

Glutomatic System

2200



Wheat



Flour



Bread



Pasta

Measure Gluten Quantity and Quality



Gluten Index:
AACC/No. 38-12.02
ICC/No. 155 & 158
Wet Gluten Content:
ICC/No. 137/1
ISO 21415

Perlen
INSTRUMENTS

Gluten

Gluten is the functional component of wheat protein. Its properties determine dough characteristics and influence end product quality. The Gluten quantity and quality affect the dough elasticity, gas retention, expansion properties and will largely influence the final baking quality. Furthermore, the ability to form a non-sticky dough, to maintain the desired dough firmness and to achieve constant pasta cooking characteristics are all influenced by the gluten properties. The Glutomatic test measures Gluten Index characterising the gluten strength as well as wet gluten content, dry gluten content and gluten water binding.



Perten Instruments' Gluten Index method is the world standard test for gluten quality and quantity in flour, wheat, durum and semolina. The method is also used for quality control during vital wheat gluten production.

Glutomatic System

Glutomatic 2200: Dual chamber system.

Centrifuge 2015: Regulated, high speed centrifuge with locking safety lid. Two test cassettes for Gluten Index determination are included.

Glutork 2020: Dries gluten completely under standardized, repeatable conditions.



Features & Benefits

Versatile Method: Measures both ground grain and flour at breeders, grain traders, flour mills and flour users, dry gluten manufacturers, pasta manufacturers and bakeries.

Segregation: Identify and separate high quality grain and flour to maximize its value.

Easy Sample Preparation: No sample conditioning or chemicals required.

Rapid Analysis: A complete test takes less than 10 minutes.

Robust Instrument Design: For use at silos or other grain intake areas in difficult environments.

Easy to Use: Automated, easy to handle instrument confidently used by non-technical operators.

Comparable Results: Glutomatic results and values are included in wheat reports worldwide.

Official Approvals: AACC/No. 38-12, ICC/No. 137/1, 155 & 158, ISO 21415.

Recommended Accessories

Laboratory Mill 3100 or 120: For rapid and convenient grinding of whole wheat to wheat meal.



Specifications

Power Requirements: 115 or 230 V, 50 or 60 Hz (specify on order).

Power Consumption: Glutomatic 2200: 185 W Centrifuge 2015: 90 W, Glutork 2020: 840 W.

Dimensions (HxDxW): Glutomatic 2200 (330x350x320mm), Centrifuge 2015 (220x265x165mm), Glutork 2020 (190x250x100mm).

Weight: Glutomatic 2200: 24 kg, Centrifuge 2015: 9 kg, Glutork 2020: 2 kg.

Parameters: Gluten Index, Wet Gluten Content, Dry Gluten Content and Water Binding.

Products: Wheat meal, wheat flour, durum, semolina and vital wheat gluten.

Gluten Index

Application & Method



Wheat & Flour



Dough



Bread



Pasta

Measure Gluten Quantity and Quality



Gluten Index:
AACC/No. 38-12.02
ICC/No. 155 & 158
Gluten Content:
ICC/No. 137/1
ISO 21415-2 & -4

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INSTRUMENTS

The World Standard Method



In many world markets, wheat and flour quality is often based upon protein content. While total protein content is very important, it is only part of the information required to determine suitable wheat and flour usage. Many situations require additional information about the functional properties and quality of the protein to predict dough and baking properties.

Gluten

Gluten is the functional component of protein and determines many dough and processing characteristics of wheat and wheat flour. Protein content is a purely quantitative analysis that may or may not be indicative of protein quality. While gluten content and protein content are correlated, there are situations during which protein content will not be indicative of quality. These situations include:

- Variable Growing Conditions
- Yearly Growing Variation
- Wheat Varietal Variation
- Wheat or Flour Blends
- Heat Damage
- Bug Damage
- Enzymatic Addition

It is under these conditions when the reported protein content is not indicative of quality that another set of tests is required. The Glutomatic system is designed to measure protein quality for the following parameters:

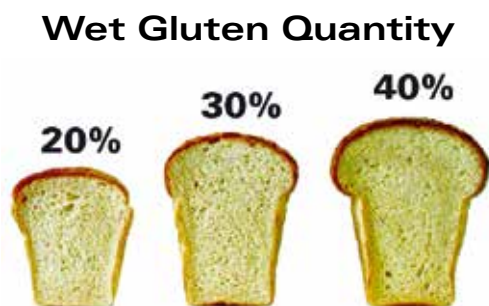
- Wet Gluten Content
- Dry Gluten Content
- Water Binding of Gluten
- Gluten strength by Gluten Index

The Glutomatic System Uses

The Glutomatic System helps users identify wheat and flour with the properties necessary for particular products. Most breads and pastas require high protein content with strong gluten. Cakes, crackers and pastries require weaker gluten to produce high quality end products.

