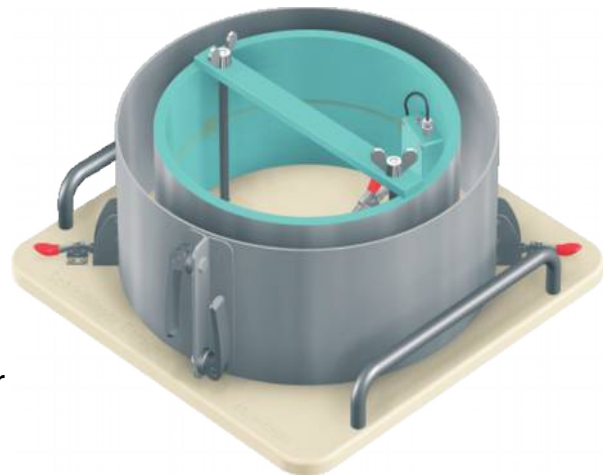
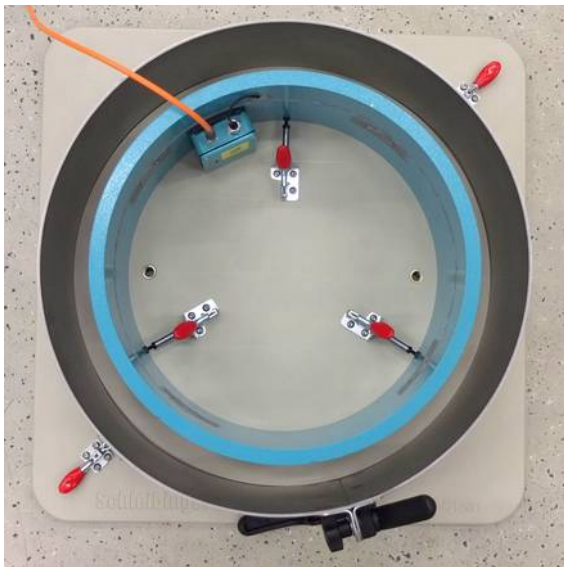


## ASTM-Shrinkage Ring– Measuring the Restrained Shrinkage According to ASTM C1581

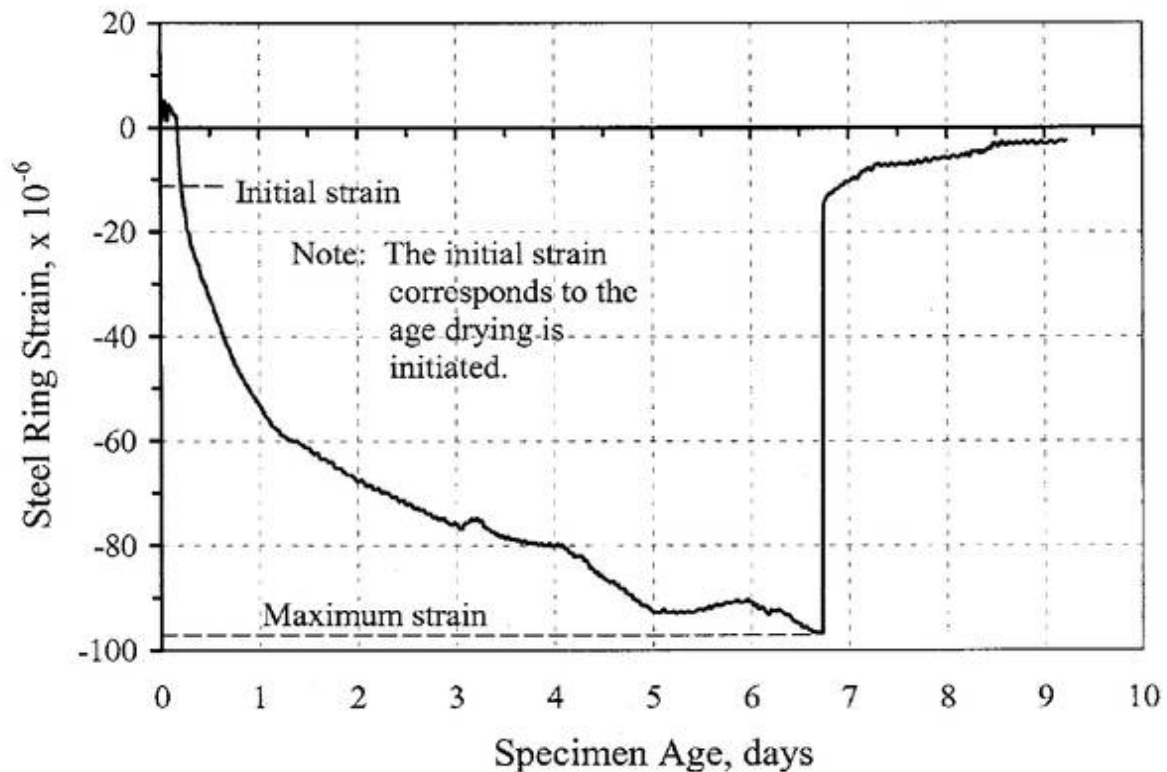
This test method covers the laboratory determination of the age at cracking and induced tensile stress characteristics of mortar or concrete specimens under restrained shrinkage. The procedure can be used to determine the effects of variations in the proportions and material properties of mortar or concrete on cracking due to both drying shrinkage and deformations caused by autogenous shrinkage and heat of hydration.



