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Watertightness of window wall interface with CS-EASY FOIL SI

At the request of Castelein Sealants, the airtightness of a window wall interface sealed with CS-EASY FOIL SI was assessed. The foil is self-adhesive and consists of a vapour permeable, coated fleece.

The watertightness of the window wall interface was assessed according to EN 1027:2016. A pvc-window was installed in a masonry wall by use of mounting brackets at the interior side of the wall. Both the exterior side of the wall and the sides of the window opening are finished with a cementitious render, the interior side of the wall is finished with gypsum plaster. The joint between the window and the wall is sealed at the exterior by means of CS-EASY FOIL SI.
The setup was tested as a worst-case scenario i.e. no cladding or additional airtight layer on the inside of the wall was installed. In reality, a cladding is usually installed in front of the interior wall, in contrast to the test setup for which water is sprayed directly onto the window wall interface. In addition, an airtight layer will usually be installed on the inside of the building envelope. When the watertight layer has an airtightness similar to the airtightness layer, only half of the wind load will act on the watertightness layer. As the pressure difference over the sealed interface is assumed to be the main parameter affecting water infiltration, it is clear that the test setup used to assess the watertightness of the sealed window wall interface with CS-EASY FOIL SI acts as a worst-case scenario.

1. Test setup and methodology

1.1 Test setup

A pvc-window frame with dimensions 560 x 1010 mm was installed in a masonry wall. Both the exterior side of the wall and the sides of the window opening are cemented, the interior side of the wall is finished with gypsum plaster. The window is connected to the wall by means of mounting brackets at the interior side of the wall. Two brackets were used at the left and right side of the window, two at the bottom and one on top of the window. The window was installed in a window opening with dimensions 585 x 1035 mm. This results in a distance between the window frame and the wall of 5 mm at the bottom, 20 mm on top of the window, 15 mm at the right side of the window and 10 mm at the left side.

