

OFFICE MEMORANDUM



MICHIGAN
STATE HIGHWAY DEPARTMENT

March 20, 1967

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To: R. L. Greenman, Secretary
Committee for Investigation of New Materials

From: E. A. Finney

Subject: "Confilm" Spray-On Film for Control of Evaporation From Fresh Concrete,
Research Project 67 NM-166. Research Report No. 626.

The following summary of information on "Confilm" has been compiled for consideration by the Committee:

1. September 17, 1965: F. E. Legg Jr., Materials Consultant, was directed by W. W. McLaughlin to investigate control of rapid drying of fresh concrete by evaporation control.
2. September 21, 1965: Mr. Legg wrote Professor W. A. Cordon concerning "Confilm," a product used to control evaporation. Professor Cordon used Confilm in experiments described in an August 1965, ACI paper titled "Control of Rapid Drying of Fresh Concrete by Evaporation Control."
3. October 4, 1965. Mr. Legg received a letter from the Master Builders Co. of Cleveland, Ohio, explaining that a Confilm patent had been applied for by Cordon. According to an agreement with Cordon, all patent rights would be assigned to Master Builders. Consequently, Legg's specific inquiry about the composition of Confilm and materials available for controlling evaporation was not answered. An offer of Confilm for evaluation, and an advertisement for the product was contained in the letter (see Attachment).
4. October 8, 1965. Mr. Legg wrote Mr. McLaughlin concerning his investigation and the contents of the Master Builders' letter. Mr. Legg's letter contained the following information:
 - a. The 1965 ACI paper demonstrated that Confilm was successful in inhibiting loss of moisture from the surface of fresh concrete, but applications might be desirable after each finishing operation.
 - b. The Master Builders' advertisement stated: "Confilm supplements the recommended practices for hot weather concreting. The use of cooled aggregates and mixing water, erection of sunshade, and placing concrete during the cool time of the day are helpful practices in combating the ill effects of rapid evaporation. Under some conditions Confilm alone will provide the necessary safeguard."

c. It has never been satisfactorily resolved whether the evaporation of bleeding water from the surface of concrete is desirable in all cases. Evaporation control may not be the entire remedy.

d. The pending patent on Confilm "seems to inhibit the Department's freedom of action in use of this material. Department opinion may consider it unwise to further contemplate use of Confilm due to its patent status."

e. If further investigation is necessary, Department personnel should attend the ACI Research Session on Nov. 5, 1965. (Cordon was scheduled to present a report titled "Influence of Evaporation Retardation of the Quality of Concrete Surfaces.")

5. November 17, 1965. R. H. Vogler of the Testing Laboratory Division attended the Nov. 5 ACI meeting, and reported the following:

a. The information presented by Cordon did not indicate that additional formal research had been done.

b. The use of Confilm aids in finishing concrete as bleed water is retained and the surface is prevented from drying before the concrete has set.

c. The need for an evaporation protective film is greater in regions of the country typified by low humidity and high summer temperature. Michigan has relatively high humidity through much of the construction season.

d. If additional information is necessary concerning the use of a monomolecular film as it affects strength, surface drying, scaling, bleeding, etc., it must be developed by the Department.

6. M. G. Brown of the Research Laboratory agrees with Vogler: "In view of the Department's recent specification change ruling out the use of membrane curing compounds on bridge decks, Confilm or equivalent may be needed to control drying rates on large machine-finished pours using retarders in hot windy weather. However, it would appear that the possible effects of Confilm on plastic concrete and properties of the hardened concrete containing various types of water reducer-retarders would have to be thoroughly explored in the laboratory before field usage."

OFFICE OF TESTING AND RESEARCH



E. A. Finney, Director
Research Laboratory Division

EAF:jcb

Attachment

MASTER BUILDERS

CONFILM

A spray-on monomolecular film that reduces rapid evaporation of water from freshly placed concrete

purpose of CONFILM:

CONFILM reduces the rapid evaporation of water from plastic concrete normally caused by dry warm wind or by low humidity, wind or high temperature.

action of CONFILM:

When CONFILM is sprayed lightly over the surface immediately after screeding, it forms a monomolecular film that reduces evaporation of surface moisture about 80% in wind and about 40% in direct sunlight. It employs the same principle used in recent years to reduce evaporation from municipal water reservoirs.

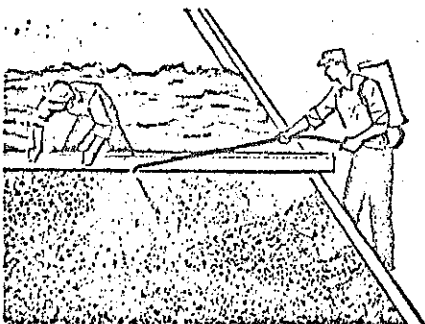
The CONFILM application has no effect on the cement hydration process. Concrete strength (early and ultimate), abrasion resistance and durability are not altered except for the improvement in over-all quality resulting from control of rapid evaporation.

