

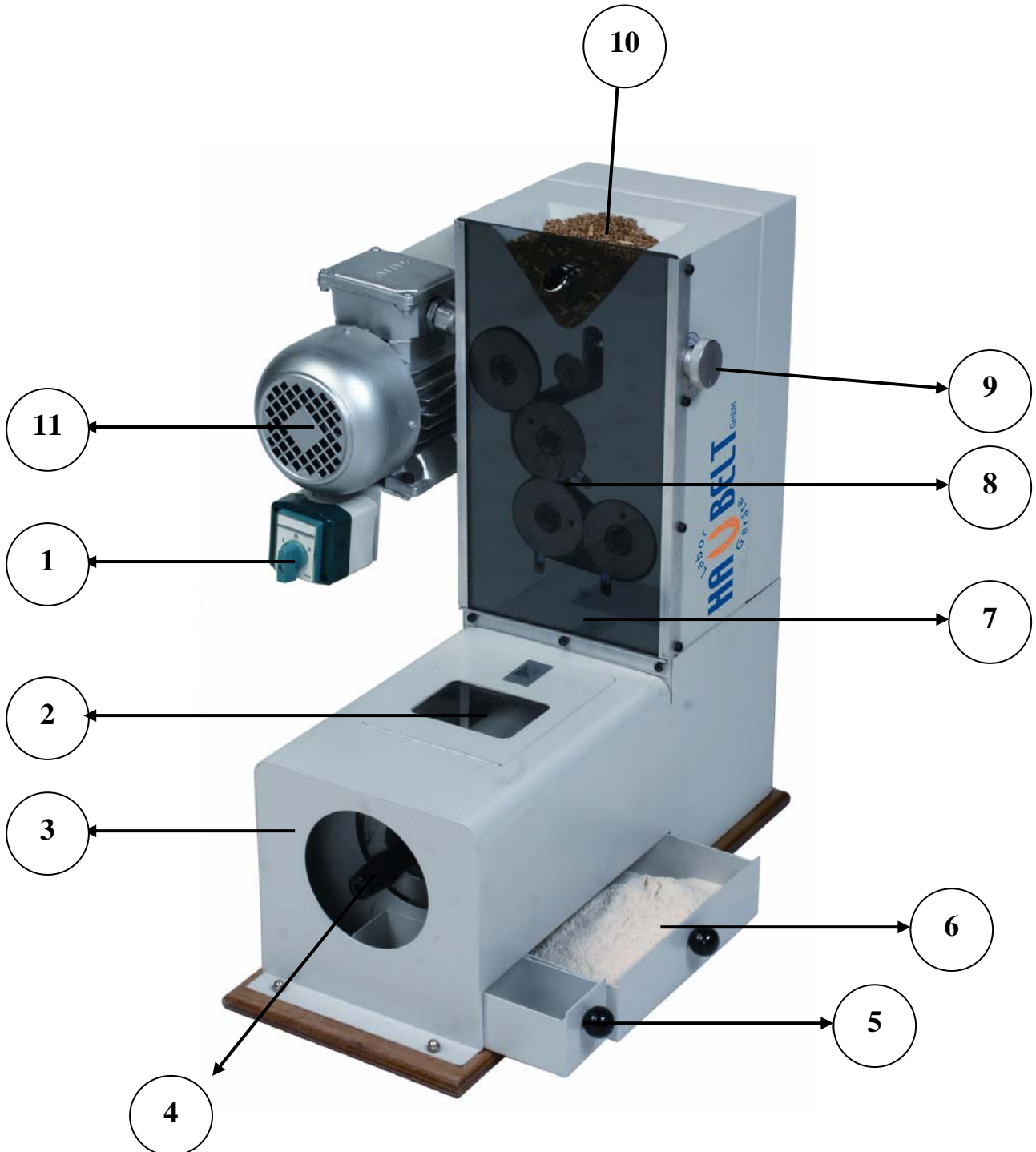
Lab Mill



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Lab Mill



1.DEVICE INTRODUCTION

1- SWITCH (POSITION 0-1-2)

The switch ensuring that the mill operates. The mill doesn't operate in position 0, operates straight in position (clockwise), operates adversely in position 2.