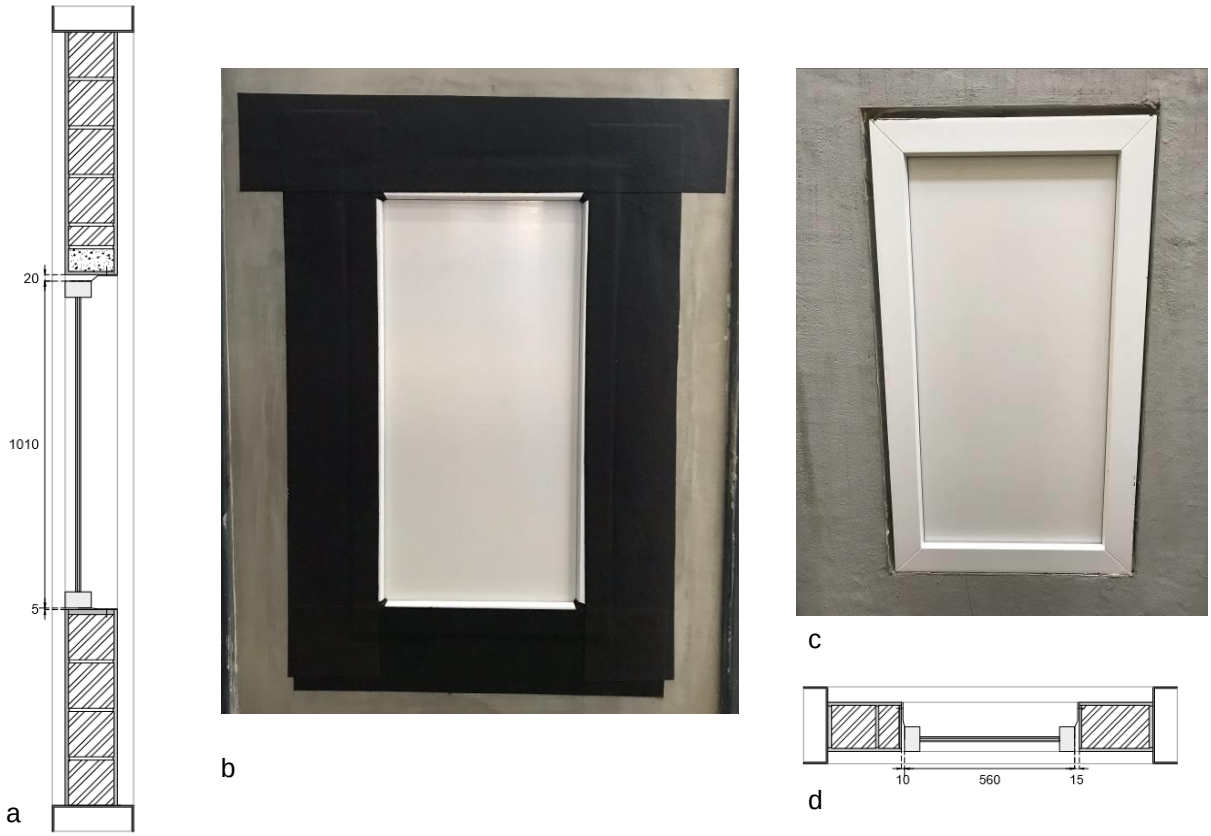

Figure 1: Test setup, a. vertical cross-section, b. exterior side of wall, c. interior side of wall, d. horizontal cross section

Before installing CS-EASY FOIL SI, the wall was dusted off and the window was cleaned using DC R40.

CS-EASY FOIL SI has a width of 20 cm. Four separate strips of foil were adhered over the joint between the window and the wall. First the joint at the bottom was covered, afterwards the right and left side and in the end the upper part. The joints of the pvc-window itself were covered with additional triangular strips of CS-EASY FOIL SI. The foil was then pressurized by means of a pressure roll.

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1.2 Test methodology

As no specific test method exists to assess the watertightness of window wall interfaces, the European standard EN 1027 for windows and doors was applied. A spraying rack with 3 circular cone nozzles was installed inside the test setup at a distance of 250 ± 10 mm from the wall and at a height of 150 mm from the window wall interface.

The test setup was submitted to a static watertightness test using a spray rate of 2 l/min/m^2. Prior to the watertightness test, three pressure pulses were applied of 660 Pa. The first 15 minutes, water was sprayed without a pressure differential. After 15 minutes, the pressure was raised every 5 minutes from 50 – 100 – 150 – 200 – 250 – 300 – 450 – 600 – 750 – 900 Pa. During the test, the test setup was visually inspected for water leaks at the interior side of the wall.

The test was performed within the conditions specified by EN 1027, ambient temperature within the range of 10-30°C, water temperature within the range of +4°C and +30°C and relative humidity within the range of 25-75%.

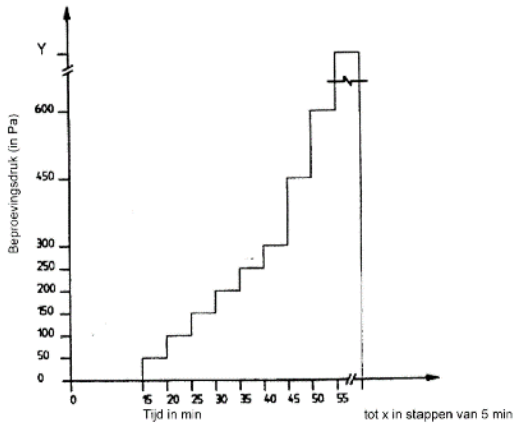

Figure 4: Sequence watertightness test

Figure 5: Test setup

2. Results

Test sequence watertightness test:

15 minutes	0 Pa	No infiltration
5 minutes	50 Pa	No infiltration
5 minutes	100 Pa	No infiltration
5 minutes	150 Pa	No infiltration
5 minutes	200 Pa	No infiltration
5 minutes	250 Pa	No infiltration
5 minutes	300 Pa	No infiltration
5 minutes	450 Pa	No infiltration
5 minutes	600 Pa	No infiltration
5 minutes	750 Pa	No infiltration
5 minutes	900 Pa	No infiltration
5 minutes	1050 Pa	No infiltration
5 minutes	1200 Pa	No infiltration

No water infiltration was observed at the interior side of the wall at a pressure difference of 1200 Pa. Also after completing the test, no water infiltration was observed.

3. Conclusion

The watertightness of a window wall interface sealed with CS-EASY FOIL SI was tested according to NBN EN 1027:2016.

Both at a pressure difference of 1200 Pa and after completing the watertightness test, no water infiltration was observed at the interior side of the wall.

No requirements within the Belgian context exist for the watertightness of window wall interfaces. Since the test method for windows is used, the window wall interface may be classified according to NBN B 25-002-01. This standard provides a classification based on the height of a building and the location, e.g. a window at a height of 25-50 m, in open terrain or near the coast needs to meet the requirements of a class 9A which corresponds with no water leaks at a pressure difference of 600 Pa.

It should be noted that the test setup is tested as a worst-case scenario as no cladding or additional airtightness at the interior side of the wall is installed. It can therefore be assumed that in reality the watertightness of the window wall interface sealed with CS-EASY FOIL SI will not be more disadvantageous than observed during the test, if installed with the same accuracy.

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