

Production: BREAD

Objective: Determination of bread firmness using the AACC (74-09) Standard method

Type of action: Penetration test

Test mode settings:

Speed	Test mode	Trigger	Target	Hold
1.7 mm/s	Strain (c)	5 gf	25%	0 sec

Accessory:

φ36 mm cylinder probe, Platform

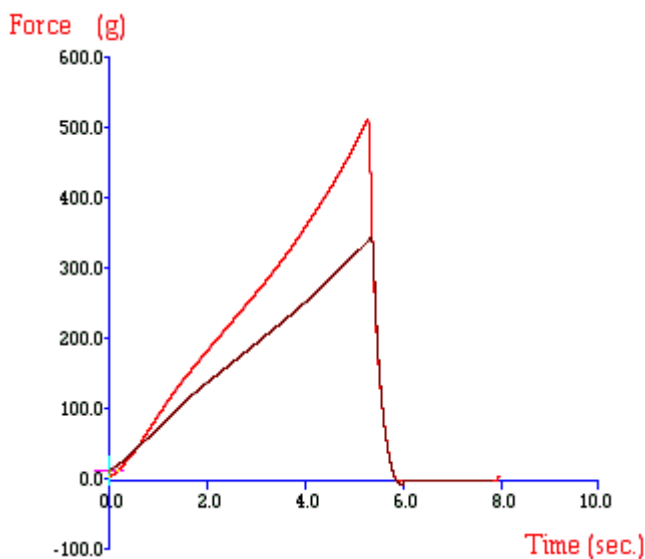
Sample Preparation:

Slice the loaves either mechanically or by hand into equal slice thickness' e.g. 25mm or 12.5mm thick. For 12.5mm (0.5inch) thick slices two slices should be stacked together for each test, discarding two or three end slices and end crust slices of loaf. For 25mm (1 inch) thick slices one slice for each test sample is used and the end crust slices of the loaves should be discarded.

Test Set-Up:

Place the sample centrally under the cylinder probe, avoiding any irregular or non-representative areas of crumb. Commence the test.

Typical plots:



The above curves were produced from testing two different brands of fresh white pan bread slices (25mm thick).

Observations:

The above plot illustrates a Force-Time (or Distance) curve which shows the characteristics of a bread firmness test. Once the trigger force is attained, the probe proceeds to compress the sample until it has compressed it by 40% of the product height. It then withdraws from the sample and returns to its starting position.

Firmness is defined in this method as the force (in grams, kilograms or Newtons) required to compress the product by a pre-set distance (i.e. force taken at 25% compression of 25mm) (AACC, 1983). A 25% compression of 25mm thick sample = 6.25mm compression distance at which point the compression force value (CFV) is taken. Units displayed can be converted automatically according to requirements and are not restricted to the units used during the test. Examples of the use of this type of test is in the determination of firmness of bread samples according to storage time or the effect of change in flour type. Clearly sample B is firmer than sample A.

Data Analysis:**Results**

Sample	Mean Compression Force 'Firmness' (+/- S.D.) (g)
A	214.1 +/- 9.5
B	337.7 +/- 15.2

Notes:

- Storage, packaging, and handling of sample before testing with the texture analyzer are considered parts of variable conditions under which bread is tested, not parts of standard testing procedures. However, it is important to identify these conditions when reporting results of firmness tests. Within any given laboratory, they must be kept constant for comparison purposes.
- Cutting crust off the bread immediately before the compression test is also considered a variable testing procedure. For "typical" pan bread, the crust does not interfere with compression by a 36mm diameter probe. However, if a larger probe or a different type of bread is used so that the crust does resist compression, the crust may be removed from the bread sample before testing.
- Stress can be measured as an alternative to plotting force by ensuring that the surface area of the probe is inserted into the correct box in the run a test window.
- 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.
- This method is applicable directly to research and quality control evaluation of white pan breads. The principle (or method) may also be used to study other loaf types and similar products, such as cakes, although sample preparation may need to be adjusted appropriately.

References:

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