2- SIEVE COVER

The cover useful for taking the sieve out after grinding and cleaning prior to the next grinding.

3- CASE

The aluminum item useful for mounting all parts of the device.

4- SIEVE

The rotary sieve ensuring that the sample ground by the device is sieved and that flour and bran are sent to the sections.

5- BRAN DRAWER

The sump in which the ground bran sample is stored.

6- FLOUR DRAWER

The sump in which the ground flour sample is stored.

7- ROLLER COVER

The cover protecting the rollers from exterior interferences during grinding.

8- ROLLERS

The metal round-gearred items useful for making flour from wheat during grinding.

9- FEEDING ADJUSTING BUTTON

The button adjusting the flow speed of the wheat.

10-FEEDING AREA

The area in which the wheat is poured prior to grinding.

11-MOTOR

The electricity motor operating the device and starting all items.

2. SECURITY POLICY :

Our Company has made principle the quality and security in the fabrication it implemented providing your satisfactory who are our valuable clients as main condition. Our Company continually maintains **research and development** activities by means of its professional staff it established in its scope by closely following the innovations both in the country and abroad for the purpose of increasing the client satisfactory in the devices it manufactured by benefitting from the recent opportunities of technology.

Our Company has registered that it makes production in compliance with the European Standards by obtaining the **CE** (European Standards) certificate.

Security Information:

- Use the roller mill with 380volt 50Hz grounded mains voltage.
- Use the roller mill on a smooth and solid surface.
- Don't allow other people than the user operator to use the roller mill.
- Control if the device operates in the correct direction (in the beam direction). If it doesn't operate in the correct direction, ensure that the device operates in the correct direction by reversing the positive (+) poles in the plug. Otherwise, the device shall not grind.
- During the operation of the device, don't open the sieve cover and slide your hands or other apparatus into the sieving section.
- During the operation of the device, don't open the glass roller cover and slide your hands or other apparatus into the grinding section.
- During the operation of the device, don't slide your hands or other apparatus into the feeding section in order to increase the grinding speed by increasing the wheat flow.
- Don't interfere in the device in any way before being sure that the device stops completely.
- In the case of any compression in the device, interfere in the device after it stops completely. Don't operate the device without turning it off completely.
- Don't allow unauthorized people and companies to interfere in the device.
- Call for technical service support when you encounter any problems.

3. APPARATUS GIVEN WITH THE DEVICE

- | | |
|---------------------|--------|
| 1. Cleaning Brush | 1 ITEM |
| 2. Operating Manual | 1 ITEM |

4. GRINDING METHOD

4.1 OBJECTIVE

This method is used in categorizing, stocking and pricing the wheat to be purchased according to the quality or in grinding the wheat to be ground in the factory homogeneously in the laboratory mill before, determining its values previously, making the necessary modifications and adjustments and defining the mixture rates.

4.2 DEFINITIONS

GRINDING: To obtain flour and bran from wheat by means of the mill.

EFFICIENCY: The value obtained as a result of dividing the flour amount into the wheat amount and multiplying the obtained value with 100 after sorting the flour and bran from wheat by means of the mill.

ANNEALING: In order to obtain flour from wheat by means of the mill, it is necessary to sort the wheat shell as coarse grains as possible. For this purpose, water is added to the wheat. The fragility of the wheat shell is reduced and its flexibility is increased by means of annealing water. Hence, it is possible to sort the shell as coarse grains. It is waited for the given water to reach to the endosperm layer inside the shell. It is not desired to reach more interior layers.

ROLLER: The round-gear steel parts used in grinding the wheat.

4.3 PRINCIPLE

The wheat to be ground in the mill should be sieved in the analyze sieve and sorted from foreign substances and hayseeds. Afterwards, it should be annealed by adding water in certain amounts in order to sort the shell from the grain easily and the grinding process should be implemented.

4.4 POINTS TO CONSIDER CONCERNING THE METHOD

4.4.1. Annealing Water Temperature:

The water to be used in annealing should be warm. The annealing water should be at 23 ± 2 °C. The higher the annealing water temperature is, the higher the contagion of the water to the wheat shell is. Thus, the annealing water temperature and annealing period are inversely proportional.

