



# SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)



COIMBATORE - 641035

TAMIL NADU

## UNIT -II BAKERY MACHINERY AND EQUIPMENTS

### What is an Alveograph?

An alveograph is a rheological tool used to assess the baking performance of flours used in baked products (bread, noodles, tortillas, biscuits, etc.). It is based on injecting air into a thinly stretched sheet of dough to form a bubble, simulating gas/carbon dioxide release and retention during dough fermentation and oven spring during baking.

Bakers use alveograph data to gain understanding of fluctuations in dough rheological changes by assessing:

- Tenacity
- Elasticity
- Baking strength
- Resistance of dough to deformation
- Extensibility

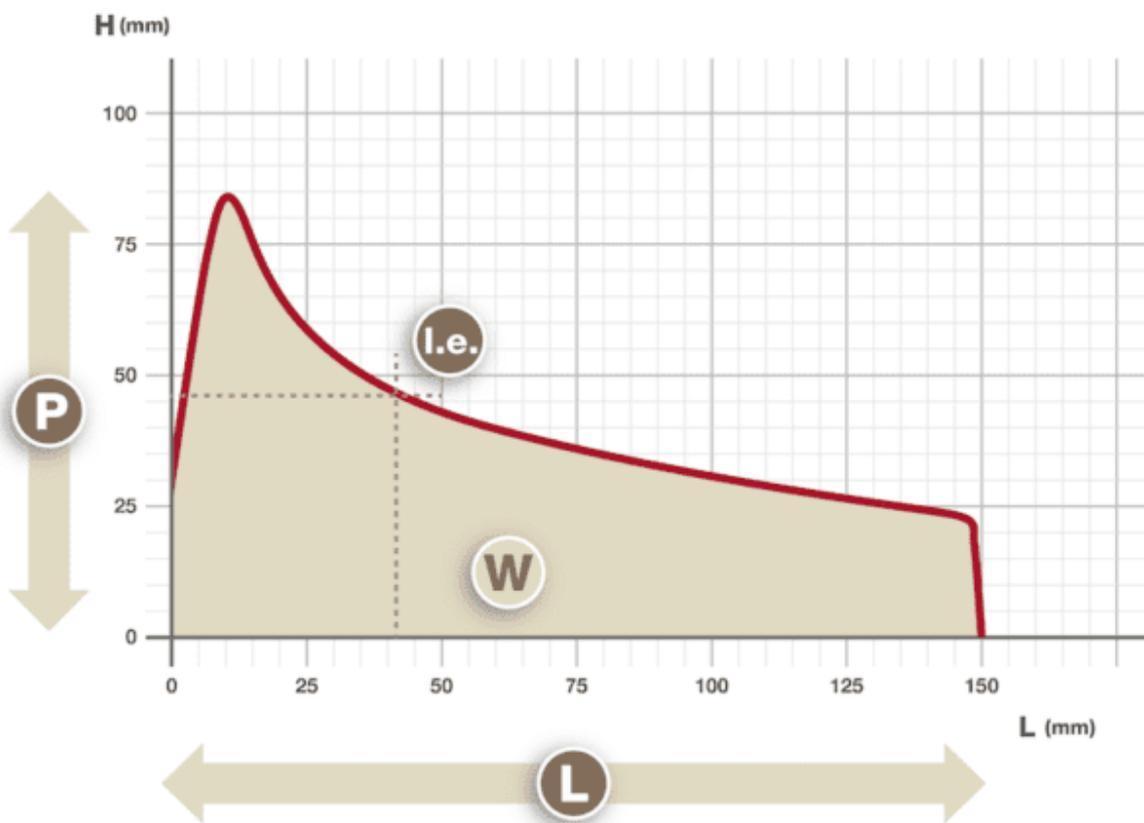
### How does it work?

The test is done with the following steps:

1. Prepare 250 g of flour and a sodium chloride solution (2.5% weight/volume). On the constant hydration method, the volume of water required to hydrate the flour to a predetermined value is adjusted according to the moisture content of the sample. An adapted hydration protocol (based on actual four water absorption capacity) is available.
2. Mix and knead in a chamber for about 8 minutes to form a dough of proper rheology and consistency.
3. Extrude the dough. This step aligns the gluten network and is very important to create repeatable and reproducible bubbles.
4. Divide the extruded dough into five equal parts. Then, they are sheeted with a roll to obtain a fixed thickness (12 mm), followed by dough resting.
5. Cut the dough sheets into discs using a die, and proof in an isothermal (temperature-controlled) box.
6. Automatically inflate the dough disc by injecting air at constant pressure and flow rate until the resulting bubble bursts. Record the pressure inside the bubble and time it takes for the bubble to burst.
7. Perform the test on the 5 individual patties, and average the pressure/time parameters.

