

GUIDELINES FOR PERFORMING AN ENDLESS CHAIN PRESSURE (ECP) DRIER TEST

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Problems with tea driers

The common problems encountered with tea driers could be summarized as follows.

1. The teas are either under-fired or over-fired.
2. The output is lower than the rated output.
3. The quality of the dried teas is not durable.
4. The teas are tainted with smoke.
5. It is not possible to raise the temperature of the ambient air to the level of the inlet temperature.
6. More teas blow out or more teas fall through.
7. Black tea particles are present in the blow out from the drier.

Guidelines for the ECP drier

Some simple guidelines are given below for the benefit of factory staff carrying out a performance test on the Endless Chain Pressure (ECP) drier.

Preparing the drier for test

1. Check whether the main fan damper is functioning properly.
2. Check whether the bypass valves are properly closed.
3. Check whether all the trays in each circuit are properly seated, and check their perforation sizes. Table 1 gives the recommended tray perforation sizes for the roll-breaker meshes used (Samaraweera, 1986).

Table 1. Recommended tray perforation sizes

Roll-breaker mesh	Drier tray perforations (mm)		
	Top tray	Mid tray	Bottom tray
No. 4	3.0	2.8	2.2
No. 5 and No. 6	2.2	2.0	1.8
No. 6 and No. 7	2.0	2.0	1.8

Look for any saggy trays and repair them.

4. Check for any air leaks in the ducting and the discharge valve, as well as from the inspection windows, and seal them.
5. Check the location of the exhaust-temperature sensor. The exhaust-temperature sensor (dial-probe) should be placed at 1/3rd the length from the feeding end, and six inches above the top circuit at the centre.
6. Calibrate the inlet and exhaust-temperature dials using a standard glass-mercury thermometer. Remove both sensors from their holders. Place the inlet sensor and standard thermometer in boiling water until the readings are steady. Record the readings when the standard thermometer reads 90°C (194°F) and 95°C (203°F). Allow the water to cool and repeat this for the exhaust sensor when the standard thermometer reads 50°C (122°F), 55°C (131°F) and 60°C (140°F).
7. Check the residence time in minutes using three markers. Keep a time gap of half a minute between each marker, and place them one by one in the left, centre and right positions, respectively. The residence time should be 21 minutes to achieve proper firing.
8. Check whether the gap between the spreader and the conveyor is the same across the belt. Uniform height adjustment of the spreader at the feeding point is important to obtain uniform firing.
9. Check that the scraper is functioning properly.

Preparing the Firewood Furnace/Air Heater

1. If any smoke taint is detected in the made tea, check the air heater for a smoke leak following the procedure given by Samarasingham (1990).
2. Weigh about 700 kg firewood in 50-kg bundles and stack them separately. These firewood bundles should be fed into the furnace at regular intervals. Feeding of firewood at regular intervals is important to maintain a steady inlet temperature.
3. Firewood should be properly split and dried. Use of a hydraulic splitter is advantageous.

4. Light the furnace, and record firewood consumption for initial heating-up of the drier. The remaining firewood can be used for drying for about three hours, and firewood consumption for each hour of the drying process should be recorded separately.

Preparing Oil Furnace/Air Heater

1. The oil-storage tank should be clearly calibrated to read the oil consumption at each stage.
2. Oil consumption for initial heating-up of the drier, and consumption for each hour of the drying process can be recorded as above.

Performance Test

1. Weigh the amount of dhool fed, and made tea collected, when the drier reaches a steady state. When the inlet- and exhaust-temperatures are steady, the drier is operating smoothly.
2. Regulate the feed rate so as to maintain the exhaust temperature at 52°-55°C (125°-130°F). This keeps the moisture content of the made teas at 2.5-3.0%.
3. If the drier has a fall-through collecting gear, collect fall-through for the first 20 minutes from the time of feeding. The amount of fall-through is a good indicator for judging the tray perforation sizes, and any major defects in the drier.
4. Continue the weighing of fermented dhool and made tea for about three hours. For each hour, record the output and the firewood or oil consumption.
5. Collect made tea samples for moisture testing from the left, centre and right positions, respectively. Record the inlet- and exhaust-temperatures while collecting the made tea samples.
6. Collect the blow-out during the test period and weigh it.
7. Calculate the average output/hour and the fuel consumption. Made tea output per kg of firewood, or per litre of oil, will give some indication of the efficiency of the drier.
8. Determine the moisture content of made tea samples using a calibrated moisture meter, or by sending the tea samples promptly to the TRI in air-tight, sealed containers.
9. If any problems cannot be identified and rectified, please consult the Technologist at the TRI.

References

- Samaraweera D S A 1986 Technology of tea processing. In: *Handbook on Tea*. (eds. P Sivapalan, S Kulasegaram, A Kathiravetpillai), 158-207. Tea Research Institute of Sri Lanka, Talawakelle.
- Samarasingham S 1990 Smoke leaks in tea dryer heaters. *Tea Bull.* 10, 3-8.