ACCELERATED SERVICE LIFE TESTS WITH CAROUSEL AND CLIMATE WALL

Bouwcentrum Technologie

Using the “carousel test” or “climate wall” (of which a more detailed description follows), it is possible to expose a (facade) construction to a rapid succession of changing and extreme weather conditions.

This method of testing makes it possible, within a comparatively short time, to gain an impression of the stability of particular constructions against outdoor climatic conditions.

Performed at Bouwcentrum Technologie on behalf of PCS Innotec to demonstrate the durability of our Project System.

THE CAROUSEL

The carousel test is aimed at checking whether the material, or a combination of materials, is suitable for use in facade construction or as facade cladding.

Not more than 6 items for testing with dimensions of c.1.0 x 1.1 m can be mounted on a six-sided, rotating framework. Certain tools are installed in front of the facade surfaces, by which the facades can be heated, cooled and sprayed with water.

HEATING

A battery of heating lamps is erected at a distance of 0.80 m from the facade surface, consisting of 13 frosted surface lamps, each 250 W.

These irradiate the facade surface evenly with a quantity of energy which at our degree of latitude may be taken up by a facade surface on a sunny day.

The insolation time lasts 6.5 hours.

SPRAYING WITH WATER

By means of four nozzles (capacity 0.25 l/min) the facade surface is sprayed with mains water.

FREEZING

The cooling system placed in front of the facade can expose the facade continuously to a minimum temperature of -15 °C +/- 1.5 °C. Higher temperatures can be selected by means of a thermostat.

The relative humidity at such low temperatures is 90-95%.

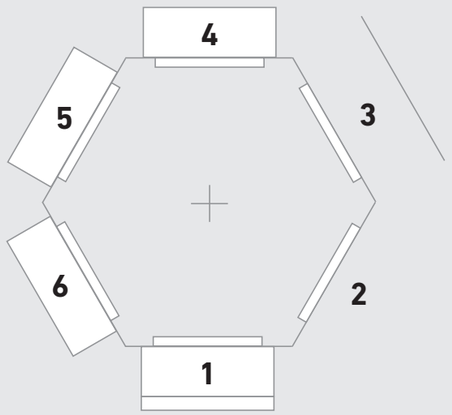
OTHER TREATMENTS

One surface of the carousel is reserved for special treatments. Normally this surface is used to cool down the test element – following insolation, in the previous position – to ambient temperature.

The set-up of the tools in front of the facades is done in such a way that, by turning the framework on which the facades are mounted, the following climatic cycle is achieved:

LEGEND

1 - Spraying, insolation
2 - Ambient temperature
3 - Insolation
4 - Spraying
5 - Freezing
6 - Freezing



CAROUSEL TEST “CLIMATE WALL”

The chosen cycle achieves the following:

- Following the freezing, the facade is defrosted as quickly as possible by spraying it with water (temperature shock through warming up).
- Following spraying with water, the facade is heated, as a result of which it dries. Here, any shrinkage caused by drying will show.
- Following an insolation period, rapid cooling is achieved by spraying the facade with water (temperature shock through cooling).
- After being sprayed with water, the facade is placed directly in front of the cooling system, thus creating optimal conditions for causing frost damage.

During the test, the air temperature on the rear side of the facade element (indoor climate) is conditioned to c. 20 °C.

Each step of the cycle lasts 8 hours: the test continues to run even outside normal working hours; thus, the complete sequence of a full cycle lasts 2 days.

INTERPRETATION

In the past items were tested for long periods – up to 150 cycles and even more.

In cases where damage was detected, this damage occurred even before the 75th cycle had run. Most damage occurred before the 25th cycle.

With a large degree of certainty, it may be assumed that, if no damage has occurred by the 25th cycle, then no damage is to be expected after a multiple of this number of cycles – or only to a negligible extent.

In case of doubt – damage at around the 25th cycle – the test will be continued until certainty about the damage development is obtained.

In practice, no damage has been established up till now in facades which have successfully withstood 25 cycles in the carousel. The oldest facades in practice are already over 20 years old. On the other hand, facades showing damage in practice, had already shown comparable damage in the carousel.

Thus, there are very reliable signs that the final result arising after 25 test cycles corresponds fairly precisely with the result that will finally be reached in practice.

The durability of successfully tested facades has therefore been estimated at a minimum of 40 years.

CLIMATE WALL

The “climate wall” is a large wall installation in which complete test facades of 3 m height and 6 m length can be set up for accelerated durability tests.

In the climate wall, the carousel principle is performed in reverse:

The facade to be tested is held firm and the tools set up in front of the facade move. The freezers of dimensions 2 x 6 x 1.6 m are set on rails and can be moved in a direction perpendicular to the testing wall.

The 144 insolation lamps are mounted on 9 supports which can be moved via guide rails – like a swing door: horizontal over the freezers in frost and rain, and vertical in front of the facades during the insolation periods.

The spray nozzles are mounted in a fixed position to the top of the wall. In general spraying is 15 l/min, which is approx. 2.5 l/min per linear metre of the test wall.

This complex set-up is especially suited for tests on constructions for which large test surfaces are necessary (e.g. facade insulation), and for tests on distortions of sections of the construction in their original size (e.g. facade cladding).

The test generally takes place in this installation with the proven carousel cycle. In this installation, however, it is possible to apply other climatic cycles.