

## Muffin Shelf Life Measurement by Hold Until Time

### TVT Texture Analyzer

The TVT Texture Analyzer (Figure 1) offers rapid and objective analysis for different products. The following parameters can be characterized for your product category:

- Firmness
- Springiness

Both international standard methods as well as customer tailor-made profiles are available.



Figure 1: TVT Texture Analyzer

### Scope

- Determination of firmness and springiness for Muffins by hold until time compression

### Method Description

The recording of the measurement data commences once the probe reaches the pre-set trigger force. The probe will then compress the sample to a pre-defined distance, and hold in that position during a pre-defined time. After the holding time, the probe returns to its starting position.

### Calibration

Make sure the instrument is correct calibrated before the measurements. How to perform the calibration can be found in the User's Manual.

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Load cell (recommended) 5 - 10 kg

#### Probe

P-CY18R, Cylinder probe 18 mm diameter, rounded edges, stainless steel (Figure 2)  
Part number: 67.30.18



Figure 2: P-CY18R

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## Profile settings

### Setting Parameter

Hold Until Time Compression

Sample height [mm]	25.0
Starting distance from sample [mm]	5.0
Compression [mm]	7.00
Hold time [s]	32
Data acquisition time [s]	30
Initial speed [mm/s]	2.0
Test speed [mm/s]	1.0
Retract speed [mm/s]	10.0
Trigger force [g]	5
Data rate [pps]	200

## Sample preparation

Store the packed muffins in double plastic (polyethylene) bags in room temperature until the testing. Texture measurements are performed at day 3, 7, 10 and 14 after baking for shelf life measurements. Use 6 muffins for every testing day. Cut off the sides, bottom and the top of the muffins to ensure the same size dimensions (25x25x25 mm) for each sample (Figure 3). This is preferably performed in a box with 25 mm high walls. Place the sample on the measuring table and center it below the probe, Figure 4. Work quickly, since contact with air dries out the bread and increases the firmness. If a sample is irregular avoid using it in the test.

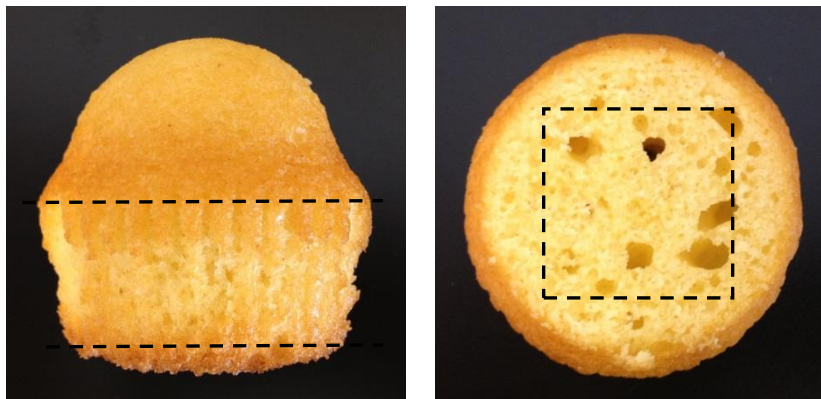


Figure 3: Muffin preparation

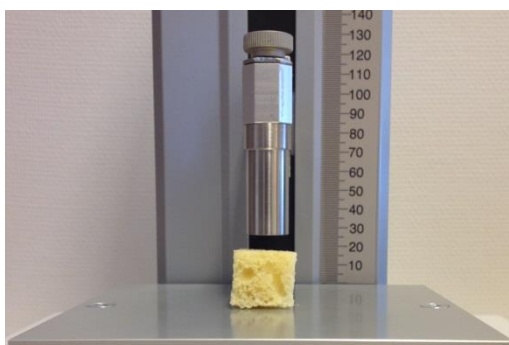


Figure 4: Sample set-up

## Curve Description

In Figure 4 a Force-Time curve is illustrated. The firmness of the crumb is taken at a distance of 6.25 mm and is here called Force X. The maximum force is here called Force A while the force required after 30 s holding time is called Force B. Force B is used for calculating the springiness.