The Glutomatic System is rapid, easy to use, and the results are easy to interpret. The test can be performed at silos, by grain traders, flour millers, bakers, pasta producers and any other flour users. By setting a Gluten Index specification on incoming materials, one of the more important properties can become more consistent. Gluten quality does not only effect end-product quality, but plays an important role in processing.

The Glutomatic Method provides a way for users to measure many gluten properties in one test. The Gluten Index method is the only method to determine gluten quality without first extracting flour. The method is suitable for both wheat meal and flour.



Calculation

$$\text{Gluten Index (GI)} = \frac{\text{Wet Gluten remained on sieve (g)}}{\text{Total Wet Gluten (g)}} \times 100$$

$$\text{Wet Gluten Content (WGC)} = \text{Total Wet Gluten (g)} \times 10$$

$$\text{Dry Gluten Content (DGC)} = \text{Dry Gluten Weight (g)} \times 10$$

$$\text{Water Binding in Wet Gluten (WB)} = \text{WGC} - \text{DGC}$$



The Gluten Index Method

The World Standard Test for
— ICC Standard No. 155 and 158, A

Definition: The Gluten Index is defined as the percentage of wet gluten which remains on a special sieve when prepared and centrifuged according to the prescribed standardized method.

1. Weighing

10.0 g \pm 0.01 g of whole meal or flour is weighed and put into the Glutomatic wash chamber with an 88 micron polyester sieve. When vital wheat gluten is measured, 1.5 \pm 0.01 g is weighed.

2. Dispensing

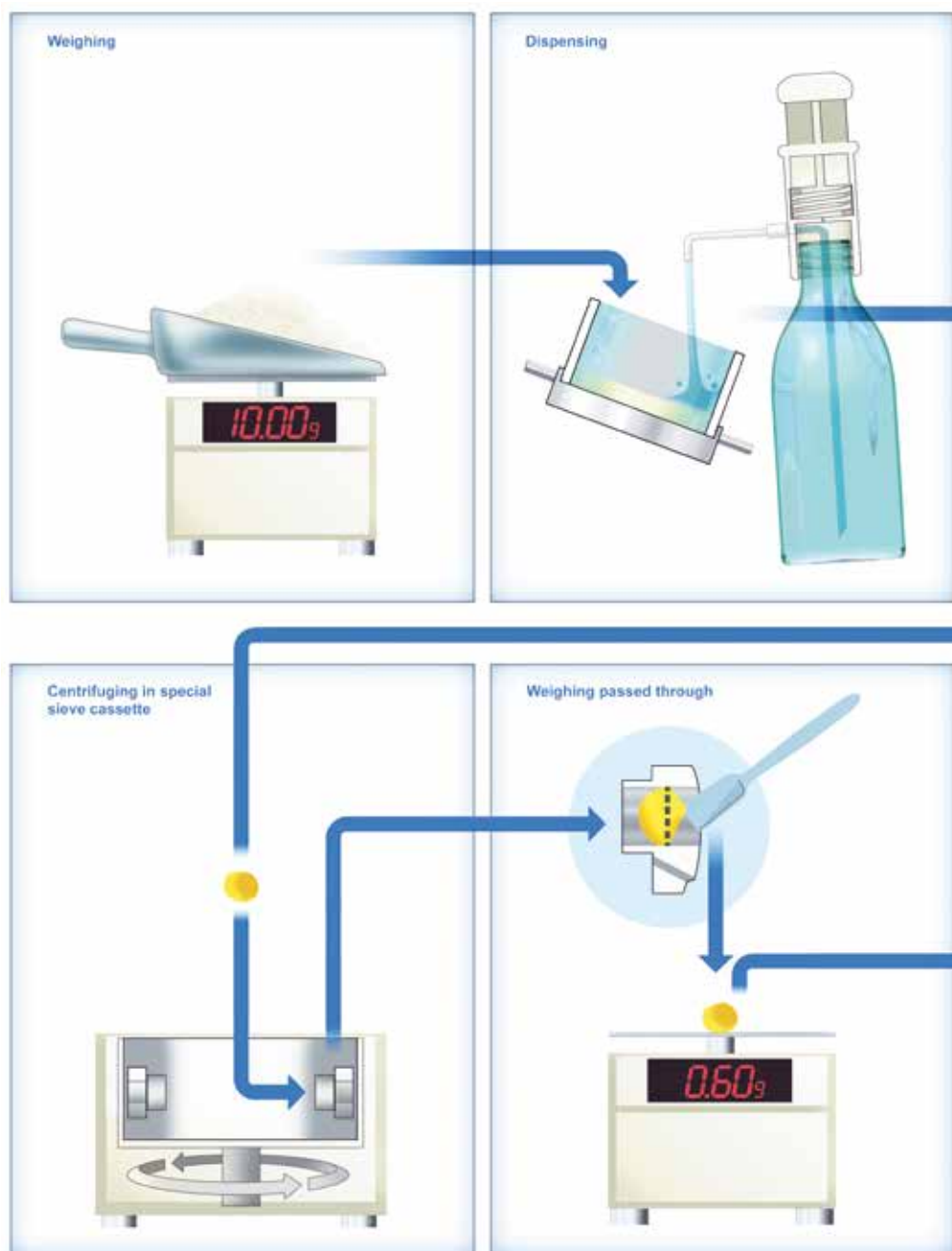
4.8 ml of salt solution is added to the meal or flour samples. No salt solution is added to vital wheat gluten samples.

