



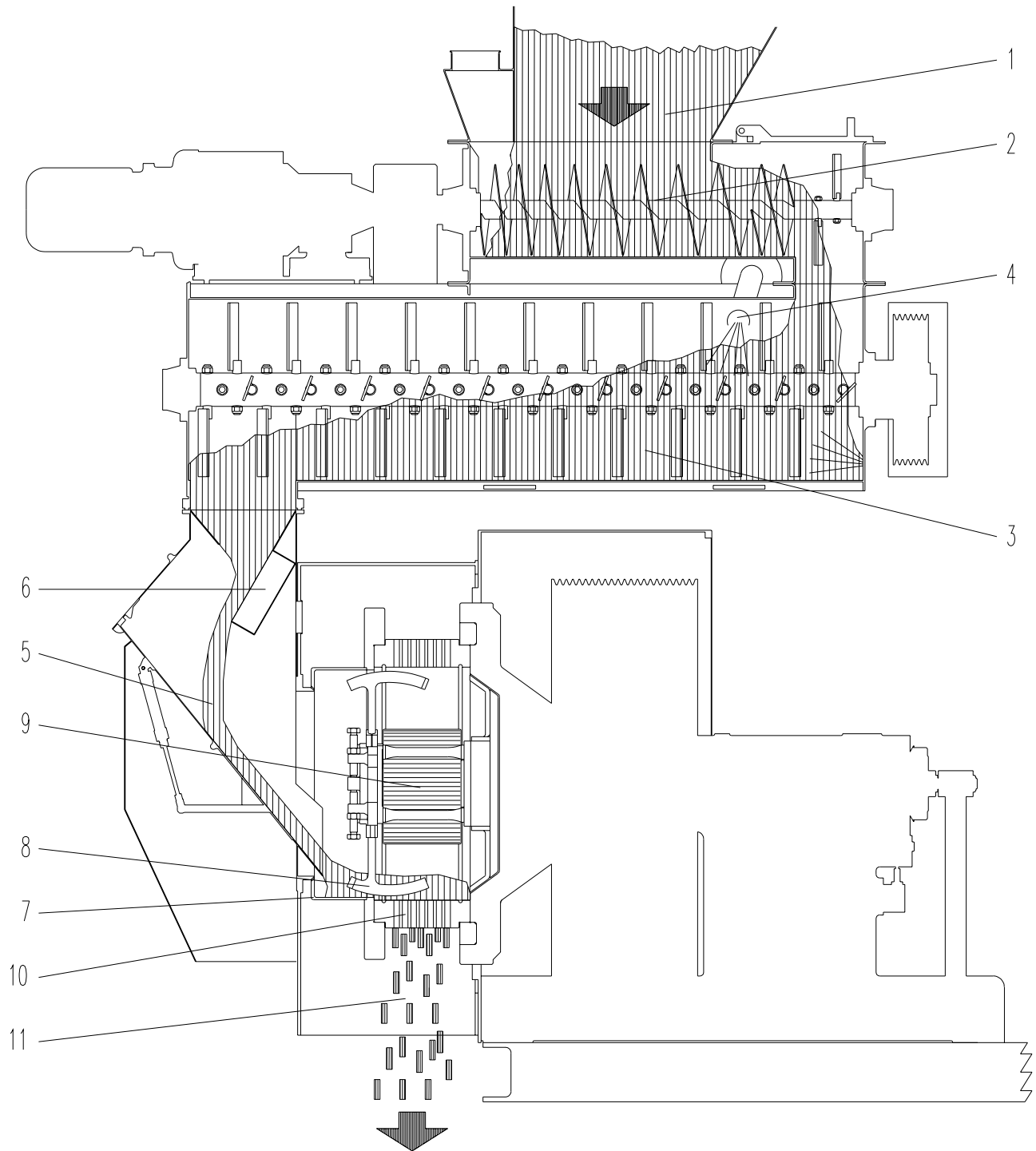
7 PELLET MILL OPERATION

- 7.1 Technological operation
- 7.2 Inspection at first starting
- 7.3 Normal starting
- 7.4 Normal stop
- 7.5 Sudden stop
- 7.6 Stop due to overload
- 7.7 Extended stop



