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PROCEEDINGS OF THE
THIRD INTERNATIONAL SYMPOSIUM
ON THE

✓ Chemistry of Cement

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LONDON 1952

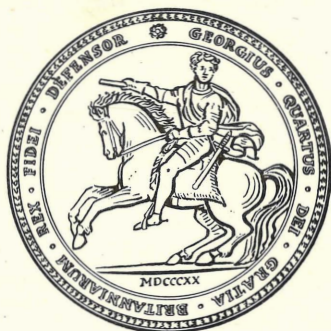
(15th - 20th Sept.)

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and the

CEMENT AND CONCRETE ASSOCIATION



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General Summary

THE THIRD International Symposium on the Chemistry of Cement was held in London from 15th-20th September 1952 under the presidency of Sir Ben Lockspeiser F.R.S., Secretary to the Department of Scientific and Industrial Research, with Sir Francis Meynell R.D.I., the Director of the Cement and Concrete Association, as vice-president. Mr. P. Gooding, the Development and Information Officer of the Cement and Concrete Association, was the organizing secretary. The editing of the 'Proceedings' has been carried out by P. E. Halstead B.Sc. Ph.D. and R. W. Nurse M.Sc. F.Inst.P.

The opening session of the Symposium took place at the Royal Institution and other sessions at the Royal Society of Arts.

The Symposium was organized jointly by the Building Research Station of the Department of Scientific and Industrial Research and by the Cement and Concrete Association, and was attended by two hundred and sixty invited delegates, representing twenty-six countries.

The proceedings included seven half-day working sessions, at which twenty-two papers were presented and discussed and three half-day visits to research laboratories and cement works. There were one hundred and two contributions offered during the discussion which followed the main papers, making a total of one hundred and twenty-four items to be published as the proceedings of the Symposium. The average attendance at each session was one hundred and sixty.

A Government reception was held for the overseas delegates, and a banquet was offered to the delegates by the Cement and Concrete Association. In addition, a series of entertainments was provided to cover each day of the Symposium.

At the opening session of the Symposium the President welcomed the delegates with a speech, in which he pointed out that "cement and concrete are major constructional materials which have revolutionized civil engineering construction and radically affect all branches of building. The world output of cement is now at least 120 million tons a year. If we convert this into concrete it means something approaching 500 million cubic yards, and we could do with a great deal more." He stressed the great importance of a correspondingly large research effort and made plain that there was "still ample room for expansion in research."

The Vice-President also welcomed the delegates. He gave a short survey of the work of the Cement and Concrete Association and emphasized the

GENERAL SUMMARY

value of the co-operation in research which exists between industry and the Government in Great Britain: "I know of no country in the world where you have quite this combination: private enterprise and close government co-operation and support without interference. This co-operation is not merely financial, it does not exist only at the high and visible levels: it exists all the way down."

An introductory address by Dr. A. A. Bates, read in his absence by Dr. R. H. Bogue, paid tribute to "national aspects of genius which shine forth in the history of the development of Portland cement," as exemplified in the great names of Smeaton, Aspdin, Vicat, Le Chatelier, Michaelis and Törnebohm. Professor H. Lafuma also gave an introductory address, in which he outlined the methods of work of his organization, the "Centre d'Etudes et de Recherches de l'Industrie des Liants Hydrauliques" and described its aims thus: "what one should expect from such an institution is, not to lay down a doctrine, but to create a congenial environment, to promote a state of mind which can be acquired only through contact with men who have long lived in an atmosphere of research work and of specialized research, as each branch has its own technique, its working rules, its way of reasoning and its own particular approach to problems. Those entrusted with the management of a Study Centre must, like the head of a research laboratory, strive to create a tradition from which the greatest possible number of scientific works can derive benefit."

Professor G. G. Wästlund gave a report of the work of the Swedish Cement and Concrete Institute, which was founded after the Stockholm Symposium on the Chemistry of Cement "mainly to do fundamental physical and chemical research on cement and allied materials and with an idea which at that time seemed to be quite new, namely to combine fundamental physical research with technical concrete research."

At the close of the third session Dr. R. H. Bogue proposed a vote of appreciation to Professor Thorvaldson for his lifelong service to the chemistry of cement. (This address is printed on page xxx).

The closing address to the Symposium, entitled "Cement Research and the Future," was given by Dr. F. M. Lea and is printed as a foreword to the papers.

The proceedings for the Symposium follow.

Programme

SESSION 1: Monday 15 September

Afternoon

ADDRESSES OF WELCOME

Sir Ben Lockspeiser F.R.S.

*Secretary, Department of Scientific and Industrial Research
President of the Symposium*

Sir Francis Meynell R.D.I.

*Director, Cement and Concrete Association
Vice-President of the Symposium*

INTRODUCTORY ADDRESSES

Dr. A. Allen Bates (U.S.A.)

