

**Fig. 1:** Resimat<sup>®</sup> 150 is designed for measuring the recovery of viscoelastic foam samples according to IKEA<sup>®</sup> specification no. IOS-MAT-0076. The cubic test sample has an edge length of 150 mm. Resimat is a brand of *Format Messtechnik GmbH*.

## Recovery Measurement According to IKEA<sup>®</sup> Specification IOS-MAT-0076

Viscoelastic foams show a characteristic recovery behavior after being compressed and then released. During the recovery process the foam gradually regains its original shape. According to the IKEA<sup>®</sup> specification IOS-MAT-0076 the **recovery time** is the time needed to regain 90% of the original thickness. Until now recovery is measured manually by using a ruler and a stop watch. Introducing the test device Resimat<sup>®</sup> 150 (Fig. 1), Format Messtechnik GmbH, Karlsruhe, Germany, has created a new approach for recovery testing according to IOS-MAT-0076.

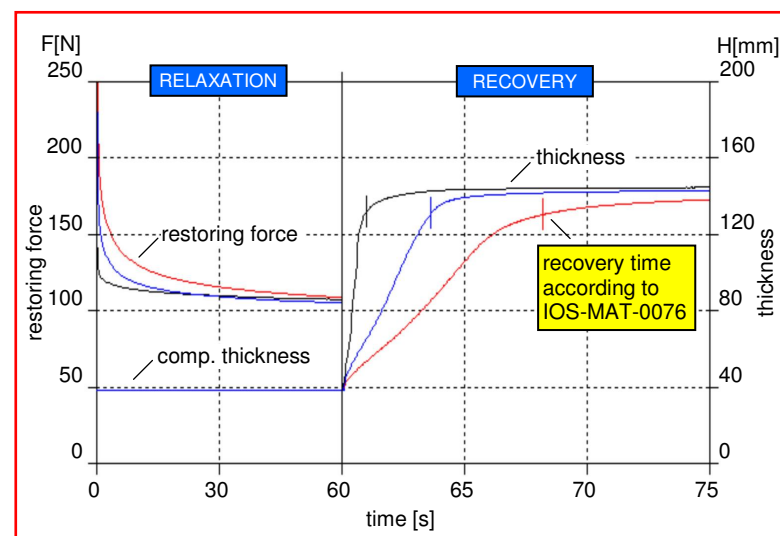
Resimat<sup>®</sup> 150 (Fig. 1) is specially designed for cubic foam samples with an edge length of 150 mm. During a test cycle the foam sample is compressed vertically onto an adjustable reference surface (Fig. 4). At a certain strain four electro magnets clamp the pressure plate and hold it for a pre-selected time. During compression a force gauge below the sample measures the restoring force. Due to the viscoelasticity of the foam the force gradually decreases. After the hold time the magnets are switched off, which instantly releases the compression force. The sample

recovers from its deformation and gradually regains its original shape. An ultrasonic sensor positioned right above the pressure plate continuously records the kinetics of the sample. The thickness vs. time curve (Fig. 2) shows the measured recovery giving clear insight into the dynamics of the foam.