7.1 Technological operation (tab. 7.1)

The pellet mill is one machine capable to produce pellets starting from mixtures of flours or by-products intended for feeding of cattle. The mixture of the product to pellet is introduced from the loading hopper **1** into the screw feeder **2** which has to proportion the mixture for the underlying mixer/homogenizer **3**. The paddles of this unit carry out a strong mixing while the product is being moved forward and added with dry saturated steam and then injected through the suitable expansion chamber **4** situated in the rear part of the mixer. From the discharging door of the mixer/homogenizer, the mixture falls through the feeding conveyor **5** which is equipped with a magnetic plate **6**, into the pellet pan **7** fitted on the front plate of the die. The product, owing to the centrifugal force, remains in the pan until the deflectors **8** of the front support plate of the rolls, while rotating, collect and distribute it between the roll **9** and the die **10**. The machine has two deflectors: each of them feeds one roll. More precisely, the lower deflector collects about 60% of the product and convey it under the first roll while the other deflector, situated on the upper part, conveys the remaining quantity of product towards the second roll. The adjustment of the deflectors inclination is very important for a correct operation of the machine and a regular wear of the die. This adjustment must be carried out by the machine operator on the basis of his experience and according to the specific weights and flowability of the sundry mixtures. By rotating, the die drags the mixture towards the rolls which press it and consequently compel it to pass through the holes of the die. The compression causes an increase in the density of the mixture which, together with the heat generated by the dry saturated steam, facilitates the extrusion of the pellet. The machine can also work without use of steam but yield and quality of the pellet will be lower. The length of the pellet can be modified by adjusting the relevant knives. The pellet, through the lower part of the door **11**, falls into the underlying cooling system.



tab. 7.1



7.2 Inspection at first starting

The unit is to be operated only after the following inspections have been carried out.



ATTENTION

Inspections to carry out when the machine is at a standstill.

- Pellet mill hopper, screw feeder, mixer and pelleting chamber must be free from any foreign matters.
- Check the electric interlocking (cooler, vibrosieve, conveyors elements, intake and measuring).
- Make sure that all safety devices are connected correctly and operate properly, especially the switch of the shear pin.
- Check whether all elements are correctly lubricated and whether the reservoir of the grease pump (if delivered) is full with grease.
- Check, after removing the protection guard, whether the V-belts are stretched properly.
- If necessary, adjust them according to the instructions of paragraph 8.6 and fit the guard again.
Repeat the adjustment after about 24 hours of operation and eventually stretch the belts again.
- Check that the paddles of the mixer are set properly (see Appendix "A") and shut the door.
- Make sure that the die is mounted properly and check whether the screws are well tightened.
- Check whether the rolls are adjusted correctly (see paragraph 8.3).
- Check whether the deflectors, which distribute the product, are adjusted correctly (see paragraph 8.4).
- Check whether the pallet cutting knives are adjusted correctly (see paragraph 8.5)
- Shut the door and lock it with the relevant lever.
- Start the grease pump motor (if installed).
- Start the main motor of the pellet mill and check whether there are anomalous vibrations. If not, check if the motor is balanced.
- Start the mixer and check the rotation direction of the shaft.



ATTENTION

Never touch moving parts during checking.

- Start the screw feeder without any product inside and check the right direction of rotation.



ATTENTION

Never touch moving parts during checking.



7.3 Normal starting

Normal start of the pellet mill and/or start with a new die can take place only after carrying out the following inspections:



ATTENTION

Inspections to carry out with the ellet mill at a standstill.