*Vice-President, Portland Cement Association, U.S.A.
The address was read by Dr. R. H. Bogue*

Prof. H. Lafuma (FRANCE)

*Director, Centre d'Etudes et de Recherches de l'Industrie des
Lians Hydrauliques, France*

Prof. G. Wästlund (SWEDEN)

*Svenska Forskningsinstitutet för Cement och Betong, vid Kungl.
Tekniska Högskolan, Stockholm, Sweden*

PAPERS AND DISCUSSIONS

The early history of Portland cement in England (*Paper 1*)

P. Gooding (U.K.)

P. E. Halstead (U.K.)

SESSION 2: Tuesday 16 September

CONSTITUTION OF PORTLAND CEMENT

CHAIRMEN:

(*Morning*) Dr. F. M. Lea (U.K.) (*Afternoon*) Prof. W. L. de Keyser (Belgium)

Morning

PAPERS AND DISCUSSIONS

The tricalcium silicate phase (*Paper 2*)

J. W. Jeffery (U.K.)

The dicalcium silicate phase (*Paper 3*)

R. W. Nurse (U.K.)

Interstitial phases in Portland cement clinker (*Paper 7*)

Herbert Insley (U.S.A.)

The ferrite phase (*Paper 5*)

G. Malquori (ITALY)

V. Cirilli (ITALY)

Afternoon

PAPERS AND DISCUSSIONS

The alkali phases in Portland cement clinker (*Paper 6*)

Terry F. Newkirk (U.S.A.)

The paper was read by Dr. R. H. Bogue

Tricalcium aluminate (*Paper 4*)

Fred Ordway (U.S.A.)

The paper was read by Dr. R. H. Bogue

Studies on the constitution of Portland cement clinker
(*Paper 8*)

R. H. Bogue (U.S.A.)

SESSION 3: Wednesday 17 September

THE SETTING AND HARDENING OF PORTLAND CEMENT

CHAIRMEN:

(*Morning*) Prof. T. Thorvaldson (Canada) (*Afternoon*) Dr. T. Heilmann (Denmark)

Morning

PAPERS AND DISCUSSIONS

The structures of cement hydration compounds (*Paper 9*)

J. D. Bernal (U.K.)

The reactions and thermochemistry of cement hydration at
ordinary temperature (*Paper 10*)

Harold H. Steinour (U.S.A.)

The paper was read by Mr. W. Lerch (U.S.A.)

Afternoon

PAPERS AND DISCUSSIONS

The reactions of cement hydration at elevated temperatures
(*Paper 11*)

George L. Kalousek (U.S.A.)

The physical structure of cement products and its effect on
durability (*Paper 12*)

F. E. Jones (U.K.)

Chemical aspects of the durability of cement products
(*Paper 13*)

T. Thorvaldson (CANADA)

SESSION 4: Thursday 18 September

SPECIAL CEMENTS

CHAIRMAN: (*whole day*) Dr. H. Gygi (Switzerland)

Morning

PAPERS AND DISCUSSIONS

The constitution of aluminous cement (*Paper 14*)

T. W. Parker (U.K.)

Slag cements (*Paper 15*)

F. Keil (GERMANY)

Expansive cements (*Paper 16*)

H. Lafuma (FRANCE)

Oil well cements (*Paper 17*)

W. C. Hansen (U.S.A.)

Masonry cement (*Paper 18*)

Charles E. Wuerpel (U.S.A.)

Afternoon

Visit to Building Research Station, Garston, Watford, Herts

SESSION 5: Friday 19 September

APPLICATIONS OF RESEARCH

CHAIRMAN: (*whole day*) Dr. R. H. Bogue (U.S.A.)

PROGRAMME

Morning

PAPERS AND DISCUSSIONS (a) In manufacture

Thermodynamics of the cement kiln (*Paper 21*)

H. Gygi *in collaboration with* F. Guye (SWITZERLAND)

The influence of the fineness of cement raw mixes on their
burnability (*Paper 20*)

T. Heilmann (DENMARK)

PAPERS AND DISCUSSIONS (b) In utilization

Some recent developments in the design and construction
of concrete structures (*Paper 19*)

A. R. Collins (U.K.)

Development of cements for special uses in the United
States (*Paper 22*)

Myron A. Swayze (U.S.A.)

CLOSING ADDRESS

Cement research and the future

F. M. Lea (U.K.)

Afternoon

Visit to the Research Station of the Cement and Concrete
Association, Wexham Springs, Stoke Poges, Buckingham-
shire

Saturday 20 September

Morning

VISITS TO:

The laboratories at Birkbeck College, University of London,
21 Torrington Square, London, W.C.1

The research laboratories of the Associated Portland Cement
Manufacturers Ltd, Stone, Greenhithe, Kent

The cement works of the Tunnel Portland Cement Co.
Ltd, Pitstone, Buckinghamshire.