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SHRINKAGE CONE

Shrinkage Cone is designed to measure the shrinkage and expansion of building materials from the first minutes and hours after water is added. Utilizing a laser beam, it detects changes in the dimensions of the materials without contact.

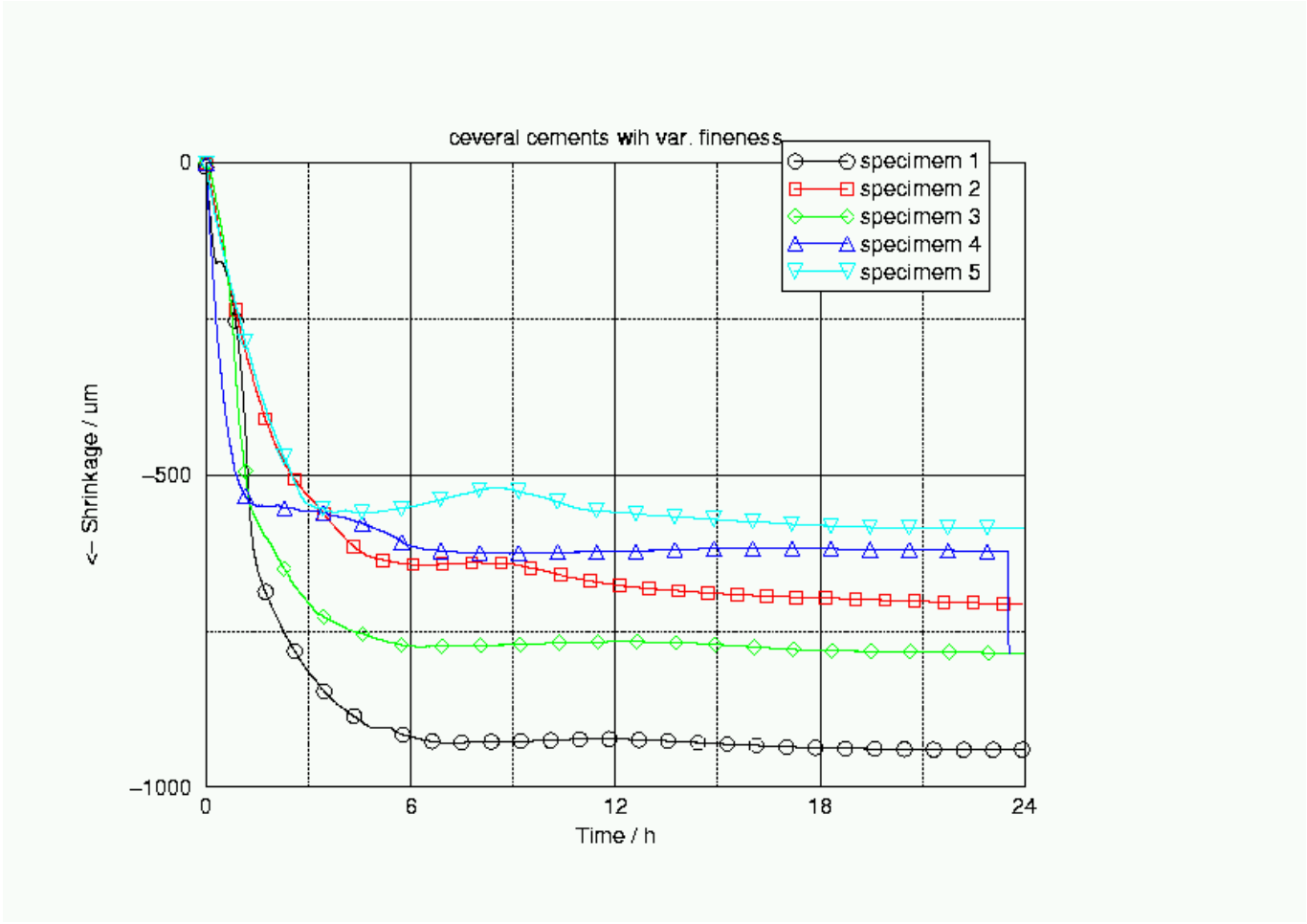
The unique design of the sample container ensures that any recorded distance changes correspond precisely to the relative change in length. Additionally, the sample container can be connected to a circulating unit, allowing for precise temperature control during measurements.

Simultaneous recording of the temperature and humidity of the environment, as well as the temperature and weight change of the sample, is possible. All measurement data are digitized and stored in a data logger for easy analysis. This comprehensive setup ensures accurate monitoring of the shrinkage and expansion of building materials, even when fired colors and additional charges are involved.

APPLICATIONS

How to Operation Shrinkage Cone?

Sample material is placed into a Shrinkage Cone lined with partition foil. A reflector is positioned on the sample surface, and the Shrinkage Cone is placed under the laser. The optimal measuring range of the laser is adjusted using a knob on the device frame. Zero adjustment and the start of the measurement are initiated on the computer by pressing a button. The measured values from the Shrinkage Cone can also be read and exported during the measurement.


ceveral cements wih var. fineness
specimem 1
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specimem 4
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0
−500
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<-- Shrinkage / um
0
6
12
18
24
Time / h

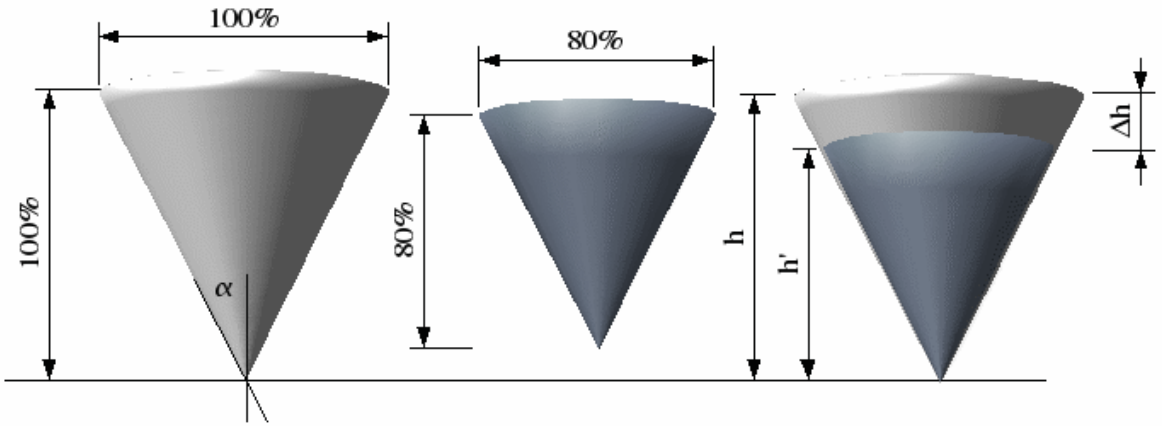
FEATURES

Features of Shrinkage Cone

- Contactless measurement using a laser
- Measurement starts immediately after mixing with water
- Includes a data logger with a network interface for integration into the intranet or lab network
- No special computer or software required
- Optionally available: cone-shaped sample container for concrete with a volume of 680 ml
- Well suited for research, development, and quality control.

THEORY & METHOD

Why a cone works...



Under the prerequisite of an isotropic shrinkage (expansion) the radius r and the height h of a cone shrink (expand) the same percentage: h' = k * h and r' = k * r (k for example 80%)