### Parameters measured by the alveograph test:

- P (y-axis): Maximum pressure required for the deformation of the sample or overpressure. P-value is graphically seen as the height of the peak and is related to the resistance of the dough to deformation (tenacity).
- L (x-axis): Maximum amount of air the bubble is able to contain. L-value is graphically seen as the length of the alveograph curve or distance at which the bubble ruptures, an indication of dough extensibility.
- Elasticity Index (Ie): Compares pressure after 200 mL volume of air has been blown into the dough test piece or bubble versus the maximum pressure (P).
- W: Indicates dough baking strength. W-value is graphically seen as the total area of the alveograph curve or total deformation energy. It represents the energy required to expand the dough and is related to flour strength. 'W' is generally much larger for hard wheat flours than for soft wheat flours.
- P/L ratio: is the quotient of the pressure required for deformation and the maximum amount of air that the bubble is capable of containing. It represents the balance of the elastic and viscous components of the dough.
- Swelling index (G): is the square root of the volume of air required to rupture the dough.



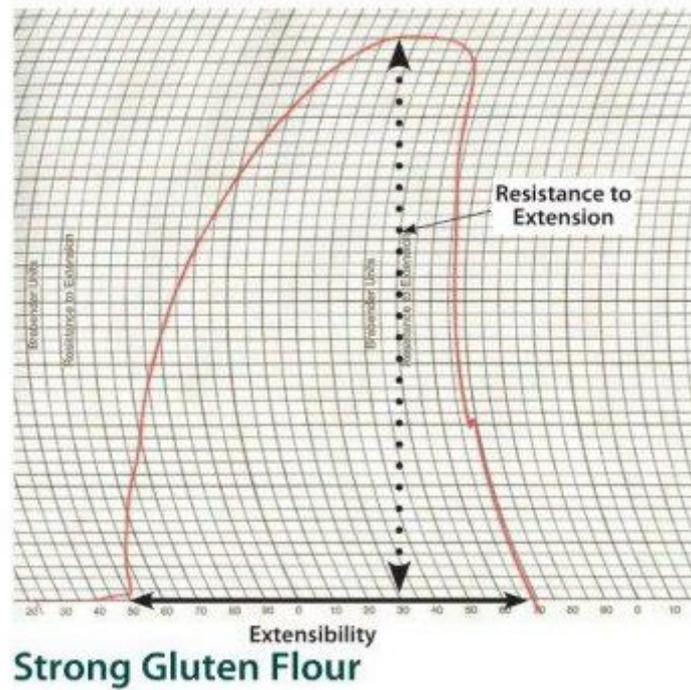
### What is an Extensograph?

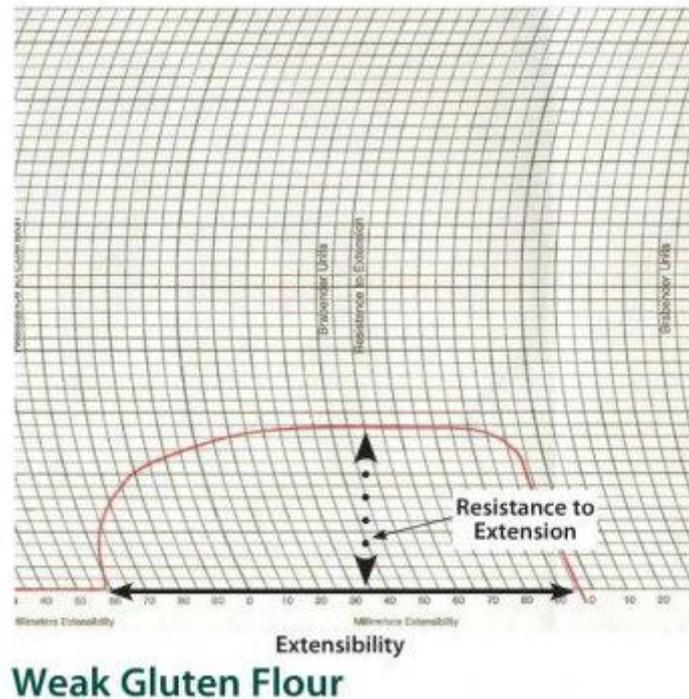
An extensograph is a tool used for measuring the flour quality and stretching behavior of dough. Extensional properties, which determine the course of dough expansion during proofing and baking, have a direct effect on:

- Loaf volume
- Quality of texture of bread crumb

### Function

Information on the extensional properties of bread dough is read directly from the diagram of the extensograph curve, also referred to as the extensogram. The extensogram represents changes in resistance, also called the strength, of the dough to extension (R) as a function of the extension distance (E).





*Resistance to Extension* (R) is indicated by the maximum height of the curve and measured in centimeters, Brabender units (BU), or Extensograph units (EU).

*Extensibility* (E) is indicated by the length of the curve. It is measured in millimeters or centimeters.

*R/E Ratio* indicates the balance between dough strength (R) and the extent to which the dough can stretch before breaking (E).

*Area Under the Curve* is a combination of resistance and extensibility. It is expressed in square centimeters.

## Process

A sample of flour- water-salt dough pieces of constant weight and of the appropriate water absorption are prepared using the Farinograph.<sup>3</sup> The Farinograph measures flour- water absorption and dough strength.

The dough piece is rounded and molded into a cylinder under constant conditions. Each piece is then pegged into a cradle and allowed to rest at a controlled temperature. The piece is extruded by a hook which travels downwards at a constant rate. The load on the dough piece is recorded and the extensograph curve is obtained.