

Chocolate Hardness, by Penetration

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:

- Hardness
- Consistency
- Stickiness

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



Figure 1: TVT Texture Analyzer

Scope

- Determination of hardness of chocolate by single cycle penetration test.

Method Description

The recording of the measurement data commences once the probe reaches the pre-set trigger force. The probe will then penetrate the sample to a pre-defined distance. After penetration, 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.

Load cell (recommended) 10 kg

Probe

P-CY02S, Cylinder probe 2 mm diameter, stainless steel (Figure 2)

Part number: 67.30.02

Rig (optional but recommended)

R-HDS, Heavy Duty Stand, part number: 67.50.80

RA-HDSSI, Standard Insert, part number:67.50.88



Figure 2: P-CY02S

Profile settings

Setting Parameter

Single cycle compression

Sample height [mm]	8.0
Starting distance from sample [mm]	5.0
Compression [mm]	2.00
Initial speed [mm/s]	0.5
Test speed [mm/s]	0.5
Retract speed [mm/s]	10.0
Trigger force [g]	5
Data rate [pps]	500

Sample preparation

Let the samples equilibrate in a temperature controlled storage place and take them out just before testing and place under the probe, Figure 3. Depending on the temperature chosen, it could be necessary to work quickly, since the room temperature can have an effect on the sample.

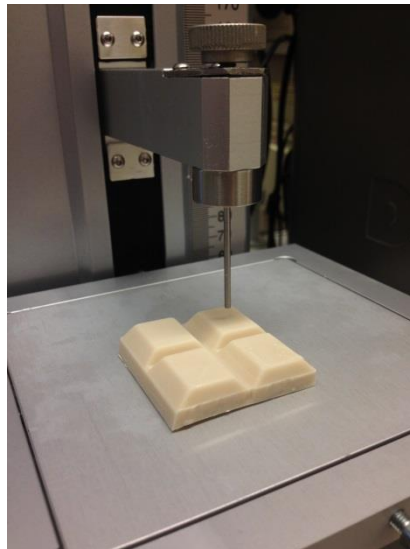


Figure 3: Sample set-up

Curve Description

In Figure 4 typical Force-Time curves are illustrated. Maximum peak⁺ force is here defined as the hardness of the sample, while the area is the total work of penetration. It is here clearly shown that the curve changes its slope when the probe have penetrated the surface of the chocolate. In this graph, not only the maximum hardness can be of interest but also the slopes and the surface hardness. The three graphs are different baking chocolates, two white from different brands and one bright from one of the brands.

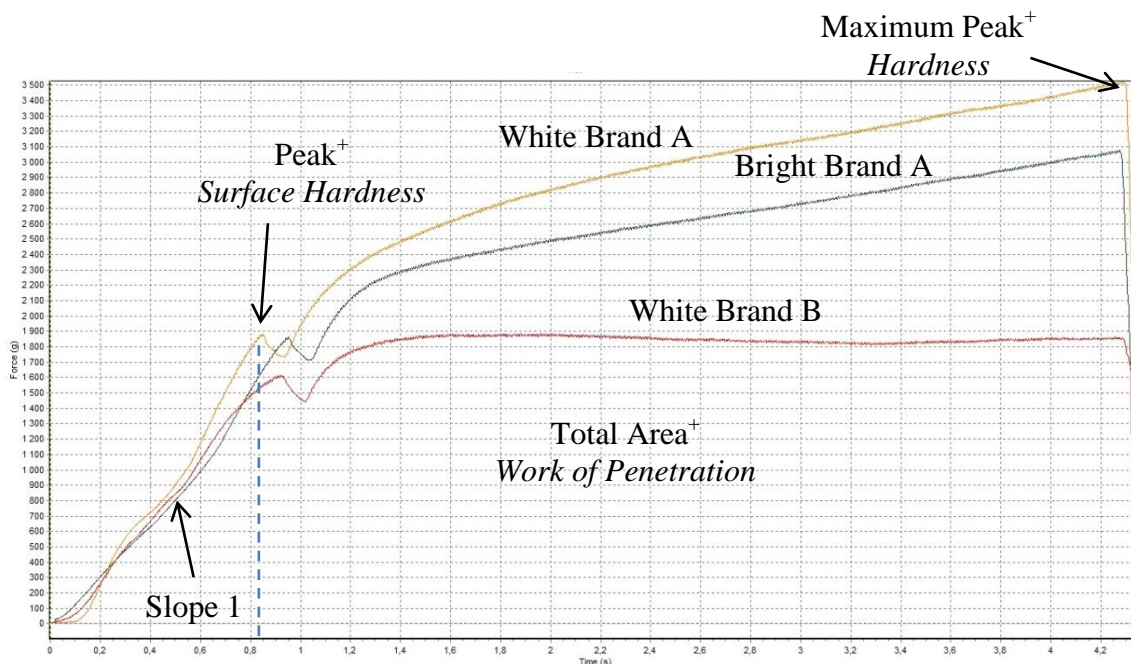


Figure 4: Penetration test of white and bright baking chocolate of different brands

Data Analysis

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