CONFILM reduces evaporation only while concrete is in its plastic state. It is not a substitute for early curing of the hardened concrete nor does it alter the effectiveness of membrane-type curing compounds.

When the concrete hardens CONFILM vanishes without a trace. There is no discoloration or coating of the hardened concrete but there is a marked absence of white calcium carbonate efflorescence on the surface.

These important benefits result from the use of CONFILM to combat rapid drying of fresh concrete:

advantages of CONFILM:



1. Reduction and in many instances elimination of plastic shrinkage cracking and wind crusting of the surface of flatwork.

2. Improved finishing results from reduction or elimination of crusting, stickiness and underlying sponginess and resultant unevenness of the hardened surface. The surface closes better under the trowel.

3. Concrete with lower slump and lower unit water content can be used for flatwork since CONFILM virtually eliminates the need to add extra mixing water to compensate for rapid evaporation during finishing.

(CONFILM does not eliminate the problem of plastic cracking caused by placing concrete on a hot, highly absorbent base which rapidly withdraws moisture from the underside of the slab. This condition should be corrected by use of plastic sheeting over the base or by cooling and saturating the base just prior to placing the concrete.)

4. Use of air-entrained concrete as required for durability and workability is encouraged whereas air entrainment otherwise might be avoided because it increases susceptibility of the concrete to crusting and stickiness under drying conditions.

continued...

advantages:

(continued)

5. Finishers can handle normal areas in a routine manner because the surface remains plastic and finishable for a longer time under rapid drying conditions.

(The quality of workmanship is improved with possible reduction in over-all cost. Timing of the various finishing operations is less critical when CONFILM is used.)

6. CONFILM supplements the recommended practices for hot weather concreting. The use of cooled aggregates and mixing water, erection of sunshades, and placing concrete during the cool time of the day are helpful practices in combating the ill effects of rapid evaporation. Under some conditions CONFILM alone will provide the necessary safeguard.

7. The use of CONFILM is low cost insurance even under marginal climatic conditions where crusting and plastic cracking might or might not occur. The concrete finishes easier and faster with better finished appearance. This in itself offsets the cost of CONFILM.

8. CONFILM is effective, beneficial and compatible with the following finishing operations:

- air-entrained and non-air-entrained concretes
- normal, retarded and accelerated setting concretes
- metallic and non-metallic aggregate dry shake applications
- surface retardants for exposed aggregate finishes
- natural and colored concrete finishes
- burnished hard trowel finishes and non-slip swirled trowel or wood float finishes
- hand finishing and machine finishing
- highway, residential, commercial, institutional and industrial flatwork
- membrane-type curing compounds, plastic sheeting, water-proof paper or ponding
- tilt-up, lift-slab, precast concretes

application of CONFILM:

CONFILM is applied with an ordinary garden-type tank sprayer or with the equipment used for application of membrane-type curing compounds.

- Dilute one part of CONFILM from the factory container with nine parts of water.
- Pump the spray tank to operating pressure and adjust the nozzle to obtain a fine spray mist.
- Early application of CONFILM is very important. Apply immediately after screeding.
- Spray surface lightly and uniformly. Repressure the tank as needed. Avoid having the nozzle too close to the fresh concrete. Be sure the spray is a fine mist. Avoid deposit of droplets on concrete surface.
- Proceed with bull-floating or darbying. CONFILM is spread uniformly by these operations. Under severe drying conditions, additional applications of CONFILM should be made after each work operation including bull-floating or darbying, wood floating, flat trowelling and raised trowelling.

precautions:

1. CONFILM should not be used under high humidity conditions or where concrete bleeds excessively.
2. Early application of CONFILM is important.
3. Apply uniformly to develop a continuous, unbroken film on the surface. A continuous film will not develop if the surface is very rough.
4. Under adverse drying conditions repeated applications of CONFILM should be made following each work operation.
5. Concrete treated with CONFILM must be cured. CONFILM is not a curing agent,

estimating data:

coverage — one gallon of CONFILM is mixed with nine gallons of water to make 10 gallons of sprayable solution which covers 2000 to 5000 square feet of fresh concrete with a single application. If more than one application of CONFILM is made, such as under adverse drying conditions, the area of concrete treated per gallon of solution is reduced accordingly.

packaging — CONFILM is packaged in 1, 5 and 55 U.S. gallon pails and drums, and 1 and 5 Imperial gallon pails.

suggested specifications:

Immediately after the screeding of concrete flatwork (floors, pavements, driveways, etc.) the surface shall be sprayed with Master Builders CONFILM to reduce rapid evaporation of water. The Manufacturer's application procedure and precautions shall be strictly observed.

MASTER BUILDERS

CLEVELAND, OHIO 44118

TORONTO 15, ONTARIO

Products for Improving Concrete