$$\frac{\text{Force B}}{\text{Force A}} \times 100 = \% \text{ Springiness}$$

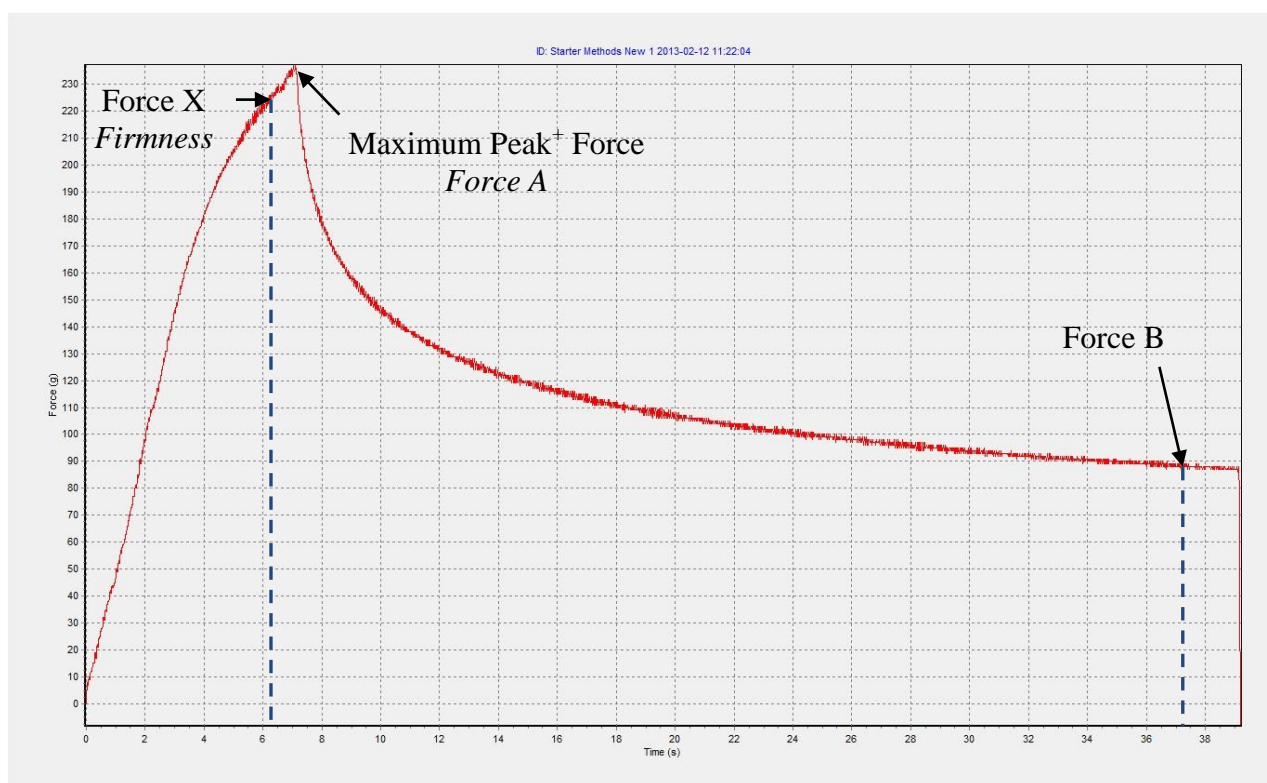


Figure 4: Hold until time measurement of muffin, AIB Standard Procedure.

## Data Analysis

The force required to compress the sample to a certain distance is here defined as firmness. All force values can be measured in the units [g] or [N]. Springiness is given as a percentage [%] value. Except raw data (force, time and distance) the program also directly provides calculated results such as *mean value* and *standard deviation*.