



GUEST EDITORIAL

Special Issue on Properties of Concrete and Behavior of Concrete Columns Subjected to Fire

The Third International Conference on Concrete under Severe Conditions, CONSEC'01, was held from 18th to 20th of June 2001 by the Department of Civil Engineering of the University of British Columbia in Vancouver.

Various topics were covered during this conference, such as cracking, permeability, durability, hot-dry conditions, chloride movements, carbonation, sulphuric acid attack, corrosion, freeze-thaw problems, impact and dynamic loading, projectile penetration, and even deterioration of cement coatings by wine.

The behavior of concrete, as a material, or of concrete structures submitted to fire was the subject of 12 papers among the total of 263 papers forming the 2200 pages of the proceedings (Banthia, Sakai & Gjrv editors, ISBN 0-88865-790-0 and 0-88865-792-7). Moreover, fire attack was not the subject of a distinctive session for the presentations but, on the contrary, these papers were disseminated in different sessions with at least one case where two papers related to this topic were presented simultaneously in different sessions. This, plus the fact that those interested by the topic of structures in fire in general cannot afford to attend every general conference on steel, on concrete, and on timber, lead to the fact that these good quality papers certainly did not received the attention they deserved.

When the list and the titles of these 12 papers was circulated on the "Structures in Fire" discussion list, the publisher and the editor of Fire Technology offered to dedicate a special edition presenting a selection of these papers. The approached authors were offered the possibility to revisit their paper in order to include additional or more recent information that they would have obtained since the date when they sent their contribution for CONSEC'01. For this special edition, each paper was submitted to the peer review process by at least 2 independent reviewers, and some modifications or clarifications have been requested in some cases.

Kang and Hong present a constitutive model of concrete subjected to elevated temperature. The model has four strain components, thermal, mechanical, thermal creep and transient strain. The authors have used it to model an experimental test made on an statically determinate concrete beam.

Komonen and Penttala investigate the effect of high temperature on the residual properties of Portland cement paste. Maximum temperatures of up to 1000°C were applied, and residual compressive and flexural strength were measured and pore structure of the pastes was determined by mercury porosimetry.

Poon and Ashar analyze the deterioration and spalling frequency of metakaolin blended concrete subjected to high temperature till 800°C. The residual compressive strength, porosity and pore size distribution were determined.

Balendran, Nadeem, and Maqsood present the results of an experimental study into the effect of elevated temperatures on the flexural and split cylinder strength of high

strength concrete. These properties were measured after a cycle of heating and cooling. Different concrete grades, maximum temperatures and cooling rates were tested.

Shekarchi, Debicki, Billard, and Granger present some environmental and numerical results of the study of the hygrothermal behavior of the high performance concrete inner wall of a nuclear power station under the simultaneous effects of the temperature and the steam pressure existing during a *Severe Accident*.

Kodur—one of the members of the FEMA investigation team on the WTC event—and McGrath present the result of an experimental program on the fire resistance of high strength concrete columns under fire conditions, and discuss the factors that influence the thermal and structural behavior.

Finally, Franssen and Dotreppe present the results of four fire tests on normal strength concrete columns of circular cross section. It is shown that two previously established calculation methods for the fire resistance of rectangular shape columns give conservative results when applied to these four circular columns.

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