

APPLICATION SHEET

Elastomers – GABOMETER®

Blow Out Tests: Heat Build-Up and Blow Out – What is the Difference?

Heat Build-Up

The dynamic heat build-up test is widely-used in the tire industry. These special tests provide data about the thermal fatigue properties of the tested elastomers. Usually, cylindrical compression samples – with diameters from approx. 18 mm up to 30 mm and a height up to 30 mm – are loaded with a static force between 200 N and 1500 N. Additionally, a dynamic oscillation is superimposed. Oscillation amplitudes between ± 1 mm and ± 2.5 mm at a test frequency of 30 Hz are typical settings. The applied mechanic deformation energy superimposed with the oscillation converts directly into heat due to the inner friction within the sample. Consequently, the testing cylinders heat up significantly.

Blow Out

The so-called blow out tests extends this procedure. Static preloads increased again (up to 2 MPa) and definitely increased oscillation amplitudes (up to ± 3.5 mm, frequencies between 10 Hz and 100 Hz) characterize this kind of investigation.

What Kind of Results Provides a Blow Out Test?

Main objective is to analyze temperature limits where disintegrations and destructions, respectively, or even „explosions“ within the samples take place. Variations in the

recipes of the compounds shall reduce the temperature rise as well as the inner friction within the sample in order to increase the durability of the products.

Blow Out Test

The figure shows the result of two blow out investigations. The test results labelled “sample 2” (red curves) demonstrate the temperature rise and damping behavior ($\tan\delta$) as a function of time for the basic compound. After 16 minutes, the blow out temperature of 180°C was already reached under the selected testing conditions (static load 2 MPa, dynamic amplitude ± 3.2 mm at a test frequency of 30 Hz).

A modification of the recipes at an unchanged basic compound causes the requested improvements. The temperature increase (sample 1, blue) is clearly flat. The blow out temperature is obtained after only 19 minutes. The durability has increased.

The improvement could be realized by reduction of the inner friction. The test shows that the damping of the modified system drops really on a lower level. Due to the lower inner friction, the temperature increase is smaller as expected.

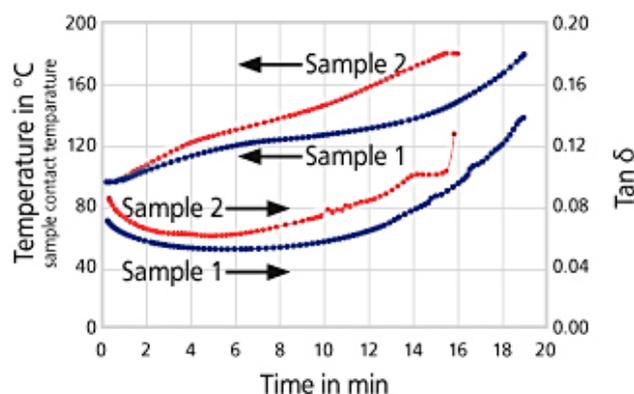


Figure: Typical Blow Out Test