### **Measurement Principle**



A sample of freshly mixed mortar or concrete is compacted in a circular mold around an instrumented steel ring. The compressive strain developed in the steel ring caused by shrinkage of the mortar or concrete specimen is measured with 4 strain gages from the time of casting. Cracking of the test specimen is indicated by a sudden decrease in the steel ring strain. The age at cracking and the rate of tensile stress development in the test specimen are indicators of the material's resistance to cracking under restrained shrinkage.\*1



Steel ring strain vs. time. The specimen is cracking after 6.8 days at a strain of about  $100 \mu\text{m/m}$  :cited from ASTM C1581

## Data Recording

A data-logger supplied with the system records strain gage 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.

The logger has a network interface (Ethernet). So you can easily integrate it into local in-tranet. With a standard web-browser software you can readout the data and visualize it. For further data handling we recommend Microsoft Excel <sup>®</sup> ore any similar visualization 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 Firefox, Chrome Opera, Edge or Internet-Explorer <sup>®</sup> .

## Literature

- [ASTM C1581 / C1581M - 09a](#)  
[Standard Test Method for Determining Age at Cracking and Induced Tensile Stress Characteristics of Mortar and Concrete under Restrained Shrinkage](#)
- [Sören Eppers](#)  
[Assessing the autogenous shrinkage cracking propensity of concrete by means of the restrained ring test](#)  
[Die Bewertung der autogenen Schwindrissneigung von Beton mit Hilfe des Ring-Tests](#)
- [Sören Eppers, Christoph Müller](#)  
[On the examination of the autogenous shrinkage cracking propensity by means of the restrained ring test with particular consideration of temperature influences](#)
- [Prof. Dr.-Ing. Harald S. Müller, Dipl.-Geol. Dipl.-Min. Astrid Hirsch, Dr.-Ing. Vladislav Kvitsel Institut für Massivbau und Baustofftechnologie, Karlsruher Institut für Technologie \(KIT\)](#)  
[Prof. Dr.-Ing. Rolf Silbereisen, Dipl.-Ing. Carsten Becker CEMEX Deutschland AG](#)  
[Schwindarmer Beton – Entwicklung und Möglichkeiten](#)
- [Frank Apicella, BASF Corp - Construction Chemicals](#)  
["Crack-Free" Repair Materials ... Are We There Yet ?](#)  
[Minnesota Concrete Council](#)
- [Jae-Heum Moon, Farshad Rajabipour, Brad Pease, and Jason Weiss](#)  
[Quantifying the Influence of Specimen Geometry on the Results of the Restrained Ring Test](#)  
[Journal of ASTM International, Vol. 3, No. 8, Paper ID JAI100436](#)
- [Henkensiefken et al. 2008 CBC](#)  
[Reducing Restrained Shrinkage Cracking in Concrete: Examining the Behavior of Self-Curing Concrete Made using Different Volumes of Saturated Lightweight Aggregate](#)

## Technical Data: Shrinkage Ring\*:

Inner Ring outer Diameter, made of steel.	330 mm
Inner Ring Thickness	13 mm
Inner Ring Height	150 mm
Inner Ring Weight	15.5 kg
Outer Ring, made of stainless steel, Inner Diameter	406 mm

- Technical data maybe changed w/o notice

## Technical Data: Data Logger\*:

Network interface and built in WEB-Server, software pre-installed.
Sampling rate 10s..1h for at least 1 year (2 GByte)
Option: environmental temperature and humidity measurement S0016
User Manual
Size: 24 x 21 x 6 cm, weight 1.8 kg

- Technical data maybe changed w/o notice

## Order Code

<b>ASTM Shrinkage ring</b>	<b>S00031</b>
<b>Data logger for with an interface for up to 5 rings</b>	<b>S0003</b>

/home/markus/Dokumente/schwindringastm/astmring\_dokUS.odt12. June 2017

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