3. Mixing

Meal or flour and the salt solution are mixed to form a dough during 20 seconds.

4. Washing

After termination of the mixing phase, the washing automatically starts and continues for five minutes. For wheat meal the sample is transferred to a chamber equipped with a coarse 840 micron sieve allowing bran particles to be washed out.



d by Perten Instruments

Gluten Quality and Quantity
ACC Method No. 38-12, ISO 21415



Principle: Wet Gluten is prepared from whole meal or flour by the Glutomatic 2200 gluten washer. Gluten Index Centrifuge 2015 is used to force the wet gluten through a specially designed sieve cassette. The relative amount of gluten passing through the sieve indicates the gluten characteristics. The wet gluten is further dried in the Glutork 2020 for dry gluten content and water binding in the wet gluten calculation.

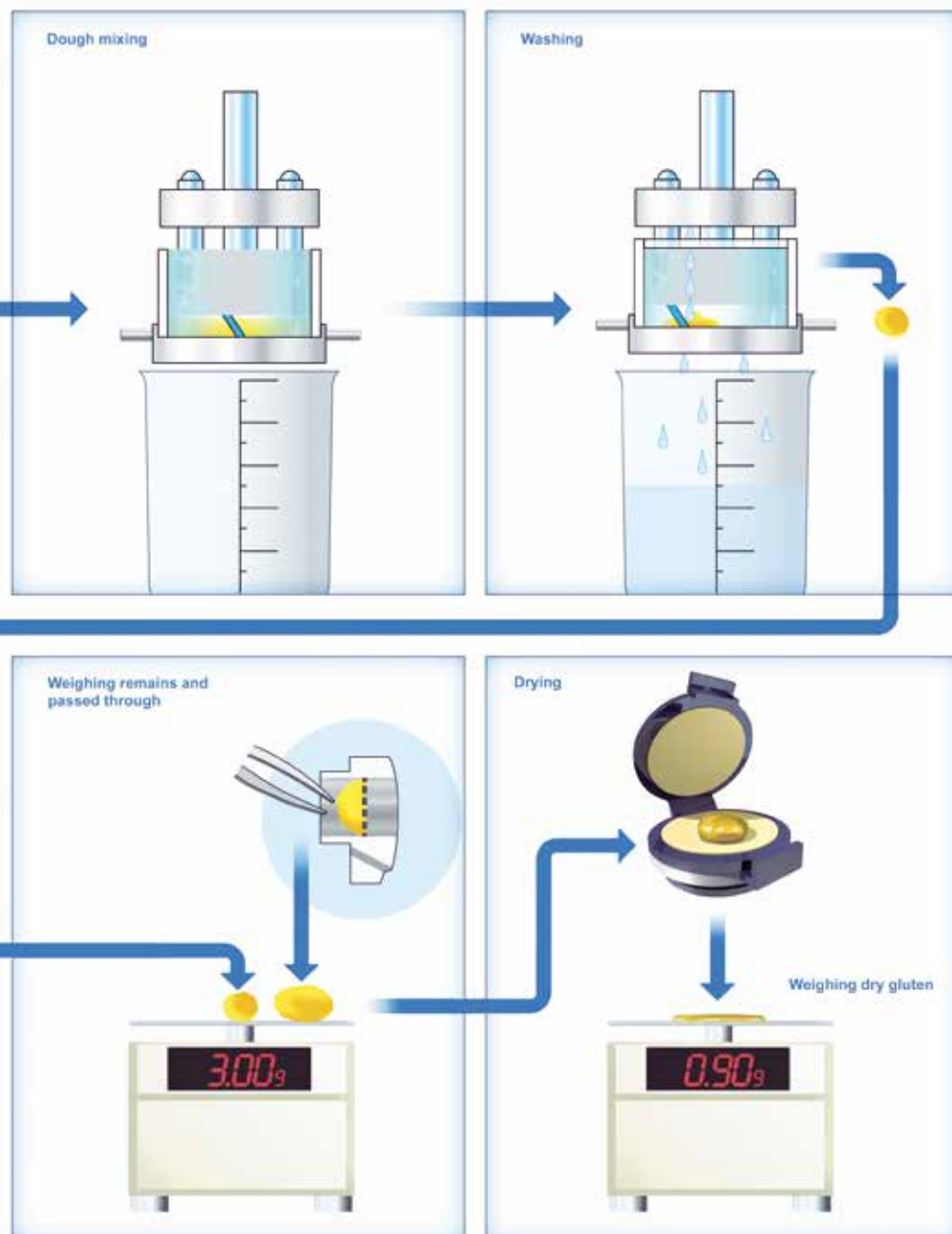


Illustration: Gluten Index Method

5. Centrifuging

The undivided wet gluten piece is transferred to the special sieve cassette and exactly 30 seconds after completed washing it is centrifuged one minute at 6000 ± 5 rpm in Centrifuge 2015.

6. Weighing

The fraction passed through the sieves is scraped off with a spatula and weighed. The fraction remaining on the inside of the sieve is collected and added to the balance. The total wet gluten weight is obtained.

7. Drying

The total wet gluten piece is dried at min. 150°C during four minutes in the Glutork 2020. After drying the gluten is weighed on the balance.

8. Calculation

The amount of gluten remaining on the centrifuge sieve in relation to total wet gluten weight is the Gluten Index.

Benefits of the Gluten Index Test



