



**Reply to the Discussion by J. Bensted of the Paper "STUDIES ABOUT A SULFATE RESISTANT CEMENT: INFLUENCE OF ADMIXTURES"\***

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The authors are grateful to Dr. J. Bensted for showing his interest in the paper of reference (1). We wish to thank him not only the detailed study he has carried out but the positive valuation he does about the interpretation of the results presented on said paper.

Dr. J. Bensted points out in his discussion two very interesting aspects related to the sulphate resistance of cements:

- A low content of C<sub>3</sub>A in the cement composition is not enough for affirming that the cement is resistant to the sulphate attack. Cements having high content of C<sub>3</sub>S (higher 60% wt) are capable of being attacked by sulphates.

- Formation of Thaumasite  $\text{Ca}_2[\text{Si}(\text{OH})_6]_2(\text{CO}_3)_2(\text{SO}_4)_2 \cdot 24\text{H}_2\text{O}$  at low temperatures as a decay OPC mortars product.

With respect to the first point, the authors agree with Dr. J. Bensted in such a way that it seems clearly insufficient to consider C<sub>3</sub>A contents as the only parameter for clasifying a sulpho-resistant type cement. In that sense, we are developing some investigations having as main objeive to know the effect of other cement components (silicates, ferrites) on the sulpho-resistance behaviour of such a cement, as well as the joint action of some aggressive agents (sulphates and CO<sub>2</sub>) and the environmental variables (temperature, humidity) on the cement durability.

As a consequence of this investigations, it likely might concluded the necessity of proposing a modification of standards (most of them indicate the C<sub>3</sub>A content as the only condition) for clasifying a sulpho-resistant type cement.

With respect to the second point, we miy say that in all the studies we have carried out on the low-energy cement (2, 3, 4) we have never found thaumasite. We consider a very interesting

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suggestion that of Dr. J. Bensted in the sense of studying the conditions of thaumasite formation in this special white sulpho-resistant cement. Obviously, it would allow to complete the knowledge on cements made from a raw mix including fluorspar and gypsum among the raw materials.

### **References**

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