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FIRE RESISTANCE TEST AND THE CRITICALNESS OF CONCRETE SPALLING REGARDING SAFETY

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ABSTRACT

This paper is aimed giving an overview about the influence regarding the spalling of concrete and its critical factors after the phase of heat dissipation.

The stiffness on the fire resistance behavior of concrete is especially a critical aspects for the rescue teams or for the reconstruction afterwards. Several huge catastrophes in the past in road or railway tunnels or even smaller accidents in basement garages are still a challenge. In literature frequently found is the description that the fire resistance of a structure is affected by the right choice of porosity. In the same way in different standards and test instructions divergent procedures and technical specifications (e.g. temperature time curves) are given, Figure 1. Even though they are dealing with the same application background.

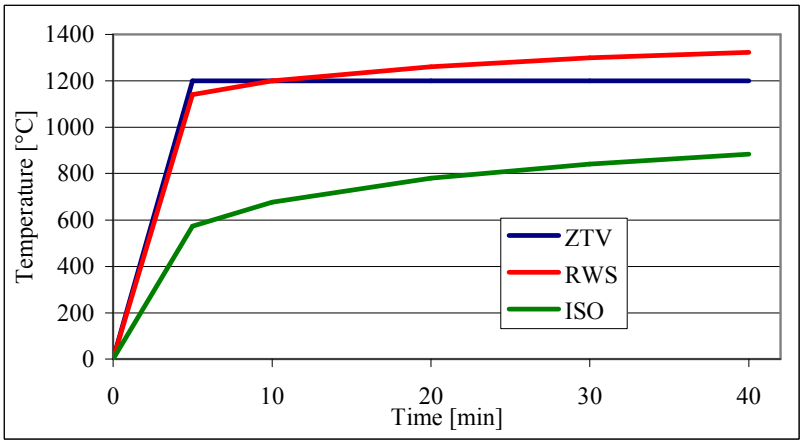

Fig. 1 - Different Temperature-Time-Curves

Also the geometric and stiffness of a structure is important for the fire resistance and not only the choice of porosity. Several experiments were done in this field. The turn of attention during the experiments was the w/c ratio. It would be an important information if this could give an statement on the resistance. One point is that by increasing the w/c ratio and the air space ration the fire resistance is increasing as well. The point is that the water vapour couldn`t escape and as a result of this the spalling increases. On the other hand the spalling decreases by increasing porosity.

Another aspect is that the characteristic of high performance concrete is different from the ordinary one. In the field of tunnel construction the usage of these kind of material is forced. The normative regulations and knowledge is not on that good stage as the ordinary one. In case of fire spallings occur explosively. These results in a direct fire exposure of the bared reinforcement. In order to enhance the fire resistance material as polypropylene fibres could

be induced. Within our test site we are doing several series of investigations to analyse that behaviour and the influence of different renderings.

One aspect which is not often regarded is this cases of investigations is the safety aspect. In addition to the structural and technical fire protection the fire defence (fire brigades) and organisational aspects have to be taken into account. The thematic conjunction between this to topics is often missing.

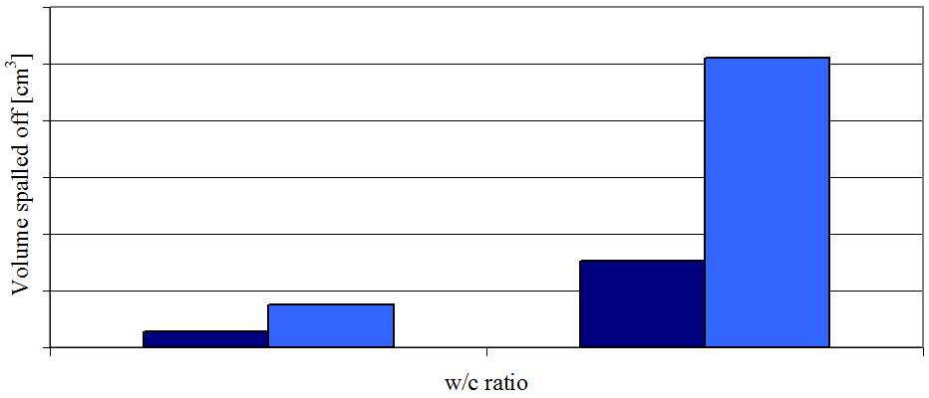

Fig. 2 - Influence of w/c-ratio on spalling behaviour

Keywords: fire test, fire resistance, fire safety, specimen stiffness, porosity, spalling.

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