



CALMETRIX F-CAL SEMI-ADIABATIC CALORIMETER & SOFTWARE

ASTM C1753 compliant Calorimeter for Cement / Concrete Professionals.

The F-Cal is a Field Calorimeter that can be used to test real concrete, mortar or cement paste both in the confines of a laboratory environment and in the field. F-Cal measures changes in temperature, as a proxy for heat, while the hydration reaction is taking place. As such, it fully conforms to ASTM C1753 (Evaluating Early Hydration of Hydraulic Cementitious Mixtures Using Thermal Measurements). As per their design, F-Cal calorimeters replicate real conditions in a flatwork job, such as, for example, a concrete slab.

The F-Cal calorimeter can accommodate up to eight standard 3"x6" (75mm x 150mm) cylinders. Cylinders can be used to test paste, mortar and real concrete and can be capped to be later used for compressive strength testing.

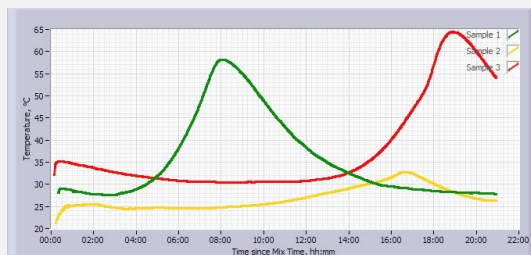
F-Cal is ideal for field applications: it does not require a dedicated computer or a power source. Data is stored in an internal memory with up to 7 days capacity, and can be analyzed with Calmetrix's CalCommander software, which combines ease of use and a suite of analytical tools.

Applications and uses.

The F-Cal is typically used in the following QA/QC applications:

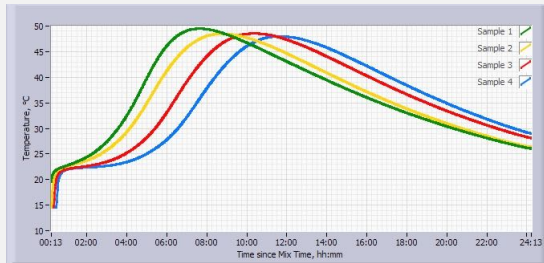
- testing as outlined in ASTM C1753
- on-site troubleshooting for material incompatibility (e.g. admixtures that do not work well for certain cement sources)
- quick estimation of setting times
- screening of materials, e.g. different sources of cement, different admixtures
- robustness test (how performance holds up to variations in material dosages)

Example of use: adverse material interaction (Applicable Instruments: any F-Cal or I-Cal instrument)



This example shows a potential adverse interaction. The green curve shows a normal Portland cement mix with 25% of a low calcium fly ash. The red curve is the same mix, with a retarder and a mid-range water reducer (brand A) at normal doses. The setting time is severely retarded, but the curve does not show any other adverse interaction. The yellow curve has the same retarder as in the red curve, but a water reducer of a different brand ("brand B"). The curve shows severe interaction, with no strength gain. The combination of fly ash, and retarder is not compatible with the "brand B" water reducer.

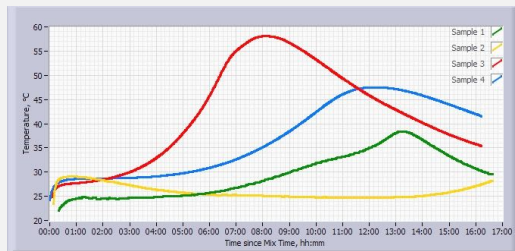
Example of use: optimum admixture dosage
(Applicable Instruments: any F-Cal or I-Cal instrument)



This example shows the effect in a given mix of gradually increasing dosage of a retarder. The progression shown in this example is a close-to-linear response to dosage, Differences in setting times can easily be inferred in the F-Cal calorimeter, with the blue curve setting 3 hours and 30 minutes after the green curve.

The same test could be conducted with different cements to select the one that provides the most robust and predictable response to dosage increases. A common test is also to look at the effect of different admixture addition (upfront, with water or delayed).

Example of use: maximize cement substitution
(Applicable Instruments: any F-Cal or I-Cal instrument)



This example shows the effect of a cement substitution by a high-calcium fly ash. The red curve is a 100% Portland cement mix. The blue curve is the same mix with 12% substitution by fly ash, the green curve has 17% substitution and the yellow curve 22%. The calorimetry curves reflect the increase in setting time (curves shift to the right) and lower reactivity (lower peaks) leading to a decrease in early strength. In this test, the green curve shows that 17% is very close to a “danger zone”. 22% substitution will severely retard the mix, with no strength gain after one day.

F-Cal is predominantly used by field personnel of Concrete Manufacturers and Suppliers of cement, supplementary cementitious materials or chemical admixtures.

Specifications.

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Power Supply	3.6-Volt built-in Lithium Battery	Accuracy	+/- 0.2% at 25°C
Number of Test Channels	8	Response Time	< 2 min. to 90%
Sample Size	Up to 1.9 kg (4.2 lbs)	Resolution	0.0018%
Battery Life	8 years (in continuous use)	Sampling Rate	1 min.
Operating Temperature Range	-40 to 70°C (-40° to 158°F)	Weight	28 lbs (12.7 kg)
Temperature Measurement Range	-40 to 100°C (-40° to 212°F)	Dimensions	25"x25"x14" (62.5 cmx 62.5 cm x35 cm)



Innovation and QC for Cement and Concrete ... Made Easy

Calmetrix Inc.
P.O. Box 696
Needham, MA 02494 USA
T: +1 (617) 203-2090
e: info@calmetrix.com
w: http://www.calmetrix.com