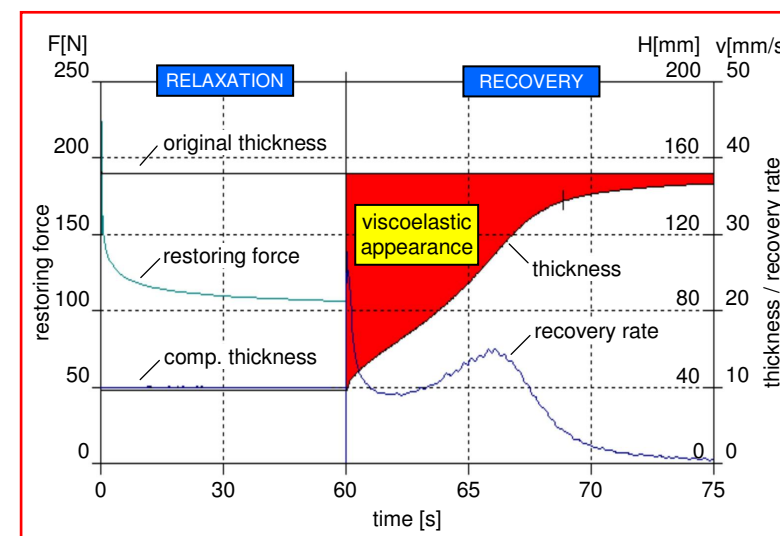
The distance of the reference surface and the thickness of the unstrained foam are measured in a zero measurement. This data is important for the applied strain. The hold time and the recovery interval are free selectable parameters. IKEA<sup>®</sup>'s IOS-MAT-0076 test norm for 150 mm foam cubes specifies a strain of 75% and a hold time of 60 seconds. After compression and subsequent recovery, the time dependant data is displayed by the software RESIMAT. The viscoelastic **appearance** (Fig. 3) is the area between the recovery curve and the original sample thickness. It shows how long a given foam deformation remains visible. The new measurement technology of Resimat<sup>®</sup> 150 is easy to use and can be applied in quality assurance testing of viscoelastic foams.

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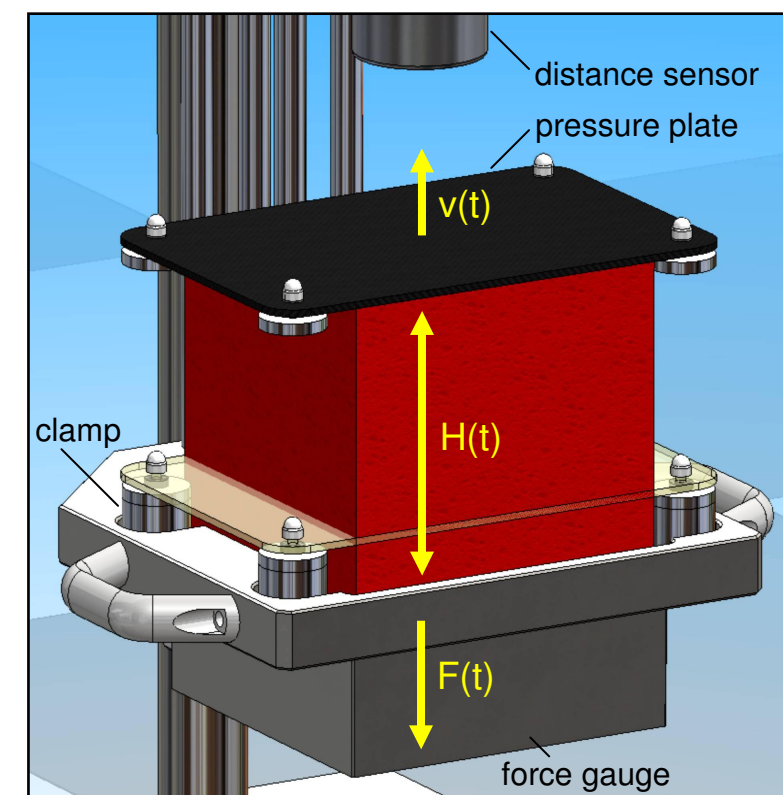


**Fig. 2:** Graphical overlay of three Resimat<sup>®</sup> 150 measurements of different foam samples. The recovery time according to IOS-MAT-0076, is the time needed to regain 90% of the original shape after a 75% compression for 60 seconds.



**Fig. 3:** The restoring force shows the relaxation during the hold time. The thickness vs. time curve shows the free recovery after relieving the pressure. The recovery rate is the differential of the thickness curve. The red area shows the "appearance".

- Mechanical testing of viscoelastic foam cubes
- Force relaxation measurement during compression
- Thickness vs. time measurement during free recovery
- "Appearance" calculation by the software RESIMAT



**Fig. 4:** The foam sample is compressed by means of the pressure plate. The distance sensor measures the time dependant thickness of the sample and the force gauge ( $F$ ) reads the restoring force.