



Swiss Hail Impact Protection Register (HSR)

ACFI Test Specifications No. 09 Waterproofing Membrane

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

www.hagelregister.ch

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9 Roofing Membranes

9.1 General information

The test specifications for the "Roofing Membranes" component category includes additional, component-specific provisions for the standard test, which are not governed by the general test specifications.

The testing for roofing membranes can be performed according to EN 13583, EN 12691, or this test specification No. 09. The results of the EN testing are transferable to the hail registry (see Section 9.11)

9.2 Intended use

The only membranes tested are those used exclusively for roof constructions. The test protocol is applicable to roofing membranes fabricated of all material types.

9.3 Test specimen

The test specimen consists of a rigid support (e.g. steel plate, fibre cement, concrete, or wood) on which the membrane is installed either without or with a thermal insulation substrate. These two types of specimens are referred to as having a hard membrane substrate or a soft membrane substrate, respectively.

1. Hard membrane substrate: The roofing membrane lies directly on the rigid support, adhesive bonded and/or mechanically fastened.
2. Soft membrane substrate: The roofing membrane is applied to thermal insulation materials (e.g. EPS; XPS; PIR; mineral wool, ..) having a minimum thickness of 100 mm. The insulation material to be tested must be properly attached to the rigid support according to the manufacturer's instructions.

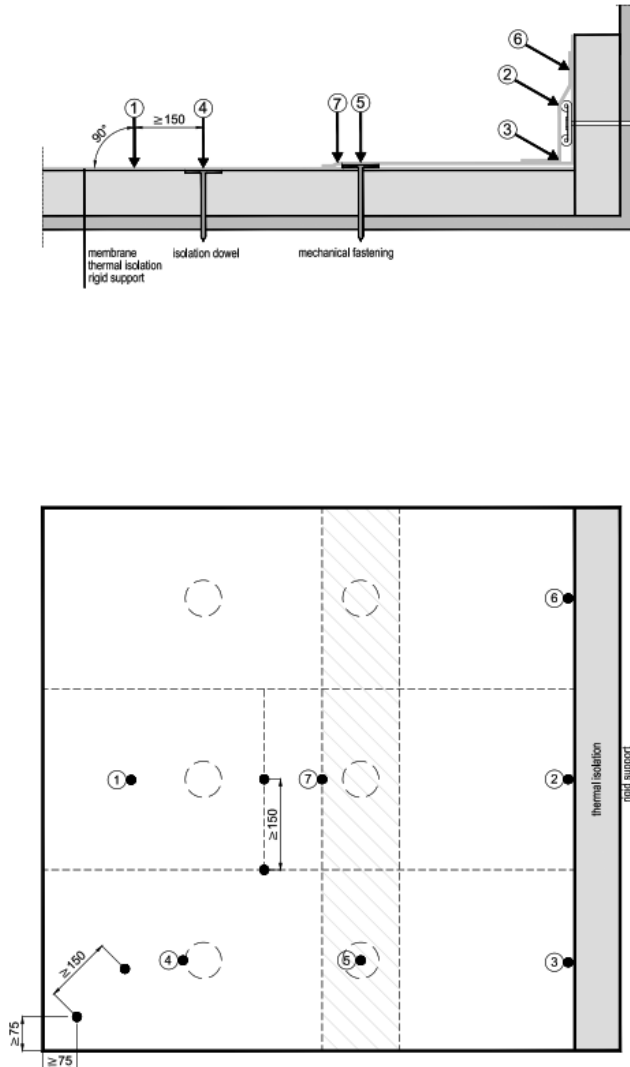


Figure 1: Schematic drawing of the cross section and top view of the low-slope roof test specimen having insulation on the rigid support. Fastening is according to the manufacturer's instructions (mechanically attached, adhered, etc.).

