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DIN EN AAMA ISO – what performance is expected of a facade?

International comparison of facades

1 Development of facades

At the beginning of the twentieth century (between 1910 and 1940), a new form of building envelope developed which was hitherto unknown – the transparent facade. The ideas came from architects such as Walter Gropius and Mies van der Rohe, who dreamt of transparent building envelopes for their buildings. What was initially a tentative movement gradually became the general trend. In the 1950s and 1960s, the construction of office buildings with facades was established and a very common occurrence. Today facades can be found in every city in the world. The construction of a high-rise building is almost unthinkable without facades.



Fig. 1 High-rise buildings with glass facades, worldwide
(source: CTBUH in AT218 May 2011 p70)

2 Worldwide standards for facades

Over the years different standard systems for facades have developed throughout the world, which are used to test and classify them. However, in recent years two “standard domains” have been established as “worldwide standards”, which are applied in many markets. On the one hand these are the American standard issued by **AAMA**, the American Architectural Manufacturers Association and **ASTM**, the American Society for Testing and Materials – and on the other hand, the European regulatory instruments such as those issued by the **CWCT**, the Centre for Window and Cladding Technology, and the **CEN**, the Comité Européen de Normalisation (European Committee for Standardisation). These two standard domains are used in many different continents for the assessment of glass facades. It is worth mentioning that there are even joint standards, also known as **ISO** standards (International Organisation for Standardisation), which are used in many standard systems worldwide.

3 Comparison of standards

When one compares the standards for the basic tests of curtain wall facades – air permeability, resistance to wind load and watertightness – one will find that differences between the European and American standards only consist of a few technical details related to testing. For example, the quantity of water to be applied for testing in the ASTM 331 standard – Standard Test Method

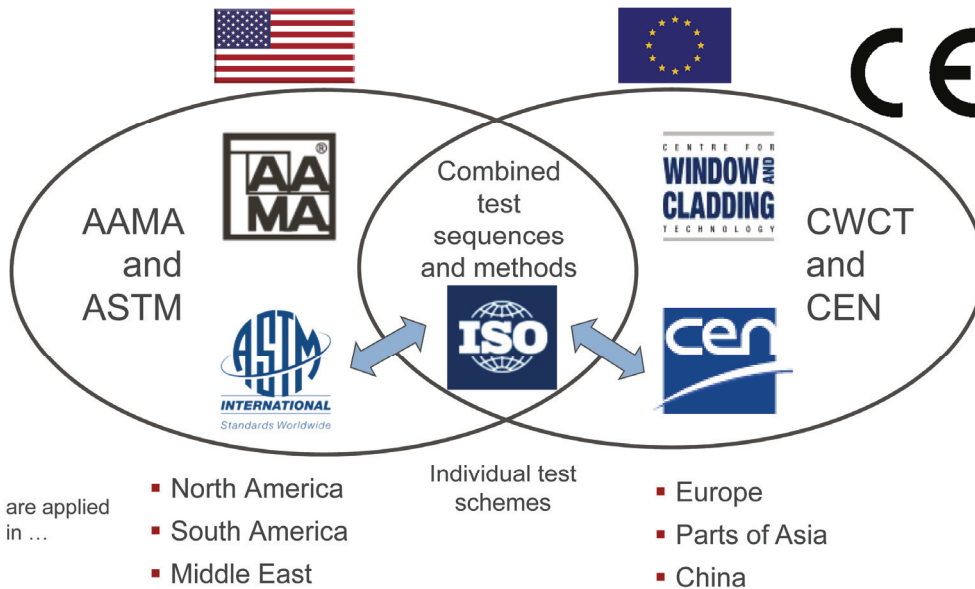


Fig. 2
Illustration of the standard systems

for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference – is 3.4 l/m² and therefore higher than the quantity or flow rate used in the European procedure under EN 12155. On the other hand, testing according to the European test methods takes longer and involves more pressure steps. However, these test methods can very easily be integrated into a combined test process by simply using the most stringent requirements from both standards.

The test sequence for the basic tests is relatively similar in both standard domains. The difference in Europe is that after testing for resistance to wind load, a repeat test for air permeability is stipulated. This can all be combined very easily.

When comparing the optional test methods one will find that there are many more methods in America, for some of which there is no equivalent in Europe. For this reason the American methods for providing evidence of resistance to interstorey drift and climate testing have been used in Europe for many years. For the purpose of revising product standard EN 13830, which deals with the seismic shock resistance of facades, this has meant that in future an almost identical test method to the American one is to be applied.

4 There are also differences

The most significant differences between the standard systems can be found in the dynamic methods for determining watertightness. The different standards use completely different test methods for generating a dynamic air flow. Whereas in Europe a large blower is moved across the facade on the outside and changes in negative pressure are applied to the inside of the facade, the test method in America stipulates that the overall facade is exposed to a dynamic air flow from an aircraft engine. Even though the methods for this performance characteristic are clearly different, comparisons have shown that they lead to comparable results.

5 Summary

When comparing all methods in America and Europe, one will find that they are very similar and can easily be combined. Where there are no methods specified in one of the systems, the specific requirement can be covered by using the method available in the other standard system. Lastly, one can say that both standard systems

can be easily covered by combining the most unfavourable conditions in both sets of methods, which then makes it possible to assess the facades under the respective classification systems.



Fig. 3 Facade test rig of the ift Rosenheim

The ift Rosenheim is set up to carry out tests to different international standards, including the American standards. The ift Rosenheim has been accredited for all important test methods by the German accreditation agency, DAkkS. Worldwide recognition is ensured on the basis of multilateral agreements and arrangements (MRA or MLA) of the national accreditation agencies with the European and international accreditation organisations.

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