

SUMMARY

Evacuation through inward opening doors

Evacuation through inward opening doors have long been considered problematic, especially at high occupancy levels. The challenge lies largely in an assumed difficulty to open the door when a group of people arrives at the door simultaneously and the door needs to be opened in the opposite direction of the evacuation flow. In older, existing buildings that have inward-opening doors, a conflict of interest may arise. A presumed impaired evacuation safety that inward-opening doors may entail is weighed against the building's antiquarian and cultural-historical value. Since the knowledge in this area is limited, challenges are created e.g. during supervision of fire safety.

Purpose and Goal

The purpose of the project Evacuation through inward opening doors is to investigate the dynamics and challenges of these evacuation processes. The goal is to contribute to improved conditions for designing well functioning evacuation in buildings with inward-opening doors.

Methods

In the project, a literature study and a series of experimental tests were carried out. The tests were carried out in a room with door environments built to reflect realistic evacuation conditions. All evacuation attempts were filmed with a total of eight video cameras that were strategically placed in the room. Several different parameters were investigated, including occupant density, door opening force, presence of a short corridor in front of the door and walking distance to the evacuation door. This was done to gain a deeper understanding of the parameters' influence on the possibility of opening the door initially, flow of people and overall possibility of evacuation.

Results

The project provides several important insights into evacuation through doors that open inward. It can be concluded that in the initial stage of passage through a door for evacuation, it is slower and requires more interaction between evacuating people for inward-opening doors compared to outward-opening doors. This does not mean that inward-opening doors need to be unsuitable from an evacuation point of view. Problems opening an inward-opening door only arise at very high occupant load, >3 people/m², in direct connection to the door. The number of people in the room is not considered to affect the risk of high occupant load in front of the door. Examples of measures to facilitate evacuation are that the door fittings allow a simple opening maneuver and that a low person density in direct connection to the door is avoided. This can be achieved, for example, by extending the walking distance before the door is reached (at least 5 m) or by introducing physical obstacles in connection with the door that limit the flow of people towards the door. Based on observations from experiments and conducted literature study, the conclusion is drawn that evacuation through doors that open inward can be performed safely, provided that certain conditions are met. Also, the need for further investigation has been mapped out.

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