Test devices for cement, gypsum and lime

**Automatic VICAT Needle Apparatus**

Apparatus to determine the setting time on up to 8 specimens irrespective from each other. The time of begin and end of the setting process of cement, gypsum or mortar is measured. The penetration depth of the Vicat needle into the specimen is measured, evaluated and saved according to 3 different methods. The measurements may be carried out in any order at any of the 8 available spots thus making optimum use of the specimen surface but considering the conditions set by the different standards.

**Le Chatelier Water Bath**

Device to determine the stability of cement which may change when expanding during hydration. For this purpose up to 16 specimen bars can be stored in a bath of boiling water or water vapor. The heating cycle – e.g. heating up to 100°C within 30 min and keeping this temperature constant for more than 3 h – is regulated automatically and with a high accuracy (accurate to 0.1°C). Setting time and setting temperature may vary according to the requirements in question.

Easy and safe handling.

**Free Lime Determination Device**

Device to determine the concentration of free lime in cement or cement clinker. For this purpose the conductivity of a cement solution in hot glycol is measured.

The menu-guided test sequence allows an easy and safe handling and short test times. The test results are available more quickly compared to other methods, thus allowing also a quicker correction of the furnace operation and the burning process.

**Automatic Blaine Apparatus**

Apparatus to determine the specific surface of cement and other powdered materials. The time required by a certain air volume to penetrate a powder bed is measured in accordance with EN 196-6. Measurement, test sequence control and evaluation are automatically performed.
Specimen preparation

The most important and maybe the most decisive part for the testing of binders is the standard-conforming, reproducible preparation and production of specimens. For this reason, the corresponding devices and auxiliary means are subject to strict quality standards regarding accuracy and user-friendliness. Standard devices for the specimen preparation are to be found in the catalogue Global Testing from Toni Technik. Example for an innovative solution in this field is the

**Mortar mixer ToniMIX**

The automatic mixing process can be programmed in accordance with the specification of different standards. Its special features are:
- automatic sand and water supply facility,
- safe mixing guaranteed by a high precision of the component parts,
- clear glass door with safety switch,
- standard dust exhaust facility and
- specially robust long-life construction.

Testing of binders

**Automatic needle testers ToniSET Compact and ToniSET Expert**

The setting behaviour is a decisive, technological factor for the processing of binders and is usually determined manually with the Vicat needle tester during time-consuming tests.

In the course of the user-oriented development of building materials with permanently new special properties, the number of these tests is increasing constantly and thus becomes an important economic factor. The traditional characteristic values “begin of setting” and “end of setting” are decisive factors for an extensive evaluation of the setting behaviour. For the product development of binders, retarders and accelerators it is of particular importance to save time by means of a fully automatic test performance. The consequent observance of defined environmental conditions (temperature, humidity of air) are further crucial advantages of the automated measuring method with ToniSET. Several specimens are tested fully automatically with both devices, optionally at a defined humidity of air or under water. The advantage of the underwater test, which seems to gain more and more ground as alternative method for the standards (EN and ASTM), is that the environmental conditions are reproducible in the best possible way.
Both variants are controlled by a MS Windows-based software whereby individual test intervals may be selected for each specimen. The current setting condition of the different specimens can be read in the corresponding program windows at any time. The moments of time for the beginning, resp. the end of setting are automatically calculated in accord. with the specifications set up after comparison measurements.

**Heat flow-differential-calorimeter ToniCAL cement, mortar and concrete**

All devices are used to determine the setting heat of hydraulic building materials. For this purpose, the microprocessor continuously records the generation of heat (Joule/gram) in dependence on time. Whereas for ToniCAL cement a quantity of 10 grams is sufficient due to the homogeneous, pulverized materials, ToniCAL mortar needs a quantity of about 70 to 140g and ToniCAL concrete finally works - due to the very coarse-grained and very inhomogeneous fresh concrete mixture - with a specimen shape and quantity that corresponds to a concrete cylinder with a diameter of 150 mm and a height of 300 mm (about 5.3 litres).

Each one of the devices consists of a control unit with temperature controller, amplifier, temperature display and processor interface as well as a separate, heat-insulated calorimeter block containing the measuring cylinders for the material to be tested and an inert sample, the measuring chains from a variety of thermosensors adjacent to the cylinders and a source of heat. ToniCAL cement is additionally equipped with a device for the subsequent dosing of additives.

The released hydration heat (Joule/mass x time) can be represented in tabular form or graphically as instantaneous or cumulative value either during the measurement or after the termination of the test. The high measuring accuracy and reproducibility guarantee a safe and reliable evaluation of the generation of heat and of the influence of additives.

**Automatic Blaine apparatus ToniPERM (Type 6565)**

The specific surface according to Blaine is an indirect measure for the grain size and has a decisive influence on the strength values of cement. Therefore, an exact, simple and quick determination is of decisive importance already during the production process (in the cement mill).

ToniPERM is an automated, microprocessor-controlled Blaine device and particularly suitable for the quick determination of operating characteristic values. It consists of a microprocessor control unit (similar to ToniTROL) and a measuring tower, optionally with one or two measuring cells.

The powdered material to be tested is compressed to a defined volume in the enlarged measuring cell (according to Dyckerhoff). After having placed the measuring cell(s) onto the measuring tower and after having entered the test-specific specimen data, the test is carried out and evaluated fully automatically. The Blaine-value is calculated out of the single values of a preselected number of tests and, if necessary, out of two measuring cells.