4.4.2. Annealing Amount (water amount to be added):

The humidity amounts of the wheat having various humidity rates are increased to 16.5% in hard and semi-hard wheat and to 15.0% in soft wheat by adding annealing water. The water amount added in order to get the ideal humidity value is the annealing amount. The annealing amount is calculated with the following formula.

Note: The water amount to be given in annealing is calculated as in the following.

$$W = \frac{(F2-F1)}{100} \cdot A$$

W : Water amount to be added

F1 : Wheat humidity

F2 : Humidity which the wheat has to have

A : Wheat amount to be annealed

For example: the annealing amount for the wheat of 1000 kg and having humidity value of 10%

$$W : \frac{(16.5-10)}{100} \cdot 1000 = 65 \text{ kg water should be added to the 1000kg wheat.}$$

4.4.3. Annealing Period:

It is aimed at reducing the fragility of the wheat shell and increasing the flexibility by means of annealing water. Hence, it is possible to sort the shell as coarse grains. The period passing until the given water reaches the endosperm layer through the exterior shell into the interior is the "Annealing Period". The annealing water is not desired to reach more interior layers. Otherwise, the flour adhered to the shell by getting wet shall be removed as shell (bran). Hence, the flour (efficiency) amount that the factory takes from the unit wheat shall be reduced. Every wheat type has difference annealing periods. The enterprise shall determine this period itself with implementations and controls.

Factors affecting the annealing period:

- I. Annealing water amount
- II. Annealing water temperature
- III. Ambient temperature
- IV. Wheat type
- V. Stock capacity

I. Annealing water amount

The annealing water amount should be sufficient for annealing. Otherwise, the annealing amount cannot reach the humidity of 16.5%. The grinding quality is reduced.

II. Annealing water temperature

The higher the annealing water temperature is, the higher the contaction of the water to the wheat shell is. Thus, the annealing water temperature and annealing period are inversely proportional.

III. Ambient temperature

The higher the ambient temperature is, the higher the contaction of the water to the wheat shell is. Thus, the ambient temperature and annealing period are inversely proportional. The annealing period is short in summer and long in winter.

IV. Wheat type

If we order the wheat from having the most annealing period to having the least annealing period, we can order the wheat as hard wheat, red semi-hard wheat and white wheat. Thus, hard and semi-hard wheat are annealed in a longer period of time whereas white wheat are annealed in a shorter period of time.

VI. Stock capacity

If the volume to be annealed is not sufficient, the annealing period extends.

4.4.4. Placing:

The wheat to be ground in the mill should be sieved in the analyze sieve and sorted from the foreign substances and hayseeds. Afterwards, the wheat annealed to their normal value (humidity of 16.5 %) are filled into the feeding area.

4.4.5. Grinding Speed:

The mills have grinding amounts according to their roller capacities. If the mills are loaded over the roller capacity, the grinding quality is reduced. If the wheat is not too thin or too coarse, the feeding setting in the laboratory mill should be kept in medium position. Hence, the grinding rollers are not loaded over their capacities. The more the feeding amount of the wheat to be ground in the mill is than the current capacity, the less the grinding capacity.

4.4.6. Device Cleaning:

Approximately a handful sample from the sample to be ground is filled into the feeding area of the device and ground for the purpose of preventing it from being contaminated by the previous sample within the device. After grinding, the bran and flour within the drawers of the device are removed. Dusts in the drawers and on the sieve and surfaces of the device are removed with a brush. The device should be cleaned with a moist fabric.

5. DEVICE INSTALLATION:

Place the device on a solid and smooth surface. Afterwards plug the power cable of the device into the socket and turn the switch to the position 1 and operate the device. For the device not to cause excessive sound and to slide due to the vibration occurring during the operation of the device, take care to place the device on a dry and smooth surface.

No liquid substance is poured into the device and the space onto which the device is installed should be dry.

The network characteristics to which the device is connected should be **380Volt 50/60Hz (AC)**. The socket to which the device is connected after being installed should be **grounded socket** for the purpose of not affecting the operator by phase leakage that might arise from any reason on the device and by static voltage shock that might occur due to magnetic area leakage.

