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Messtechnik GmbH

Rise Pressure Measurement of Sealing Foams and Microcellular Foams

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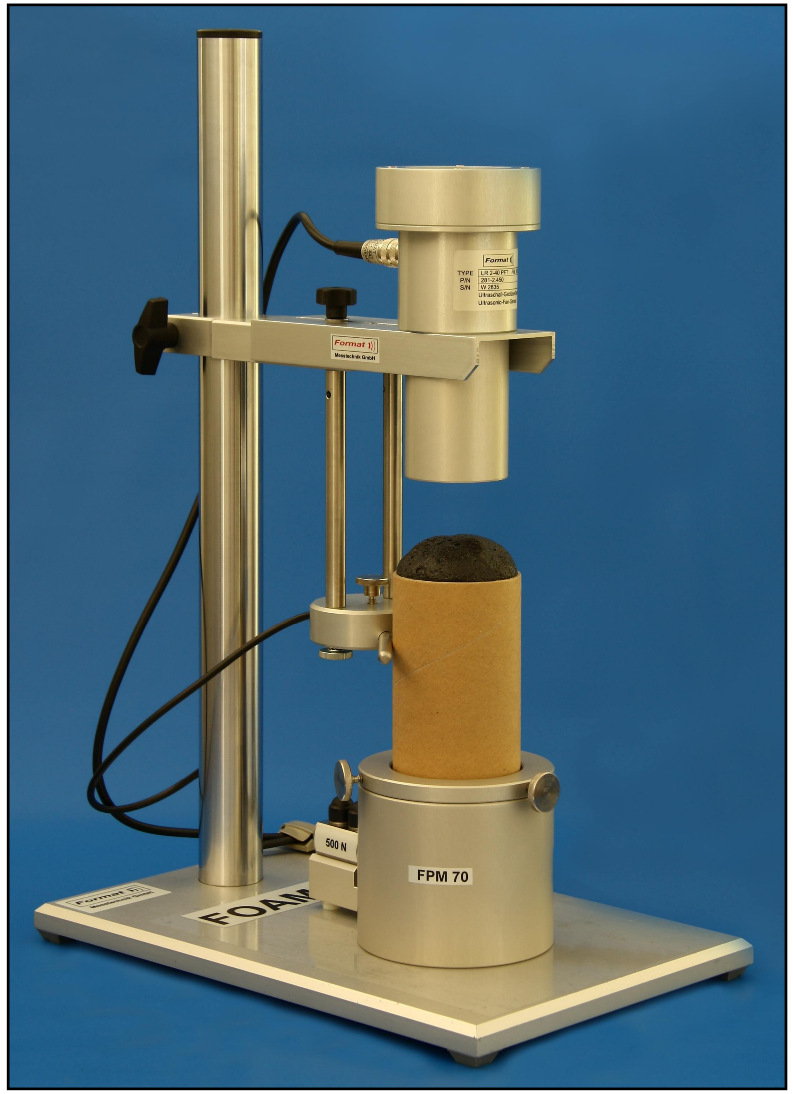

Fig. 1: The new Foam Pressure Measurement Device FPM 70 on the stand of the Foam Qualification System FOAMAT®. Rise height, rise pressure and reaction temperature are measured simultaneously.

Sealing foams and microcellular foams are traditionally tested in small cups measuring their rise profile. Format Messtechnik GmbH, Karlsruhe, Germany has introduced the new **F**oam **P**ressure **M**easurement Device **FPM 70** (Fig. 1), making a new approach for testing the rise pressure and the viscosity of high density foams. The FPM 70 test container consists of a cardboard cylinder and a heatable pressure plate inside an aluminum tube (Fig. 5). The foam can expand along the cylinder while the pressure is being measured as stress over the pressure plate. The rise profile is measured by the proven ultrasonic fan-sensor PFT mounted on a stand.

The pressure plate is protected by a PE cling film in order to avoid any foam contamination. The compound of foam and the cardboard cylinder produce stress over the bottom of the cylinder. The pressure plate is connected to a load cell which transmits a signal to the controller unit of the FOAMAT® system. The pressure data is simultaneously recorded with the foam rise height (Fig. 3). The software FOAM processes all data and enables the user to display the rise profile and the rise pressure superimposed in one graph. After the test, the foam sample can easily be removed from the FPM 70 device by just loosening the clamp ring. The cardboard cylinder containing the foam sample is pulled off the lower part of the FPM 70. The foam sample can then be used for further tests.

FPM 70 has been specially designed for small foam samples of high density. Compared to other measurement containers like the **A**dvanced **T**est **C**ontainer (ATC) the foam volume has been reduced down to 15% (Fig. 4). Pressure as low as 40 Pa can be measured with high accuracy. From the pressure data, the gel time, the maximum pressure, the pressure decay and the remaining stress, can be evaluated. The remaining elastic stress is of main interest regarding sealing foams. It should be high to seal a gap properly.

