Production: CHEWY CONFECTIONERY

Objective: Measurement of the hardness and stickiness of chewy confectionery by penetration

Type of action: Penetration test

Test setting:

Speed	Test mode	Trigger	Target	Hold
2 mm/s	Distance (c)	20 gf	2 mm	0 sec

Accessory:

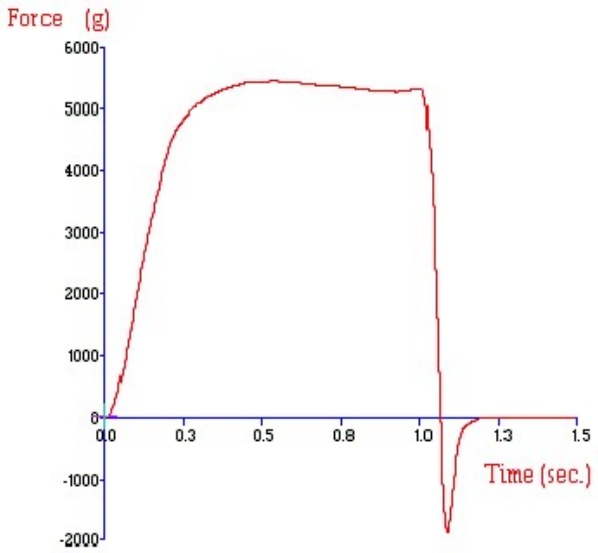
ϕ6 mm cylinder probe, Platform

Sample Preparation:
Allow the samples to equilibrate at a controlled temperature e.g. 20C, then remove from place of storage just prior to testing.

Test Set-Up:
Secure the Heavy Duty Platform on to the machine base. Place the sample on the blank plate of the Heavy Duty Platform and position centrally under the probe. Place a holed plate on top of the sample, leaving only the test region exposed. Move the probe down to ensure that there is good clearance around the probe and the holed plate. Commence the penetration test.

NOTE: A confectionery holder may be used as an alternative to the holed plate. If using the holed plate one should hold the plate down firmly when the probe withdraws from the sample to avoid erroneous results.

Typical plots:



The above curve was produce from a piece of chewy confectionery (25mm x 25mm x 10mm), tested at 20C.

Observations:
Once the probe triggers on the surface it then proceeds to penetrate to a depth of 2mm within the sample. At this point the force value is recorded and taken as a measure of 'hardness' of the sample. The probe then withdraws from the sample at which point the maximum force to withdraw or 'stickiness' is recorded. The curvature of the plot appears to indicate flow of the sample as the probe is penetrating to the required depth. An increase in hardness of the sample would give an increase in the relative force values with an anticipated change in curvature as flow (or 'chewiness') decreases.

Data Analysis:

☒Max Force

☒Min Force

Results

Sample	Mean Maximum +ve Force 'Hardness' (+/- S.D.) (g)	Mean Maximum -ve Force 'Stickiness' (+/- S.D.) (g)
A	5620.6 +/- 243.3	-1956.8 +/- 196.6

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.
- If hardness were to increase considerably it is likely that this would decrease flow properties ("chewiness") significantly and may be replaced by a brittleness property, whereby the sample would be seen to fracture under compressive force.
- 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 optimise 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.