9.4 Test set-up

The roofing membrane is tested as a system. This means including walls and associated fasteners in the specimen, as well as fasteners that attach the membrane to the substrate, if they are part of the system in practice. The test can include single-ply or multi-ply membrane assemblies. All specimens must represent the system's use in actual practice. Any surface treatments are part of the test and must be part of the system.

Membrane installation is executed according to the manufacturer's application guidelines.



9.5 Specimen storage prior to testing (conditioning)

At least 1 day of conditioning in the testing climate (see Part A).

9.6 Specimen treatment prior to testing

The test specimen must have a testing climate (see Part A).

9.7 Target area and angle of impact

Horizontal surfaces of the test specimen are impacted at an angle of 90°. Vertical surfaces are impacted with an angle of 45°.

Figures 2 and 3 show the target areas for a roofing membrane specimen. It is impacted at the following locations:

- 1 Specimen surface
- 2 Mechanical fasteners attached to the wall
- 3 Transition area from the membrane specimen surface to the wall

If mechanical fasteners are included in the test specimen attaching the membrane to the substrate, the following locations must also be impacted:

- 4a. centre of the fastener and disc assembly
- 4b. edge of the fastener and disc assembly
- 5a. centre of the mechanical fastener attachment
- 5b. edge of the mechanical fastener attachment
- 6. surface above a mechanical fastener where the membrane overlaps the wall
- 7. surface of seams of the roofing membrane

A distance of at least 150 mm must be kept between the impact zones. The distance to the specimen edge is at least 75 mm. The impact angle is 90°. Any other critical target areas that exist must also be tested (see Part A).

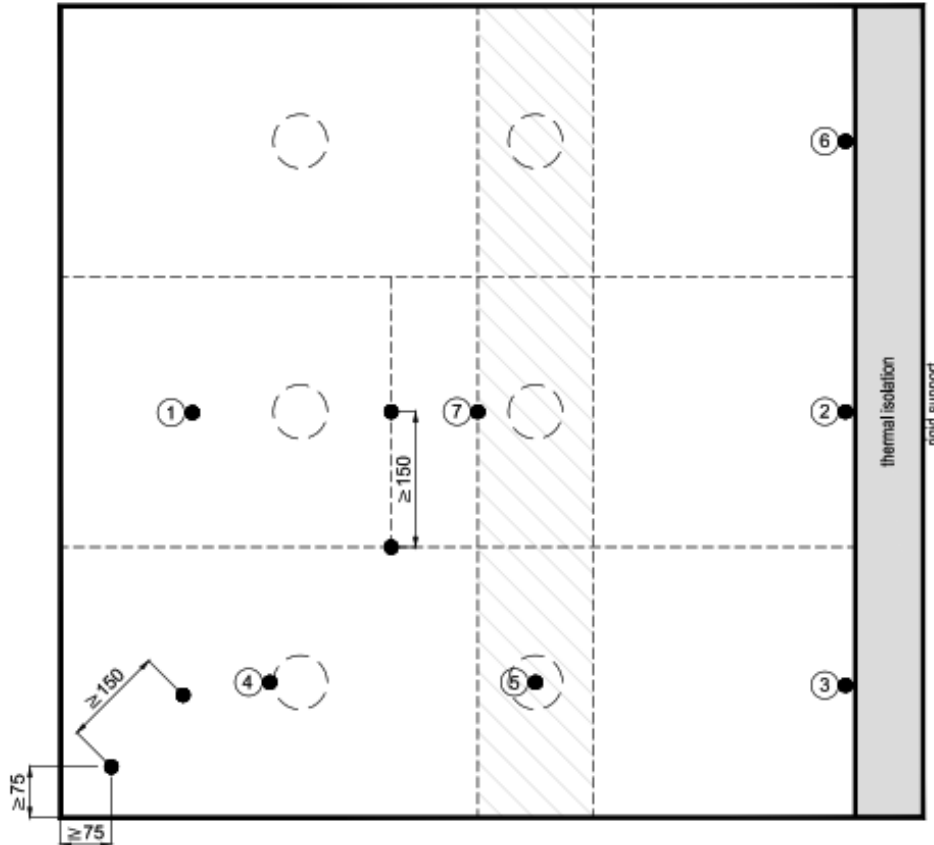


Figure 2: Top view of impact locations for roofing membranes. Dimensions of test specimen are ca. 1000 mm x 1000 mm.

