Rolf Schnitzler
ift Rosenheim

Facades – bizarre shapes, state-of-the-art technology

The challenge of test verification

1 Introduction

Curtain walls should primarily be able to fulfil their function as building envelopes. The requirements for tightness, thermal insulation, sound insulation etc. must be fulfilled. Nevertheless, of course, the visual impression of a facade is also in the focus of the building owner and the architects. If the architect is also given sufficient design freedom, impressive facade shapes can be created.

Even if bizarre, complicated shapes often cause a frown in the beginning, these facades are often a welcome reference project for the manufacturers. However, the more innovative such facades are and the less experience with the construction exists, the more the manufacturer depends on the fact that the chosen facade construction is also well thought-out. Therefore, in such cases a large part of the responsibility lies with the consultants and technical engineers.

2 Are project related tests really necessary?

Before a new product is introduced, the task of a cost-benefit analysis is performed. If products are innovative, they bring the customer added value and the price is right, then they can usually also be sold well. This applies to coffee machines as well as to facades. However, with the difference that coffee machines do not always have to overcome the "architectural hurdle". Therefore, when developing new facade systems, it is important to ensure that there is a visually appealing variety of variants in addition to technical development. A situation where at some point every system facade reaches its limits simply because of the storage costs.

Every system facade is subject to the initial test, the so-called type test, for the purpose of CE marking. And of course the system manufacturer endeavours to cover the entire product range with one or more specimens representative of a system. However, as soon as the architect requests project-related system modifications, the question arises whether

the tested performance characteristics are influenced by these modifications. Modified profile contours, new fittings or opening types or penetrations of the drainage levels due to external louvers are only a few of the most serious changes that can have an influence on the performance characteristics. The same applies, however, if facades are built exclusively with tested system components, but are converted into geometries that were not taken into account in the type test. These can be slopes, overhangs, polygonal or curved areas.

In such cases, architects and consultants usually do not rely on existing test certificates but demand a project-related test according to the specifications. If this is not the case, it is up to the manufacturer to decide whether the technical changes in the system achieve the same classifications as the base system or whether a new test is required. This evaluation is a requirement for the obligatory issue of a declaration of performance. The responsibility for the correctness of the declaration of performance lies with the manufacturer.

Product standards provide manufacturers with assistance here. These use the rules for direct application to specify which changes allow the tested performance properties to be transferred to. The new product standard for facades EN 13830:2015 (not yet harmonised) describes this in Annex F, Table F1. Alternatively, the ift-Rosenheim offers the possibility of making a case-related, independent statement via the preparation of expert statements.

If no clear statement can be made on the transferability of the performance characteristics, a serviceability test should be carried out by an accredited and notified testing laboratory. Only in this way can the resulting test report be used for CE marking of the building facade.

3 Checks on site

In facade tests according to EN 13830, the tightness of a prototype is tested, but not the tightness in the installed project or the tightness of the perimeter joint. A further form of facade testing, which can be carried out directly on the building, offers a possibility to achieve more safety on the building in addition to type testing in the laboratory.

Standards are available which describe a reproducible test procedure. For example, the driving rain tightness of an already installed facade can be checked according to EN 13051 (Fig. 1). For this purpose, a water spray bar is mounted in front of the facade. Water can be applied either with or without pressure/suction load.

Fig. 1
Watertightness in field tests according to EN 13051:2001 (Source: ift Rosenheim)

Another similar procedure is offered by the AAMA 501.2-03 (Fig. 2) entitled "Quality Assurance and Diagnostic Water Leakage Field Check of Installed Store Fronts, Curtain Walls and Sloped Glazing Systems". Although it is an American standard, this method is also popular in Europe, mainly because of its ease of use.

Fig. 2
Hose test according to AAMA 501.2-03, Quality Assurance and Diagnostic Water Leakage Field Check of Installed Store Fronts, Curtain Walls and Sloped Glazing Systems

4 Conclusion

Innovative and visually impressive facade shapes certainly require more effort in terms of serviceability testing. It is important to tackle this issue at an early stage and that all parties involved in the project communicate possible weaknesses openly. Experience has shown that this is the best way to control the costs incurred for checking the serviceability of the facade.

If the manufacturer cannot guarantee the required performance characteristics on his own responsibility, it may be possible to obtain an expert opinion from an expert or testing institute as an alternative to type testing.

However, the more severe the technical and project-related modifications of a system facade, the less opportunity there is to avoid the need for proper new testing for CE marking.

Literature

[1] EN 13830:2015
Curtain Walling - Product standard
Beuth Verlag GmbH

[2] DIN EN 13051:2001
Curtain Walling – Watertightness – Site Test
Beuth Verlag GmbH

[3] AAMA 501.2-03
Quality Assurance and Diagnostic Water Leakage Field Check of Installed Store Fronts, Curtain Walls and Sloped Glazing Systems“