- Pellet mill hopper, screw feeder, mixer and pelleting chamber must be free from any foreign matters.
- Make sure that all safety devices operate properly, especially the switch of the shear pin.
- Check whether all elements are correctly lubricated and whether the reservoir of the grease pump (if delivered) is not empty.
- Check, after removing the protection guard, whether the V-belts are stretched properly. If necessary adjust them according to the instructions of paragraph 8.6, and fit the guard again.
- Check the wear of the spirals and of the screw feeder paddles and shut the door.
- Check the wear and the inclination of the mixer paddles and shut the door.
- Make sure that the die is mounted correctly by inspecting whether the screws are tightened thoroughly.
- Check whether the rolls are adjusted correctly (see paragraph 8.3).
- Check whether the deflectors, which distribute the product, are adjusted correctly (see paragraph 8.4).
- Start now the pellet mill.

 **The motors must be always started according to the following order**

1. Grease pump motor (if installed)
2. Main electric motor
3. Mixer electric motor
4. Speed change gear electric motor of the screw feeder.

- Open the inspection door of the mixer and feed gradually the feeder with the help of a paddle by letting in oat or maize so that the die can get rid of the mixture which stops the holes; then heat the die gradually. This operation requires some minutes and the product coming out must not go down into the underlying cooling installation. Make sure that the absorbed power is the minimum; proceed with the work in this way for some minutes without opening the steam until the die gets warm.

 **Note: Only when the die is warm, the optimal operation is reached.**

 **Important: A too quick start can damage the bearings.**

When the mill is started after a long stop, it is necessary to work at low load for about 30-40 minutes so that the bearings have the time to reach the work temperature gradually and to get the right radial and axial tolerance before coming to full production.



- Start the cooling installation;
- Pour the product into the hopper connected with the screw feeder.

Later, if the extrusion is regular, without sudden change of power absorption, increase the capacity of the die up to 50% of the full power and, in the same time, let in steam slowly remaining at 10°C – 15°C below the normal pelleting temperature.

- Work with the pelet mill at 50% for about half an hour; afterwards, if no problems arise, increase the quantity of flour and steam up to the maximum of the power allowed by the main motor.

As regards the temperature that the mixture must reach in the mixer, it is possible to give in principle some information as shown in the following table:

CLASSES OF COMPOSED FODDER	TEMPERAT. OF MIXTURE
Fodder rich in cereals	Normally 70 – 80 °C
Heat sensitive fodder - containing sugar 5 to 10% - containing powdered milk 5 to 10%	Not over 40 – 50 °C
Fodder rich in proteins - containing 25 to 45% raw protids - molasses over 5%	Not over 40 – 50 °C
Fodder rich in forage - fibrous, poor in proteins, bulky and light, containing proteins 12 to 16%	Not over 40 – 50 °C
Fodder rich in urea over 6% - urea and molasses 5 to 8% - minerals	No steam

If the die is not run in, it is necessary to prepare a mixture to pour into the pelletizing chamber for about 15 to 30 minutes. Mixture is composed of bran (85%), abrasive powder (5%) and oil (10%).

If a used die is used, always check wear and conditions.

7.4 Normal stop

Stop first the screw feeder and then the mixer.

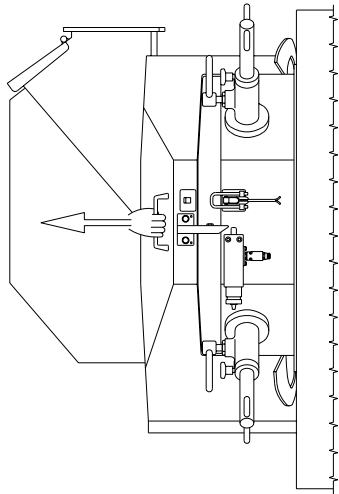
Check through the inspection door of the conveyor whether the product is exhausted.

Before stopping the pellet mill, feed the mill manually for some minutes with oat or with an oily product. In this way the holes of the die fill with an elastic product which can be easily removed and by which it is possible to start again next time when the die will be used again.