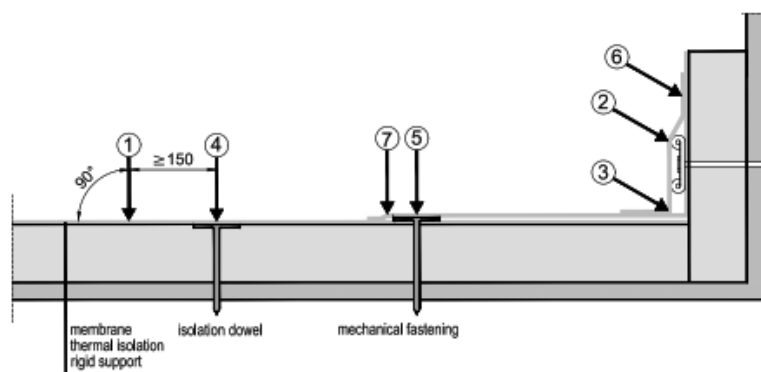


Figure 3: Impact zones, impact angles for roofing membranes.

9.8 Component function

The component is tested for watertightness.



9.9 Damage criterion

The test specimen is considered to be undamaged provided it has no punctures and no cracks. The test specimen is considered to be damaged, if it is punctured or cracked.

Remark: The test specimen may have cracks on the surface and still be watertight. In this case, it is considered to be damaged.

9.10 Measurement Method

The test specimen is visually inspected using a magnifying glass (6x) for cracks and punctures. In all cases the vacuum test according to EN 13583 must also be performed. The back side of the test specimen must be inspected in all cases.

9.11 Allocation of hail impact resistance according to EN 13883 to the Swiss Hail Impact Protection Register

For roofing membranes that were tested for hail resistance according to EN 13583, the hail resistance is allocated according to Table 1; no additional test certificate is required.

The damage velocity classifications in a, b and c are assigned according to SIA 271. The conversion table applies to adhered, mechanically fastened, or ballasted roofing membranes according to SIA 271.



Plastic and elastomeric sheets	V_{damage} [m/s]	
	Hail impact resistance, hard membrane substrate, class a	≥ 15
Hail impact resistance, hard membrane substrate, class b	≥ 20	HW 3
Hail impact resistance, hard membrane substrate, class c	≥ 25	HW 3
Hail impact resistance, soft membrane substrate, class a	≥ 20	HW 3
Hail impact resistance, soft membrane substrate, class b	≥ 25	HW 3
Hail impact resistance, soft membrane substrate, class c	≥ 30	HW 3

Polymer-modified bitumen sheets	V_{damage} [m/s]	
	Hail impact resistance, hard membrane substrate, class a	≥ 15
Hail impact resistance, hard membrane substrate, class b	≥ 20	HW 3
Hail impact resistance, hard membrane substrate, class c	≥ 25	HW 3
Hail impact resistance, soft membrane substrate, class a	≥ 20	HW 3
Hail impact resistance, soft membrane substrate, class b	≥ 25	HW 3
Hail impact resistance, soft membrane substrate, class c	≥ 30	HW 3

Table 1 Assignment of values according to EN 13583 in hail impact resistance classes 1 to 5. (Damage velocity for adhered, mechanically fastened, and ballasted roofing membranes)

9.12 Allocation of hail impact resistance according to 12691 to the Swiss Hail Impact Protection Register

For roofing membranes that have been tested for hail impact resistance according to EN 12691, a and b, the hail resistance is allocated according to Table 2; no additional test certificate is required.