Another advantage of the FPM 70 design is that the viscosity model of Hagen-Poisseuille can be applied. Having measured the rise height and the rise pressure, the viscosity of the expanding foam can be calculated by using simple physical principles (Fig. 2).

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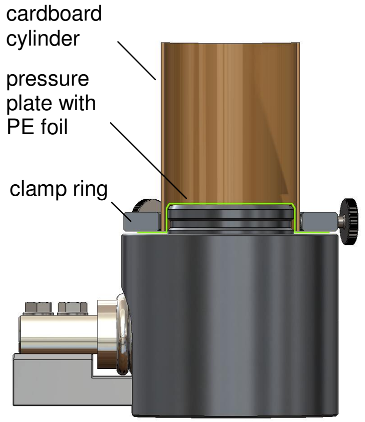

Fig. 5: Cross section of the new FPM 70, designed for the pressure measurement of high density foams.

- **Measurement of rise pressure, rise height and temperature**
- **Determination of gel point, max. pressure and elastic stress**
- **Heatable pressure plate**
- **Replaceable cardboard cylinders**

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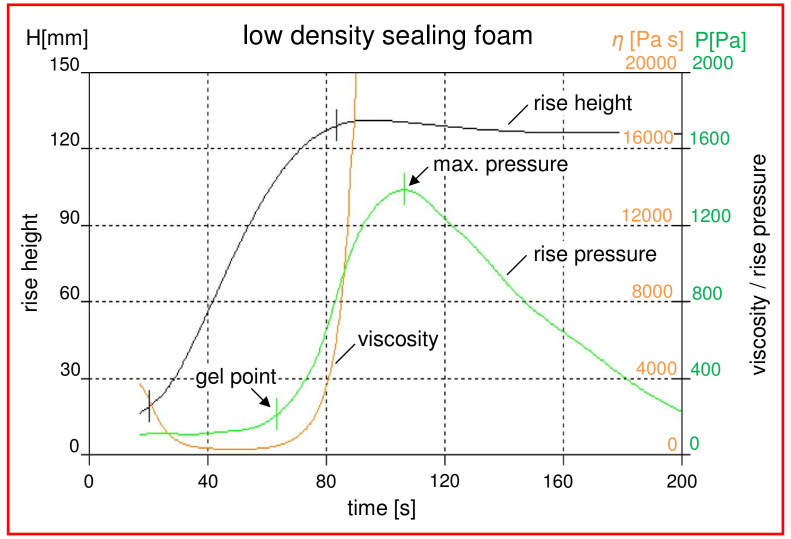

Fig. 2: Rise height, rise pressure and viscosity of a low density sealing foam measured with the FPM 70. The viscosity data is calculated by using the physical model of Hagen-Poisseuille.

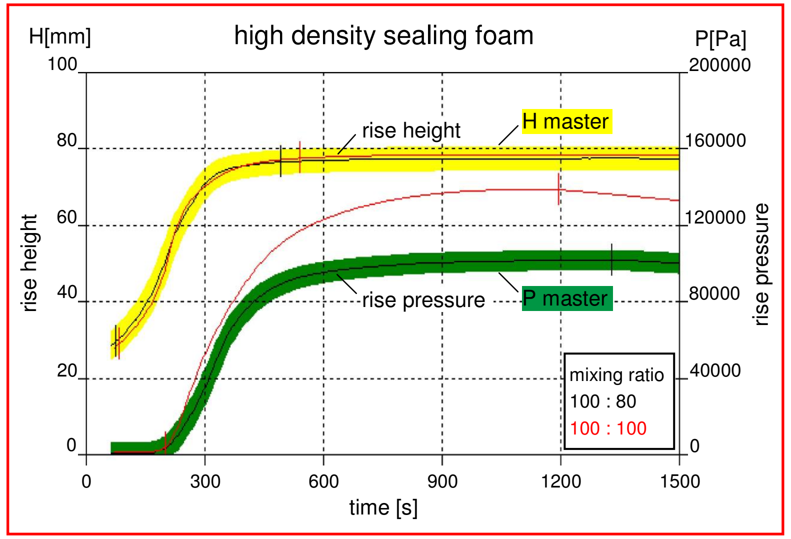

Fig. 3: Two rise height and rise pressure profiles of a high density sealing foam. The mixing ratio was changed from 100:80 to 100:100. The master curves can be adapted to acceptable QC margins.

Fig. 4: The new Foam Pressure Measurement Device FPM 70 compared to the Advanced Test Container ATC. The test volume is reduced down to 15%.