The Glutomatic system provides important information of gluten properties. It is a valuable tool for breeders, grain traders/handlers, flour mills, bakeries, pasta producers

and vital wheat gluten manufacturers.

Breeding

By measuring the functional properties of protein at an early stage - without having to extract flour - breeders can select the appropriate wheat classes for further breeding and refinement.

Grain Trading and Handling

The ease of use and the speed of the method enable the user to classify the incoming wheat based on gluten quantity and quality, essential for maximizing trade margins and supplying products suitable for varying end-use purposes.

Flour Milling

Millers can blend flour to meet end-user demands while not selling high quality product at a low price thereby improving operating margins.

With the Gluten Index, the Wet Gluten Content and the Falling Number analysis results available, millers can quickly predict the final baking quality, reducing the requirement for test baking.

Baking

The gluten properties and structure are important to:

- Form elastic dough
- Retain gas during fermentation and baking
- Allow expansion
- Carry expansion
- Retain the shape of loaf

As baking quality is both related to starch and protein characteristics, a combination of the results from the Falling Number and Glutomatic tests can be used to predict the baking quality.

With the Gluten quality and quantity information at hand, bakeries are able to use the most cost effective grade of flour while still meeting end user quality. Maximizing the use of high quality flour and minimizing addition of expensive vital gluten results in substantial savings.

Durum and Pasta

The Gluten Index is reported worldwide in crop reports as an important quality indicator.

