

Abstract

In order to reduce the energy consumption in buildings and to avoid damages at buildings by condensation in building components the building envelop should be durable airtight. The demand of being airtight should be valid during the whole life circle of a building. This aspect does not only refer to building components and layers in building components which guarantee the airtightness but also to adhesives connecting different building elements e.g. layers of vapour barriers.

Loads influencing adhesives are mainly caused by the wind. Wind is not a steady state effect but shows alternating loads. For that reason it was necessary to develop a method to proof the durability of adhesives in airtightness layers under the regard of alternating loads. The forces being used by those tests are resulting from regulations in standards like DIN EN 1990:2012-08, DIN EN 1991-1-4:2012-08 und DIN EN 1991-1-4/NA:2012-08 which are fixed in building law. They represent average and maximum wind loads during a prognosticated useful life of building components or buildings from 50 years. The required changes of loads and its cycles being used to simulate fatigue failure were taken from a British report and completed with loads from wind gusts. The aging of the materials during their prognosticated useful life of 50 years will be simulated by storing the samples for a duration of 120 days at a temperature of $\theta = 65 \text{ }^\circ\text{C}$ and a relative humidity of $\phi = 80 \%$. With a test apparatus designed especially for the purpose to simulate alternating loads the fatigue failure of the examined adhesives can be proofed in relation to the prognosticated useful life using average wind loads and extreme gusts. By the use of this measurement method which is close to reality a statement can be made to answer the question if adhesives fulfil the requirement to be airtight during the prognosticated useful life of building components or buildings.