

Production: BISCUITS/COOKIES

Objective: Measurement of the hardness and resistance of biscuits/cookies to bend or snap

Type of action: Bending

Test setting:

Speed	Test mode	Trigger	Target	Hold
3 mm/s	Distance (c)	50 gf	5 mm	0 sec

Accessory:

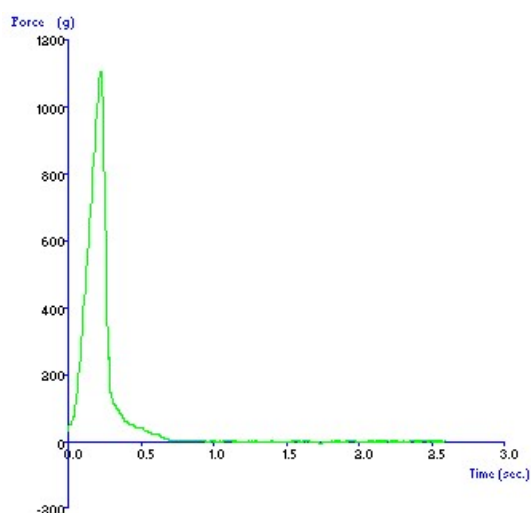
Three-point bending rig, Platform

Sample Preparation:

Test Set-Up:

The two adjustable supports of the rig base plate are placed a suitable distance apart so as to support the sample e.g. 40mm. For comparison purposes this gap distance should be noted and kept constant. The base plate is then secured onto the Heavy Duty Platform. The Heavy Duty Platform is manoeuvred and locked in a position that enables the upper blade to be equidistant from the two lower supports. The sample is removed from its place of storage and is placed centrally over the supports just prior to testing.

Typical plots:



The above curve was produced from a plain dough biscuit, tested at 20C.

Observations:

Once the trigger force is attained the force is seen to increase until such time as the biscuit/cookie fractures and falls into two pieces. This is observed as the maximum force and can be referred to as the 'hardness' of the sample. The distance at the point of break is the resistance of the sample to bend and so relates to the 'fracturability' of the sample i.e. a sample that breaks at a very short distance has a high fracturability.

Data Analysis:

- ☒ Max Force
- ☒ Peak Distance

Results

Sample	Mean Max. Force 'Hardness' (+/- S.D.) (g)	Mean Distance at Break 'Fracturability' (+/- S.D.) (mm)
A	1150.3 +/- 130.4	0.68 +/- 0.7

Notes:

- The Noise emitted during this test can be measured and analysed using an Acoustic Envelope Detector.
- In some varieties of biscuits/cookies the uppermost surface may be quite variable due to inclusions such as chocolate chips. The trigger force may need to be increased slightly to avoid early triggering.
- When comparing biscuits/cookies consideration should be taken that the diameters of the samples and the distance between the supports are identical. A sample of larger diameter (and hence larger contact area) will require more force to fracture. Similarly a larger force would be required to fracture the samples if the lower support blades were moved closer together.
- If the sample has a pattern/writing on the surface it should always be orientated in the same direction for each test.
- Inclusions may also interfere with the fracturability and indeed may serve to strengthen the structure of the biscuit/cookie if in the line of the blade. Also, the structure of the cookie i.e. the presence of large air pockets may cause large fluctuations in the force. It is for these reasons that the variation of test results may appear to be quite high.
- Storage, packaging and handling of the sample before testing are considered variable conditions under which the biscuits are tested. These conditions should be identified and kept constant 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.