged.
<b>Classification criterion</b>	The classification criterion is the diameter of the hailstone at which the component or material is not damaged.
<b>Material stretching</b>	Residual condition of a material that remains after the yield point has been exceeded. The condition may occur in the form of macrostretching or microstretching without the formation of holes, which means that leak tightness is still guaranteed. Example: bluish white spots on impact-resistant PMMA (often also referred to as stress whitening).
<b>Test specimen holder</b>	The test specimen holder serves to position the test specimen and matches the test device (vertical or horizontal trajectory).
<b>Test specimen</b>	Representative sample of a component being tested to determine its hail resistance class.
<b>Projectile mass</b>	The weight of the projectile, measured with a balance after removal of the projectile from the freezer.
<b>Test specification</b>	The test specification controls the execution of the hail test. A distinction is made between the general and component-specific test specifications. The two general test specifications A and B regulate general principles of the hail test. The component-specific test specifications provide the de-tailed information for testing the respective component.
<b>Damage criterion</b>	The damage criterion sets the threshold at which the function can no longer be fulfilled if reached or exceeded, and at which the component is damaged in relation to that function.
<b>Weak spots</b>	The weak spot of a test specimen is the location where the lowest hail impact resistance is found.
<b>Test set-up</b>	The experiment describes the arrangement of the test specimen on a frame or support and the fastening method used during the test.