Technical Bulletin
Flyash Cement Replacement

The Concrete Floor Contractors Association of Canada represents the concrete finishing industry.

Technical Bulletins are designed to provide state of the art information to owners, specifiers and contractors to both improve quality and reduce problems.

We hope that this information will assist you in this goal.

If you have any questions, or comments, please feel free to contact us at 905-582-9825 or by e-mail at info@concretefloors.ca

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Concrete Floor Contractors Association

Background

Flyash is a very fine by-product of coal burning and has been used extensively across Canada to replace portland cement in concrete. The physical characteristics of flyash vary significantly corresponding to their source. There are 3 types of flyash: 1) Type CH (high calcium), 2) Type CI (intermediate calcium) and 3) Type F (low calcium). Type C flyash reacts and hardens in the presence of water like portland cement (hydraulic reaction), but Type F flyash has very little or no self-cementing properties reacting with by-products of portland cement hydration (pozzolanic reaction).

Concerns:

The inclusion of flyash in concrete affects all aspects of the concrete including set retardation and reduced bleed rate. Delays in set and retarded bleeding create a condition where the surface of the concrete may dry prematurely creating concrete mixes which may be very difficult or impossible to finish to normal standards.

High volume supplementary cementing materials (HVSCM) “green” concrete mixes create extreme finishing, protection and curing requirements that must be carefully managed by the Concrete Purchaser .

Recommendations:

The concrete mix for floors should be carefully analysed at the preconstruction meeting to ensure compatibility with the type of slab under construction (including consideration for finishability and drying shrinkage).

To avoid problems associated with set delays and reduced bleeding, the maximum cement replacement with flyash in concrete floor mixes should not exceed 15%.

Type F flyash should not be used in concrete floor mixes unless the water:cement ratio is less than 0.5.

Further References:

- Natural Resources Canada CANMET “Flyash in Concrete” (ISBN 0-660-15764-0).