

DATA SHEET

Adiabatic concrete calorimeter



Concrete adiabatic calorimeter

General description

When concrete is curing and hardening, the hydration reaction of cement develops a large amount of heat with an increase in temperature. The temperature rise accelerates hardening of cement however, if it is not properly dissipated, it can cause the arise of tensile stresses inside the concrete structure with the consequent appearance of cracks and reduction of mechanical properties.

This effect is encountered particularly in massive concrete castings, due to the limited heat dispersion, leading the behaviour closer to adiabatic conditions.

The isothermal and semi-adiabatic testing methods are consequently less representative and most commonly used for mortars and cement pastes, basically to compare the behaviour of different types of cements.

The adiabatic method is the only method allowing correct evaluation of the heating process inside massive concrete works.

CONTROLS is the only testing equipment manufacturer who developed in the late 80s, in partnership with the main research laboratories, the first industrial adiabatic concrete calorimeter, so far having been limited to few prototypes in reasearch centers.

Nowadays the equipment has been completely renewed with the latest technologies, including new electronics and PC software, ensuring high testing accuracy.

Working principle

A fresh sample is positioned in a calorimeter cell ensuring adiabatic conditions by avoiding heat exchange with the environment. Since this condition cannot be obtained in practice in a passive system (no insulating material is infinitely non-conductive) the temperature of the room sorrounding the specimen is forced to be equal (or slightly lower by max 0.5°C) to the temperature of the sample during all the test. Two PT 100 temperature sensors are used, one positioned in the sample and one in the calorimeter cell. The temperature measurements are used by a PID closed loop control system to ensure a stable sample conditioning according to the Standard requirements.

The equipment consists of:

- external insulating enclosure
- calorimeter cell
- two platinum PT 100 temperature sensors measuring sample and cell temperatures
- 150mm polystyrene cubic mould
- calorimeter cell conditioning system controlled by a PID closed loop system
- PC software (PC not included)

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Main features

- Real time measurement of heat of hydration of 150mm concrete cube during hardening.
- Reliable evaluation of the heating process inside massive concrete castings.
- Calorimeter cell with minimized heat loss from the concrete sample for true adiabatic conditions.
- Evaluation of the heat of hydration taking into consideration the temperature reached by the concrete.

Standards

- EN 12390-15

Specifications

Up to 6 calorimeter cells can be managed by the same PC software

Max concrete temperature: 80°C (some types of material -e.g. concrete with accelerating admixtures and/or high cement content- may overcome this value and damage the equipment. Please ask our technicians)

Platinum PT 100 having 0.01°C resolution and 0.1°C accuracy

Adiabatic error: less than 0.05°C/h

PC connection via LAN cable

Internal SD memory for test data backup in case of temporary loss of communication with PC

PC software for acquisition, elaboration and printout of test data including:

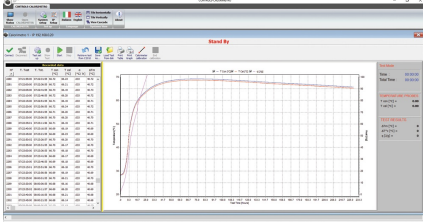
concrete temperature vs time graph

cell temperature vs time graph

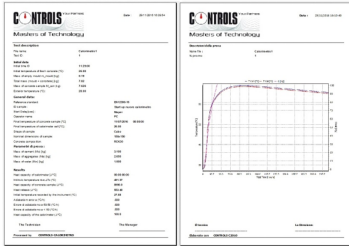
intrinsic of temperature rise

cumulative heat development

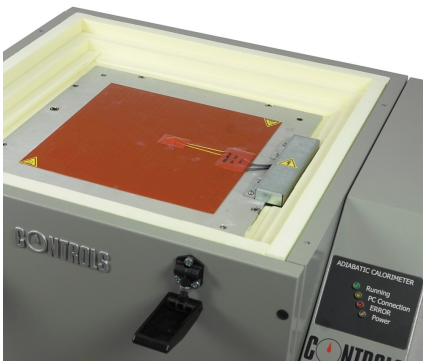
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Temperature vs time graph displayed in real time during the test



Test report



Internal view

Products

54-C2010/A

Computerized concrete calorimeter for the determination of the heat of hydration to EN 12390-15.

Accessories and consumables

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54-C2010/A1

Spare mould for adiabatic calorimeter

82-P8000/PC

High specifications desktop PC with LCD monitor. Operating system: MS Windows pre-installed. Top brand model fully covered by international warranty and serviced by global after sales network. 110-240 V, 50-60 Hz, 1 Ph

54-C2010/8

Set of 3 spare copper tubes

54-C2010/5

Spare convective paste, 50 g