$$General: V=\frac{1}{3}\pi r^2 h; V'=\frac{1}{3}\pi r'^2 h'$$

$$r=h\tan(\alpha)\rightarrow V=\frac{1}{3}(h\tan(\alpha))^2 h$$

$$\alpha=const\rightarrow V=c\,h^3; V'=c\,h'^3$$

$$\frac{V'}{V}=\frac{h'^3}{h^3}\rightarrow\frac{h'}{h}=\sqrt[3]{\frac{V'}{V}}$$

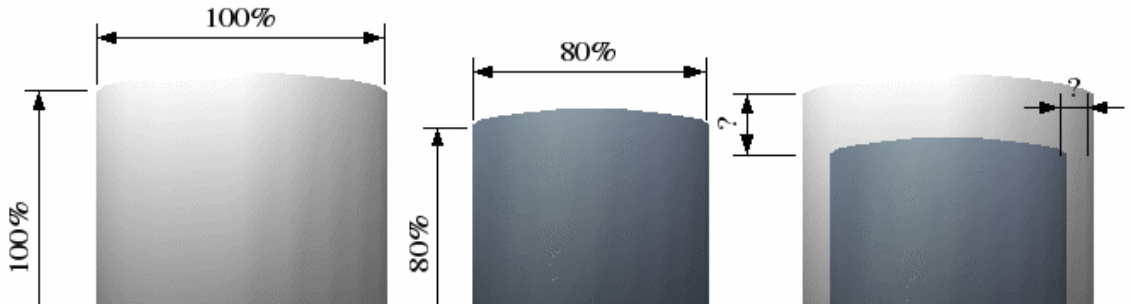
$$Example: k=0{,}8; \alpha=30°; h=10\,cm$$

$$h'=0{,}8\,h=8\,cm\rightarrow\Delta h=2\,cm$$

$$V=\frac{1}{3}(h\tan(\alpha))^2\pi h=349\,cm^3$$

$$V'=\frac{1}{3}(h'\tan(\alpha))^2\pi h'=178{,}7\,cm^3$$

$$\frac{h'}{h}=\frac{8}{10}=\sqrt[3]{\frac{V'}{V}}=\sqrt[3]{\frac{178{,}7}{349}}=0{,}8$$



TECHNICAL SPECIFICATIONS

Technical Specifications of Shrinkage Cone

Measurement range	10 mm
Resolution	< 2 µm
Sampling rate	1 s ... 4 h
Sample volume mortar or paste	350 ml
Sample volume concrete	680 ml
Dimension of the Base plate	Approx. 42 cm x 27 cm
Electrical connection	110 V ... 240 V / 50 Hz ... 60 Hz

Scope of delivery:

The measuring device includes a data logger, sample container for mortar or paste, thermocouple Type K, combined temperature and humidity sensor for the environment, connection port for a balance (balance not included), partition foil, reflector, and user manual.

Order Informations:

Part no.	Description
S0050	Shrinkage Cone
S0051	Sample container for concrete
S0052	Sample container for mortar or paste
S0053	Partition foil for sample container 350 ml
S00531	Partition foil for sample container 680 ml
S0055	Reflector

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Toll-Free: 1.877.884.TEST (8378) | Fax: 954.697.8211
E-mail: info@qualitest-inc.com
Address: 8201 Peters Rd., #1000,
Plantation, FL 33324, USA.

Qualitest Canada & International
Tel: +1.905.944.9825 | Fax: +1.905.944.0304
E-mail: sales@qualitest-inc.com
Address: 70 East Beaver Creek Rd., #9, Richmond Hill,
Ontario L4B 3B2, Canada.

Qualitest Latin America (Mexico and LATAM Region)
E-mail: ventas@qualitest-inc.com

Qualitest KSA (Regional Office)
Tel: +966 11 500 6659
Address: Level 7, 3.09, District 3, King Abdullah
Financial District, Riyadh, Saudi Arabia

Qualitest Singapore (ASIA PACIFIC Regional Office)
Tel: +65 6393 5480 | E-mail: singapore@qualitest-inc.com
Address: 50 Raffles Place, Singapore Land Tower,
Level 46, Singapore, 048623.

Qualitest Indonesia (Representative Office)
Tel: +62 21 2985 9522 | Fax: +62 21 2985 9889
E-mail: indonesia@qualitest-inc.com
Address: One Pacific Place Level 11, Jl. Jend. Sudirman,
Kav. 52-53, SCBD Area, Jakarta 12190, Indonesia.

Qualitest FZE (Regional GCC/ME Office)
Tel: +971 4 8819252 | Fax: +971 4 8819262
Email: gcc@qualitest-inc.com
Address: Jafza One, BB 1610, Jebel Ali Free Zone,
PO Box 261440, Dubai, UAE.

Qualitest India
E-mail: india@qualitest-inc.com
Address: 15th Floor, Dev Corpora, Pokhran Road No.1,
Eastern Express Highway, Thane, Maharashtra,
Mumbai, 400601, India

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