Turn the switch on the device to the position 1. Control whether the sieve operates in the accurate direction or not. If it doesn't operate in the beam direction, it means that the balls of the mill operate reversely. In this case, the mill shall dislocate the wheat and not grind. In such a case, replace the phase connections on the motor or use the position 2 instead of position 1 for normal grinding.

Ensure that whether the drawers of the mill are placed into their slots or not. Otherwise, the flour and bran produced in grinding shall fill the base of the mill.

Ensure that whether the sieve of the mill is placed into its slot completely or not. Otherwise, it shall cause that the flour and bran is filled into the flour drawer and contaminated with each other.

Take care to clean the space between the roller cover (glass) and the rollers of the mill with a brush after every grinding operation. Otherwise, the dust to occur in grinding shall fill the space between the rollers and the glass roller cover and reduce the grinding capacity.

NOTE: The breakdowns that might arise from not obeying the aforementioned conditions are not within the scope of the warranty.

6. GRINDING PROCESS:

6.1 GRINDING PREPARATION

6.1.1 Apparatus to be used in Grinding

*Wheat Analyzing Sieve

*Digital clock

*Annealing Machine or a jar that can be easily closed and having wide edge

6.1.2 Sieving the Wheat to be Ground

The sample taken from the trucks or bags are sieved through the analyzing sieve consisting of triangular sieve having hole interval of 2,2 mm and 4 mm and sorted from foreign hayseeds and substances such as stone and metal materials. Afterwards, this cleaned sample is subjected to annealing process according to the sample type.

6.1.3 Annealing the Wheat to be Ground

Annealing is applied in order to make the physical structure of the grain the most sufficient for grinding. Annealing provides the following advantages in addition to provide hardness and flexibility to the shell and crispiness to the endosperm.

- Since the flexibility is increased by annealing in addition to that the shell gets harder, it is parted less in breaking rollers.
- Since the annealing provides certain crispiness to the endosperm, it is possible to sort it into semolina by less pressure in the breaking rollers.
- The bran is sorted as thin and big plates whereas the endosperm is sorted as little particles easily in the breaking rollers by annealing.

The sample is taken from the wheat cleaned from its foreign substances as sufficient to use in the laboratory. Then it is annealed by adding water according to the wheat type and humidity content. The annealing process is implemented by adding water as the humidity of the soft wheat shall be 15% and the humidity of the hard wheat shall be 16.5%. Afterwards, it is mixed in the annealing machine or in a jar that can be closed easily and having wide edge for approximately 30 minutes. Afterwards, it is waited within water for the purpose of providing water to diffuse within the grain homogenically. It is mixed at least 2-3 times within this period.

6.2. GRINDING PROCESS

The objective of grinding is to sort the shell and endosperm from each other and to turn the endosperm into flour.

- Ensure that whether the mill is clean or not prior to grinding the wheat. The sample sump of the mill should be checked for the possibility of the previous sample's remaining in the sump and if there is, the remnants should be removed. See 4.4.6
- The wheat is filled into the sump of the mill and the flow speed is checked by grinding an amount of wheat. If the flow speed is excessive, it is adjusted with the feeding setting button at the side of the device. See 4.4.5

Note: The most ideal way of the feeding setting is to operate it in the position $\frac{1}{2}$.

- After starting the grinding process, the wheat comes to the breaking rollers first. The breaking rollers open the wheat grain and minimize the endosperm a little.
- Afterwards it comes to the grinding rollers and is sorted from the endosperm until the flour is produced and smaller endosperm particles (semolina) and few amount of flour are produced.
- After the wheat passes through the grinding rollers, it comes to the crushing rollers and small endosperm particles are crushed and turned into flour herein and the bran is filled into the sieving sump as to be sieved together with the flour without sorting into very small particles.
- While all these grinding processes continue, the grinding process continues on the other hand. The sample sieved in the sieving section is deposited into the bran and flour drawers separately. Hence, there is no extra time spending for this process.

7. CALCULATION OF THE RESULTS:

Generally, the results are not calculated in the laboratory mills. Only if desired, the efficiency is calculated. However, the flour quality is more important than the efficiency in the laboratory mills. Thus, the sedimentation to be implemented in the laboratory occurs in the tests of delayed sedimentation, index, energy, ash.

$$A = \frac{B}{B+C} \cdot 100$$

The value obtained as a result of the calculation process gives the mill efficiency as percent.