During pasta manufacturing, gluten has great influence in:

- Forming non-sticky dough
- Achieving desired processing characteristics
- Maintaining firmness and cooking stability
- Obtaining products with desired cooking characteristics



Required Equipment



Glutomatic 2200

Dual Glutomatic 2200 instrument, for dough mixing and gluten washing.



Gluten Index Centrifuge 2015

Speed controlled Gluten Index Centrifuge 2015 with two sieve cassettes for the Gluten Index Test.



Glutork 2020

For drying of gluten when determining the dry gluten content.



Accessories

Laboratory Mill 3100 or 120

Hammer type mills producing meal for quick and easy sample preparation for the Glutomatic tests as well as other analysis.

Balance: Required accuracy ± 0.01 g or better.

Perten Instruments Methodology Check List

Gluten content and Gluten Index Values

Sample weight	Check that the balance used for weighing the sample is correct, by comparing with known standard weights.
Dispenser	Check your dispenser accuracy by weighing the pumped volume. For example; the weight of 4.8 ml 2% NaCl-solution is 4.84-4.92 gram (20-24°C).
Time settings	Check that time is set to 20 seconds of dough mixing and 5 min. of washing. Compare Glutomatic manual Appendix 1.
Wash water	Check that your washed water volume is 265 +/- 15 ml. This is not critical but should be approximately within these limits. Check that water starts dripping immediately after the first 20 seconds of dough mixing.
Mixing hook	Check that mixing hooks are not bent. Use a ruler and hold against hook. Hooks should be straight. It is preferable that you remove (unscrew) the hook and check this.
Mixing hook – sieve distance	See the Glutomatic manual for adjustment procedures. Distance should be 0.7 mm. Gauges 0.6 – 0.8 mm are supplied with the instrument. Test as figure 15 in manual. Check with 0.6 and 0.8 mm gauges that there is a gap and that it is tight respectively.
Plastic chamber	Check that the plastic chamber 21.10.21 is not sticking on the Plexiglas body 21.10.11. If you assemble the chamber using too much force it may deform. It may then stick to the Plexiglas body when placed into the working position and fixed in the bayonet fitting. With sticking we mean that there is a too tight gap between the chamber and the Plexiglas body and that the chamber hardly can slide along the body.
Sieve holders	Check that you are using the correct sieve holder 21.10.22 & 21.10.32. The sieve holder to be used with the fine sieve is chromed and unmarked. The sieve holder to be used with the coarse sieve for the whole meal method is either black chromate or chromed marked with a groove or ring. You cannot use the marked sieve holder with the fine sieve as the distance between hook and sieve will be different as this holder is made for the coarse and thicker sieve.

Methodology Check that sieve is clean before use – this is important. Commercial flours generally give no problems. Experimentally milled flours may be more slimy or sticky and may require that the sieve is taken out from the sieve holder and carefully cleaned.

After adding sample, shake gently so as to spread out sample evenly, direct stream of added mix solution against the side wall. Shake gently to spread solution over all of the flour surface. Compare figures 6 and 7 in the manual. Place the wash chamber into working position without delay.

After washing check that the gluten appears thoroughly washed out.

ICC 137 or 155 Check that the same methods are compared. The difference in wet gluten content may be 1.5% on flour and 2.5%-units on meal with the ICC 155 with plastic sieves and the plastic centrifuge cassette giving higher results than ICC 137 with metal sieves and the metal centrifuge plate.

We recommend ONLY ICC 155 as we consider the reproducibility as better and as ONLY ICC 155 is used for Gluten Index.

Centrifuge When the washing is ready, move the gluten piece(s) to the cassettes in the Centrifuge with as little impact on the gluten as possible. Make sure the Centrifuge is started 30 seconds after the washing is ready, at the signal from the Glutomatic.

When the centrifugation is ready it is important to remove the fraction of the gluten that has passed the sieve in the cassette in the proper way. Make sure that the gluten is cut at the outer surface of the sieve and not pulled out from the holes. Also look for any gluten that may be sitting on the wall of the centrifuge and include that in this fraction.

When the outer fraction of the gluten is weighed, the remaining gluten on the inner side of the cassette is removed by pulling the complete fraction out of the cassette. Make sure all gluten is removed and placed on the balance for weighing.

Results When the Wet Gluten Content is calculated, the results shall be reported at a fix moisture content of the sample. See the manual for the calculation.