

Thermal performance in industrial doors – what are the contributing factors?

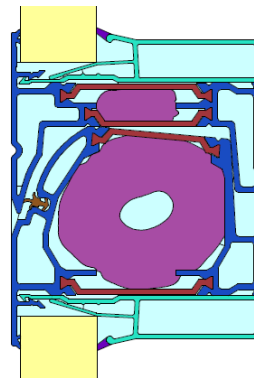
The environmental performance of buildings is largely affected by the thermal performance. Heat or cool losses often takes place at various locations in buildings, like walls, doors, or windows. The energy management is often driven by the heating or cooling requirements and today they are more demanding than ever before.

ASSA ABLOY Entrance Systems is one of the foremost leaders in opening solutions, offering doors for different situations. A master thesis project has been carried out at the faculty of engineering at Lund University, in collaboration with ASSA ABLOY, where the goal has been to develop a new possible frame section that is thicker and more insulated than existing solutions. This project has focused on investigating the thermal performance of the industrial doors. The overhead sectional doors are built up by panel or frame sections, or a combination of both.

Offering a more insulated frame section is important to contribute to a better energy use as well as indoor climate.

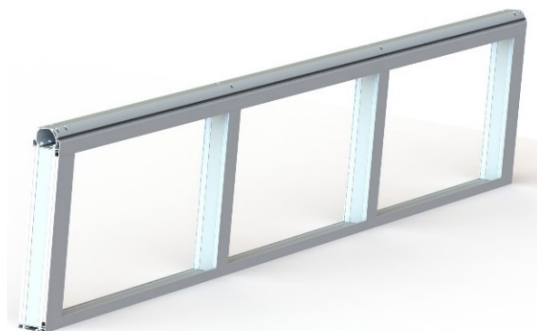
The thermal performance of a building is measured in terms of heat loss, often expressed as U-value or R-value. The U-value of a door, window or other building component is commonly calculated by adding the thermal transmittance of the components and the thermal interactions between the components together. The material of the frame has a great effect on the U-value of the frames. Throughout the project different possible designs for the new frame were developed and compared by looking at the thermal performance as well as the rigidity of different alternatives. Multiple possible materials have been considered, as wood, aluminium, and plastics. It was concluded that a polymer composite would be an interesting alternative, due to the low thermal transmittance. However, due to extremely high manufacturing costs this option was ruled out. Instead, the more common material for frame sections was chosen to be more suitable. Today, a lot of frames are built up by aluminium

profiles with an insulating profile in between, to limit the heat transfer. In this project, an additional plastic foam was put inside the frame, in order to insulate it.



Cross-section of connected joint between two frame sections.

The result of the project is a frame section that offers a low U-value compared to existing frame sections in ASSA ABLOY's portfolio. Different windows can be inserted in the frame, but the option with the lowest U-value is also the most expensive. The panel sections offer an even lower U-value than the frame sections, regardless of which window is used, and to get the lowest possible U-value the least amount of frame sections should be used in an industrial door.



New design of frame section.

The project has laid a foundation for the continuation of the development of a new frame section. With a more thorough cost analysis as well as investigation of production methods, a fully functioning frame can be produced.

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Sofia Björnsson and Frida Sterner

Title of Master Thesis:

Frame Sections for Highly Insulated Industrial Doors