A: Mill efficiency %

B: Obtained flour amount gr

C: Obtained bran amount gr

Example: If the flour amount obtained in scaling is 60 gr and bran amount is 40 gr

$$A = \frac{60}{60+40} \cdot 100 = \%60$$

7.1. EVALUATION OF THE RESULTS:

When 8XXX sieve is used in the wheat samples for bread, the efficiency is desired to be $\geq\%45$.

Factors affecting the efficiency:

- Wheat type
- Wheat form
- Wheat homogeneity
- Whether the wheat's being annealed or not
- Annealing amount of the wheat
- Sample amount
- Sieve pore dimensions
- Sieving period
- Grinding speed

are the main factors affecting the efficiency.

8.MAINTENANCE INSTRUCTION:

Our roller mill's efficiency's being well and its implementing the grinding process in shorter period of time have provided both that you who are our valuable clients save time and that the results closer to the factory values are obtained. Please consider the following maintenance instructions for the purpose that our device shall provide quick and accurate results to you who are our valuable clients.

For the Attention of the User Operator:

After sieving on the device, open the sieve cover and remove the sieve and unloaded the remaining products within the sieve. Open the control cover of the mill and clean over the brush and interior parts with a brush. Afterwards clean the sieve with a brush or if there is with air and resettle it. Remove the flour and bran drawers of the mill and unloaded them and clean them with a brush if there is no air. Open the mechanical cover of the mill and remove the dust cartridge and clean it with a brush if there is no air and resettle it. Also clean the air fan and its surrounding at the front part of the mill with air, if there is no air, with a brush. After the completion of dust cleaning process, clean the case of the device with a moist fabric. Repeat this process after the completion of every sample. Furthermore, remove the allen screw at the sides of the air setting screw of the mill and clean with air, if there is no air, with a brush once two or three months as dependent on the process density.

The aforementioned maintenance instructions are the responsibility of the user operator. The incorrect results that the User Operator obtains from the samples without obeying the maintenance instruction in the Sieve Shaker are not under the responsibility of our Company.

9.BREAKDOWNS AND SOLUTIONS :

Question:

- The roller mill doesn't work.

Answer:

- Control whether the switch located at the motor section of the roller mill is on or not.
- Control whether there is power on the network coming to the roller mill or not.
- Control the plug of the roller mill and ensure about whether it is plugged into the socket or not.
- Control whether there is a disconnection on the cable of the device.

Question:

- The roller mill works, but not grind.

Answer:

- Control whether the frame of the mill works in the beam direction or not. Otherwise, provide it to work accurately by selecting the other than the direction 1 and 2 on the switch.
- Control whether the balls of the mill rotate or not.
- Control whether the feeding screw of the device is unscrewed or not.

Question:

- The roller mill motor works, but its balls don't rotate.

Answer:

- Control whether the balls of the roller mill are stuck or not.
- Control the shaft of the pulley fixed to the motor. It may be dislocated.
- Open the back cover of the roller mill and control whether the tensions of the belts are proper or not.
- Control whether the belts at the back side of the roller mill are disconnected or not.

Question:

- The sieve of the mill doesn't rotate.

Answer:

- Ensure about whether the sieve is placed into its shaft completely or not.
- Control whether the brass apparatus located on the shaft assisting to rotate the sieve is loosened or not.
- Control whether the pulley belt of the sieve is disconnected or not.

Question:

- The roller mill gets stuck.

Answer:

- Control the humidity of the ground wheat (is the humidity is over than 16.5 %)
- Open the back cover of the roller mill and control whether the tension of the belts are proper or not.
- Control the power connections on the motor.
- Control whether the feeding adjustment screw works accurately or not.

Question:

- Abrading sound comes from the roller mill.

Answer:

- Remove the roller cover and control whether the screw in the middle of the rollers is loosened or not.

Question:

- Bran mingles into the flour sump from the roller mill.

Answer:

- Control whether there is tear in the sieve of the mill.
- Control whether the sieve is placed into its slot completely or not.
- Otherwise, call for the technical service support.