APPLICATION**SHEET**

Elastomers – GABOMETER®

Heat Build-Up Test – Flexometer Tests

Reproducibility – An Important Quality Feature for Heat Build-Up Tests

Dynamic heat build-up tests provide better understanding regarding thermal aging properties of the corresponding elastomers.

Of course, due to homogeneity fluctuations within different batches of test specimen, the most important requirement for a reliable flexometer is the reproducibility of the test results. Figure 1 shows such a reproducibility test.

Two test specimens (same batch – cylindrical samples for compression load) were tested at 30 Hz under identical static and dynamic load conditions. Both the heat build-up within the center of the sample (measurement was carried out with a needle thermocouple – option) and the temperature on the "skin" of the sample (corresponding to standard ASTM D 623, DIN 53 333 – recorded at the cross sectional area) are in a quite satisfying accordance.

Even the tanδ (material damping) measurements show excellent reproducibility.

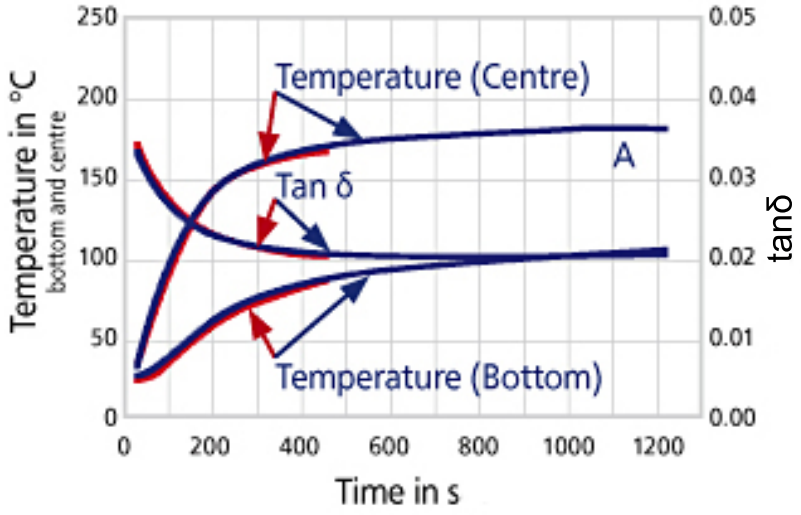

Fig. 1. Reproducibility test

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Practice-Related Tests – What is the Benefit of an Additional Temperature Sensor (Needle Thermocouple)?

Nowadays, heat build-up tests performed with Goodrich Flexometers are quite common.

With conventional flexometer tests, however, information due to resolution problems related to the basic test principle is occasionally lacking.

Figure 2 shows the temperature rise of samples A and B that is more or less identical for the bottom temperature. The bottom temperature sensor only records the temperature on the "skin" of the sample at the samples cross sectional area, but with this sensor, no information concerning the "real" temperature in the core of the samples is available.

Results from practical tests show that sample A has a longer life cycle compared to sample B. Unfortunately, the conventional heat build-up test did not reveal any difference.

Only with a second thermocouple – in this case the needle type sensor located in the center of the test specimen – will provide additional information. Now, the test results show a temperature difference of nearly 20°C between samples A and B.

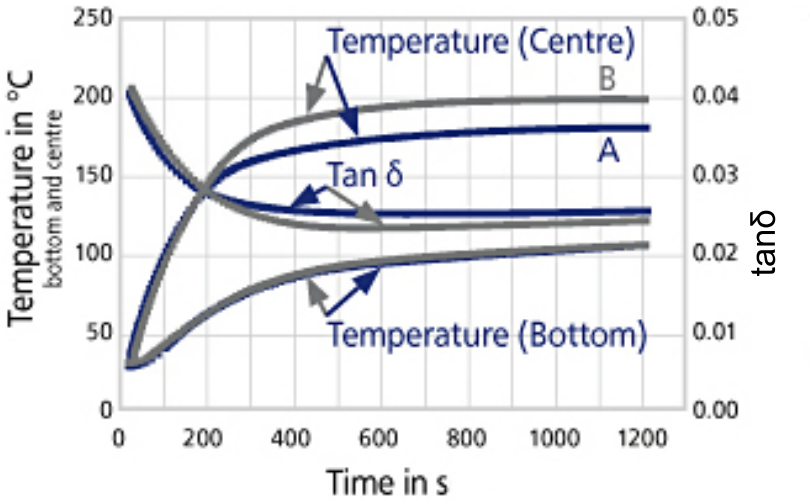

Fig. 2. Comparison of Compounds A and B

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Practice Related Tests – What Additional Information Can Be Observed by Recording tanδ?

Figure 3 shows an additional example for a heat build-up test. In this test, different basic compounds are compared. The materials are significantly different. Sample A shows a heat build-up which is about 20°C above the corresponding temperature rise of compound C.

Consequently, the damping properties (tanδ) of polymers are also quite different, as can be expected for different basic compounds.

Compound C shows a much lower damping value and thus, it is substantially more elastic than compound A. Therefore, compound C provides a much lower rolling resistance than compound A.

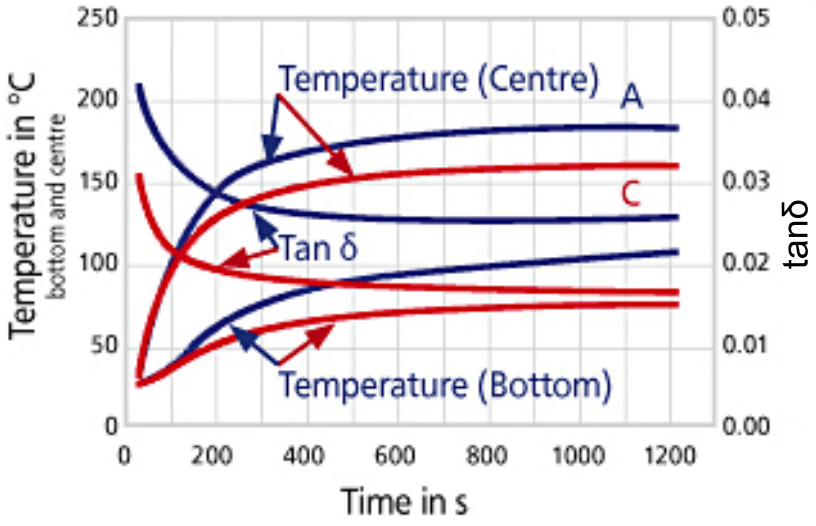

Fig. 3. Comparison of Compounds A and C

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