

## I. IDENTIFICATION DATA

<b>Thesis title:</b>	<b>Response of Concrete Structures to Loading by Confined Explosions of Condensed Charges</b>
<b>Author's name:</b>	<b>Bc. Ratislav Matyáš</b>
<b>Type of thesis :</b>	master
<b>Faculty/Institute:</b>	Faculty of Civil Engineering (FCE)
<b>Department:</b>	Department of Concrete and Masonry Structures
<b>Thesis reviewer:</b>	Ing. Jiří Rymeš, Dr. Eng.
<b>Reviewer's department:</b>	Červenka Consulting s.r.o.

## II. EVALUATION OF INDIVIDUAL CRITERIA

<b>Assignment</b> <i>How demanding was the assigned project?</i>	<b>challenging</b>
The thesis deals with a topic above the scope of the standard master course.	

<b>Fulfilment of assignment</b> <i>How well does the thesis fulfil the assigned task? Have the primary goals been achieved? Which assigned tasks have been incompletely covered, and which parts of the thesis are overextended? Justify your answer.</i>	<b>fulfilled</b>
The assignment of the thesis was to quantify the impact of condensed explosions, including the evaluation of the loads affecting the reinforced concrete elements. These are fulfilled using the two available literature references: the U.S. Army Corps guidelines and the guidelines of the U.S. Nuclear Regulatory (NUREG). Finally, in line with the assignment, the presented methodology is applied to an example using simple but sufficient numerical methods.	

<b>Methodology</b> <i>Comment on the correctness of the approach and/or the solution methods.</i>	<b>correct</b>
The thesis is organized in a logical way, gradually presenting different aspects of influencing confined explosion while describing how these are implemented in the evaluation methodology.	

<b>Technical level</b> <i>Is the thesis technically sound? How well did the student employ expertise in the field of his/her field of study? Does the student explain clearly what he/she has done?</i>	<b>A - excellent.</b>
The complex phenomenon of condensed explosions is addressed with an engineering approach with is more than adequate for the master course level. In the aspects where the available literature seems to lack data, the author proposes an extension of the methodology. In such cases, it is well reasoned.	

<b>Formal and language level, scope of thesis</b> <i>Are formalisms and notations used properly? Is the thesis organized in a logical way? Is the thesis sufficiently extensive? Is the thesis well-presented? Is the language clear and understandable? Is the English satisfactory?</i>	<b>B - very good.</b>
Yes, the reasoning and explanation in the thesis are good. Although more graphical content would be beneficial for the thesis readers, for instance in sections 2.3.4 and 2.3.5 where figures from UFC-340-02 are referred but not shown.	

<b>Selection of sources, citation correctness</b> <i>Does the thesis make adequate reference to earlier work on the topic? Was the selection of sources adequate? Is the student's original work clearly distinguished from earlier work in the field? Do the bibliographic citations meet the standards?</i>	<b>A - excellent.</b>
As mentioned above, the author uses two main, publicly available sources to quantify the effects of confined explosions and then refers to other literature when necessary. It seems sufficient.	

**Additional commentary and evaluation (optional)**

*Comment on the overall quality of the thesis, its novelty and its impact on the field, its strengths and weaknesses, the utility of the solution that is presented, the theoretical/formal level, the student's skillfulness, etc.*

See the overall evaluation below.

**III. OVERALL EVALUATION, QUESTIONS FOR THE PRESENTATION AND DEFENSE OF THE THESIS, SUGGESTED GRADE**

*Summarize your opinion on the thesis and explain your final grading. Pose questions that should be answered during the presentation and defense of the student's work.*

Ratislav Matyáš submitted a well-structured thesis clearly demonstrating that he can get familiar with a complex phenomenon such as confined explosions, the loads they generate, and the impact of these dynamic loads on reinforcement concrete elements and structures. In the thesis, the author uses the available literature sources and extends their application within the scope of his engineering competencies. The result is a tool which seems to be capable of evaluating the response of simple reinforced concrete structures to the explosion impacts. It has the potential to be applied in the assessment of structural robustness.

The following topics might be interesting to discuss during the Q&A session:

- 1) How rapid is the practical application of the methodology? Can the process of chart reading in chapters 4.3.3 and 4.4.3 be automated?
- 2) The numerical model method presented in chapter 4.5 relies on a simple 1D beam model. Is this methodology suitable also for 3D models?
- 3) The presented methodology assumes that the impact load is generated by a pressure front only. In a real scenario, the pressure front often carries various materials, debris etc., that also load the structure. Is there a methodology for how to take this into account?

The grade that I award for the thesis is **A - excellent**.

Date: **2.2.2024**

Signature: