



## **Rheology Solutions**

*Rheology Solutions is the sole Australian distributor of this product range and we welcome the opportunity of discussing your application requirements.*

*We hope the information you are seeking is contained within this file.  
If you have any questions, or require further information please contact us.  
We look forward to being of further service.*

*Regards from the Team at Rheology Solutions.*

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## A Laserbeam Measures the *very early* Shrinkage and Expansion of Building Materials. Touchless and with 1 Mikron Resolution

With Schleibingers latest innovation the Schleibinger Shrinkage Cone deltaEL it is possible to measure the shrinkage or expansion of fluid building materials in the first minutes and hours after start of mixing. The expansion of the building material is registered touchless and very exact by a laser beam. There is no mechanical coupling between the fluid and the sensor necessary.

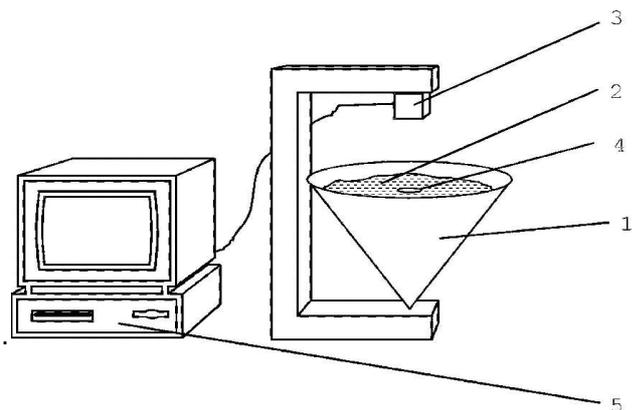


To ensure that the measured distance correlates with the relative length change of the material we use a cone formed specimem container. So the height changes allways correlates with the volume change.

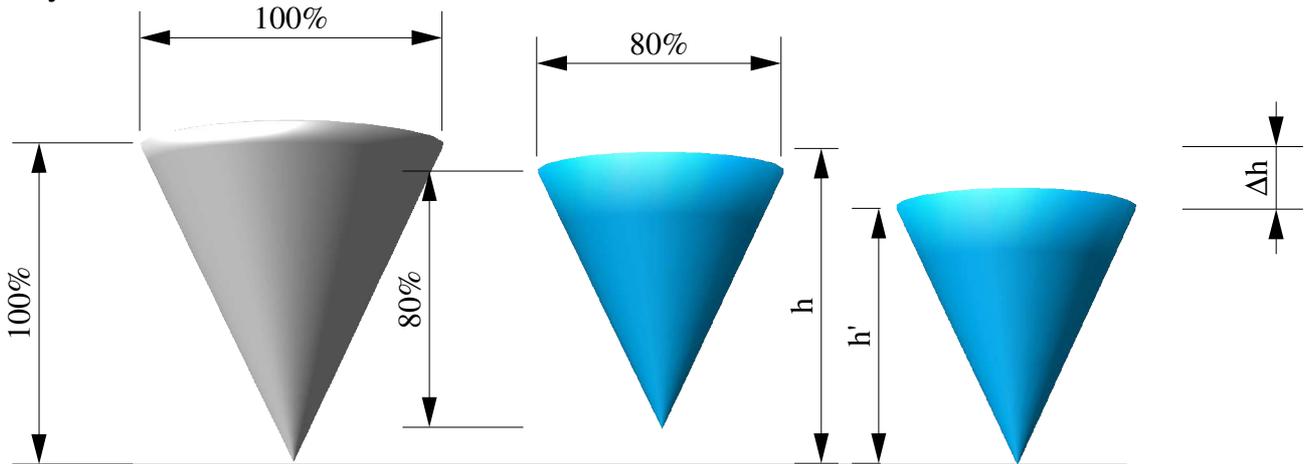
The length change is registered with a resolution of 1/10 mikron. A data-logger supplied with the system registers the data and store it in the logger as standard ASCII files. Optional a synchronous registration of temperature and humidity ore of a balance (Mettler, Sartorius) is possible. Two temparature channnels and a mixed temperature /humidity channel are available. The logger has a network interface (Ethernet). So you can easily integrate it into local intranet. With a standard web-browser software you can readout the data, and visualize it. For further data handling we recomend Microsoft Excel<sup>®</sup> ore any similar visualisation program. The data are visualized online graphical and numerical on the screen. No special PC software is necessary. You need only your browser-software like Mozilla ore Internet-Explorer<sup>®</sup> .

### How it works:

- Fill the fluid building material (2) into the cone formed specimem container (1)
- The container is set under the laser unit (3), which is mounted on a high performance boom stand.
- With a rack and pinion the distance is preset to about 0  $\mu\text{m}$  .
- The automatic offset adjust is done by a mouse click on your PC (5).
- An autonomous data logger will register your data for several weeks on an integrated CF-card memory. The data-logger has a network interface. You can easily readout the data, with any browser software like Internet-Explorer ore Netscape.



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:  $h' = k \cdot h$  and  $r' = k \cdot r$  ( $k$  for example 80%)

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

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

$$\alpha = \text{const} \rightarrow V = c h^3; V' = c h'^3$$

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

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

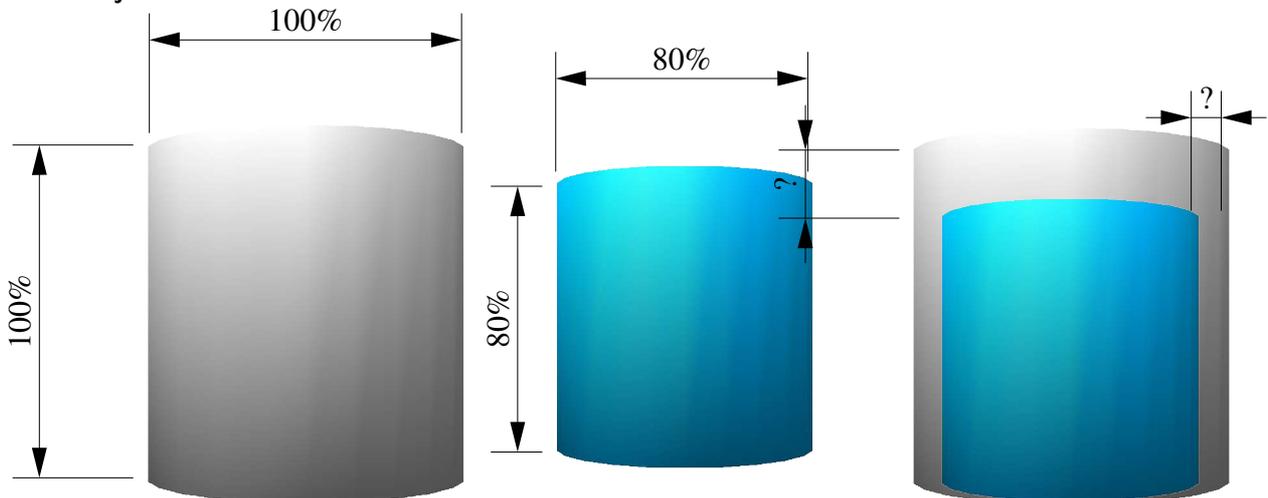
$$h' = 0,8 h = 8 \text{ cm} \rightarrow \Delta h = 2 \text{ cm}$$

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

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

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

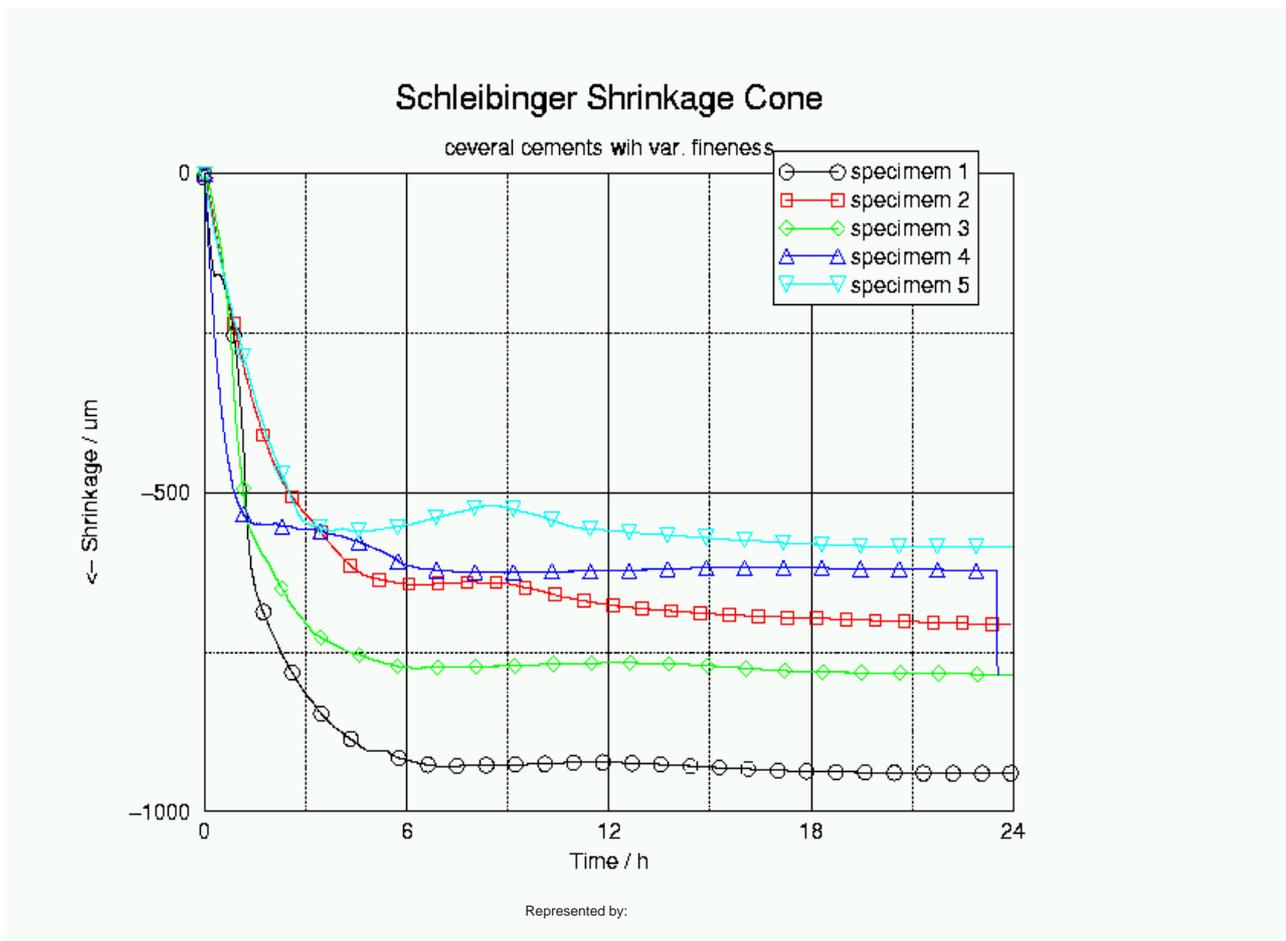
And a cylinder doesn't:



## Technical Data

Range	4 mm
Basic distance	25 mm
Resolution	0.3 $\mu\text{m}$
Spot sizer	0.8 mm
Laser	1 mW at 625 nm, class 1

Other measurement ranges also available. Recommended computer for readout the data logger: IBM-PC, one Ethernet port, Win 95, 98, NT, 2000, XP, Linux, FreeBSD, MacOS. Technical data maybe changed without notification, DBPa registered.



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