

Production: CARMEL

Objective: Measurement of hardness, stickiness and stringiness properties of caramel using a 0.75" spherical probe

Type of action: Penetration test

Test mode settings:

Speed	Test mode	Trigger	Target	Hold
5 mm/s	Distance (c)	5 gf	2 mm	0 sec

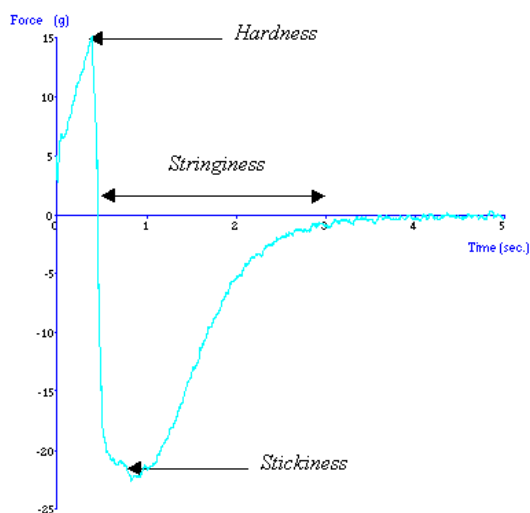
Accessory:

φ20 mm spherical probe, Platform

Test Set-Up:

The samples were equilibrated at 29C prior to testing. Each sample container was positioned centrally under the probe in turn. The probe was moved up as far as possible, to enable a maximum distance on probe return (allowing for a very stringy product to be tested correctly).

Typical plots:



The above curve was produced from a test carried out in the original sample container at 29C.

Observations:

Once a trigger force of 5g has been detected on the surface of the sample the probe then proceeds to penetrate the caramel to a distance of 2mm. After the probe has reached this distance it withdraws at 10.0mm/s to its start position above the caramels' surface. The magnitude of the absolute positive value corresponds to the 'hardness'. The larger the maximum positive force the harder is the sample. The maximum negative force relates to the 'stickiness'. The more negative the force the stickier is the sample. The distance at which the sample separates from the probe is indicative of the 'stringiness'. The greater this distance the stringier is the sample.

Data Analysis:☒ Max Force☒ Min Force**Results**

Sample	Mean Max. +ve Force 'Hardness' (+/- S.D.) (g)	Mean Max. -ve Force 'Stickiness' (+/- S.D.) (g)	Mean Distance to Separation 'Stringiness' (+/- S.D.) (mm)
A	15.9 +/- 0.8	-23.7 +/- 1.3	24.1 +/- 2.3

Notes:

- It may be necessary to modify the test to penetrate to a lesser/greater depth into the sample. This will subsequently decrease/increase the 'Hardness' values. Any values obtained are only relative at the specified distance to which they are penetrated.
- Storage, packaging and handling of the sample before testing are considered variable conditions under which the sample is tested. It is important to identify these conditions and keep them constant when reporting results of firmness tests for comparison purposes.
- When attempting to optimize test settings it is suggested that the first tests are performed on the hardest samples to anticipate the maximum testing range required and ensure that the force capacity allows testing of all future samples.