

## Opponent's review of the Doctoral Thesis

Candidate Mgr. Batuhan Der

Title of the doctoral thesis Numerical calculation of members and joints at Elevated temperature

Study Programme Integrated safety

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### Topicality of the doctoral thesis theme

Commentary: The work is very topical. Advanced models are becoming the norm in fire safety.

excellent     above average     average     below average     poor

### Fulfilment of the doctoral thesis objectives

Commentary: The thesis meets the global requirements for a quality doctoral dissertation.

excellent     above average     average     below average     poor

### Research methods and procedures

Commentary: Experimental and numerical knowledge validates and verifies numerical design calculations.

excellent     above average     average     below average     poor

### Results of the doctoral thesis – dissertant's concrete achievements

Commentary: The elevated temperature numerical design calculations are suitable for the design of connections with advanced elevated temperature and members with simplified room temperature.

excellent     above average     average     below average     poor

### Importance for practice and for development within a branch of science

Commentary: It allows the design of beams from global analysis at normal temperature and the design of contactors for global analysis at elevated temperature.

excellent     above average     average     below average     poor

**Formal layout of the doctoral thesis and the level of language used**

Commentary: The work deserves more precise expression and precision in writing. Imperfect wording and flaws can be found on every page. It would be advisable to pay more attention to the graphic representation as well, e.g. in Fig. 5.1 and 5.2 it is not possible to clearly assign the labels to the curves.

excellent     above average     average     below average     poor

**Statement on compliance with citation ethics**

Some parts of the text are not original and were taken verbatim without any modification. However, it can be stated that problematic text occurred only in a small part of the work and, moreover, in a chapter that does not bring any new knowledge. Subsequent chapters bringing new knowledge and experimental results are undoubtedly original and beneficial for further research. The rules of citation ethics were not violated.

**Remarks**

Describe the model of bolts and welds under elevated temperature in a fire.

Describe the load carrying capacity of sheet metal, slender plate, bolts and welds at elevated temperatures in a fire.

Chapter 4.2 states that the experimental samples were heated to the required temperature, which was subsequently maintained 15 minutes before the start of the experiment and further during the entire duration of the experiment. Why was 15 minutes chosen? Does that time affect the results of the experiment? Would the results be different if that time were longer, eg 120 minutes?

Chapter 5: Why was the numerical model primarily validated based on foreign experiments?

The aim of the work is the investigation of connections at elevated temperatures. However, the experimental specimens were designed in such a way that the bolts in shear failed every time. Why weren't some of the samples targeted for a different mode of failure?

Chapter 6.3, states that the Idea Statica software, which was used for the CBFEM calculations, can not yet modify the modul of elasticity. It can therefore be assumed that the results of the verification studies provided in chapter 5.3 are considered with an unreduced initial modul of elasticity also for samples with a elevated temperature. Does the change of the modulus of elasticity affect the results of the verification study? Especially the end plate connection study provided in chap. 5.3.5.

**Final assessment of the doctoral thesis**

The dissertation meets the requirements for a doctoral dissertation, and after a successful defense, I recommend that you be awarded the degree of Doctor of Philosophy.

Following a successful defence of the doctoral thesis I recommend the granting of the Ph.D. degree

yes  no

Date: May 2, 2024

Opponent's signature: .....  .....