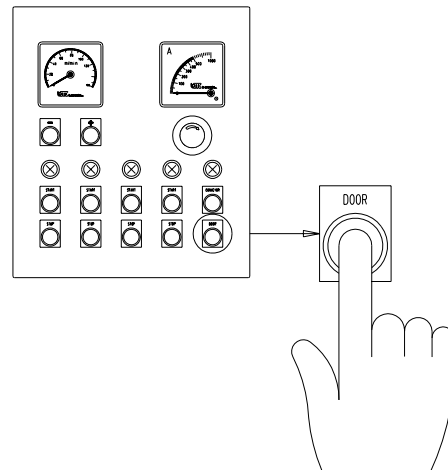
 **This operation is to be performed every time the mill is stopped.**

Wait until the mill stops before open the main door. Press the button “DOOR” on the control panel for release the security piston, then open the main door (tab. 7.4.1-tab. 7.4.2).

Do not open the door before the pellet mill has come to a complete stop. Do not force its opening.



tab. 7.4.1



tab. 7.4.2

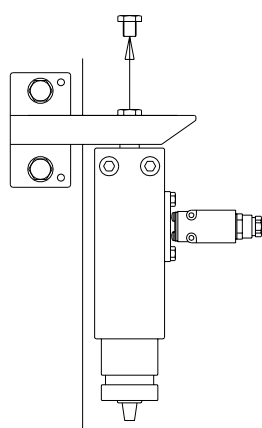
7.5 Sudden stop

When the stop occurs suddenly, as is the case of power failure it is absolutely necessary to carry out the following operations:

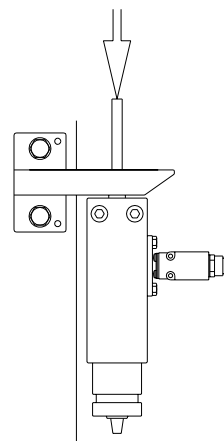
- Wait until the pellet mill stops before open the main door. Press the button “DOOR” on the control panel for release the security piston, then open the main door (tab. 7.4.1-tab. 7.4.2).

Do not open the door before the pellet mill has come to a complete stop. Do not force its opening.

If there is not electric power you must remove the hexagonal cap on the top of the door catch using a rod with a diameter of 10 mm, push down the pin of the safety piston so as to free the catch and open the door. Replace the cap on the hole in the catch (tab. 7.5.1-tab. 7.5.2).



tab. 7.5.1



tab. 7.5.2

- Remove from the die all material not yet compressed.
- If the interruption is short and the die has no time to cool, close the main door and start the pellet mill pouring in oat through the proper doorlet on the conveyor.
- If the interruption is so long that the temperature of the die drops slowly to the room temperature, it might be possible to be obliged to remove the die to clean the holes.



7.6 *Stop due to overload*

Too much feeding of product or a foreign matter between the die and the rolls would create an overload so that the shear pin, placed in the rear part of the base, breaks and, as a consequence, the pellet mill will stop because of the prompt operation of the circuit breaker.

Remove the reason of the overload in case of excess of feed.

Wait until the pellet mill stops before open the main door. Press the button "DOOR" on the control panel for release the security piston then open the main door.

Do not open the door before the pellet mill has come to a complete stop. Do not force its opening.

Remove the foreign matter, if any, and clean then the pelleting parts; finally make sure that neither the die nor the rolls have been damaged.

Replace the pieces damaged. If any.

Take again the driving group to the correct position.

Replace the shear pin.

Check the correct operation of the circuit breaker of the shear pin housing.

7.7 *Extended stop*

Should the mill not be operative for more than 60 days, before starting it, feed it manually for some minutes with oat or an oily product. In this way the holes of the die will be filled with an elastic product easy to remove by which it is possible to start again next time when the die will be used again. When the mill is still warm, replace all grease in the bearings and fill with oil the reduction units and the speed change gears. Remove the belts and store them, avoiding too tight folds, not direct on the floor, in rooms protected from light, bad weather, humidity and remarkable changes of temperature. Protect all surfaces involved with couplings (flanges, shafts and joints) and the pulleys races with an antioxidant product.

All hydraulic and steam pipes are to be set to zero pressure.