

Pea Tenderometer and  
Inspection  
Procedure Manual

2006

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## **INTRODUCTION**

Pea tenderometer readings are used to determine the grower's load payment and they dictate production practices within the plant. It is important that growers be fairly compensated for their peas and that competing processors pay for their raw product on a uniform basis.

UPGRADE CONSULTING LTD staff is responsible for checking the accuracy of pea tenderometers and ensuring consistency between processors. This procedure manual is intended as a guide for checking tenderometers, plant sampling procedures, and the proper recording of gross load weight, tare, net load weight and tenderometer readings.

## **Health and Safety**

UPGRADE CONSULTING LTD staff is required to work in a safe and cautious manner. As this work is conducted on processor premises, inspectors must follow all safety and sanitation policies of UPGRADE CONSULTING LTD and the processor, which may include the use of hard hats, safety footwear, hairnets, and ear protection. Any policies requiring the removal of watches, jewellery, etc. must also be adhered to.

Inspectors must also exercise caution on processor premises and avoid any potentially dangerous equipment or activities. Any injury, no matter how minor, should be reported to your supervisor immediately.

## **Processor Responsibilities**

The processors do Tenderometer readings and tare collection, used in determining price paid to growers. UPGRADE CONSULTING LTD Inspectors must ensure that these procedures are done in the following manner.

### **A Unloading**

Truckloads of peas must be weighed prior to unloading to determine the gross weight of the truck. Unloading is to be done by gravity dumping only; no water can be applied except to clean out the few remaining peas after the load has been emptied. Inspectors must use their discretion to ensure that water is applied only for this purpose as wet tare absorbs water and therefore weighs more. The empty truck must be weighed to calculate the gross weight of the peas.

Scales must bear a current Weights and Measures Certification (within the last two years) or have had recent servicing (within the last year) evidenced by a service sticker or invoice.

## B Sampling for Tenderometer

As the peas are unloaded, they will go through a dry cleaner and a washer. A minimum of three representative samples is required from each truckload of up to twelve tons. For each additional four tons, or part thereof, an additional sample will be taken, up to a maximum of six samples. Each of the samples weighing approximately one-half pound is to be drawn after the dry cleaning and washing. Samples at this point should be adequately mixed and each sample can be tested separately. Although the sample will be washed, it should be checked to ensure it is free of any foreign matter such as leaves, stems or pods. The sampling should be done at intervals to represent the entire load but must be clearly identifiable by grower. Samples must be taken within two hours of arrival at the plant.

## C Tenderometer Readings

Only tenderometers with a recent UPGRADE CONSULTING LTD certification (see Tenderometer Certification) can be used for grower payment. The processor must take a minimum of three tenderometer readings per load. Inspectors should ensure that the tenderometer grids are cleaned after each test and that the unit is in proper working order. Tenderometer readings must be accurately recorded and attributed to the proper grower.

## D Tare Collection

Tare chargeable to the grower is removed at the dry cleaner. Processors have the option of removing and weighing the tare load by load or collectively for each grower. In either case, it is essential that each grower's tare is collected and weighed separately. The method of tare collection is important as well. If the processor uses collection bins, wheelbarrows, etc., these containers must be weighed full and then empty to determine the true weight of the tare. Only tare collected by the dry cleaner should be charged to the grower. Tare that is cleared off the floor or collected during machine clean-outs cannot be weighed and assessed to growers as by then the true identity has been lost. Tare collection bins should be checked to ensure that peas or pods containing peas are not being collected and charged as tare weight against the grower. Sieve size holes should be checked to ensure that for Alaska variety they do not exceed 3/16 inch and for all other pea varieties they do not exceed 1/4 inch. Scales used to weigh the tare must have a recent Weights and Measures certification or servicing. Inspectors must ensure that the tare calculations are accurate and assessed to the proper grower.

## E Tenderometer, Weight and Tare Recording

These calculations, which all affect grower payment, must be done accurately and be traceable. As these figures are recorded at various locations in the plant, inspectors

should ensure that they are properly transferred and tabulated on the weight ticket giving the net value of the load.

## **Equipment**

### **A FTC Tenderometers**

The FTC tenderometer works by hydraulically lowering a set of grids through a sample of peas. The force required to crush the peas is measured electronically and displayed in terms of tenderometer units.

Processors may use either of two FTC models. The first is the FTC T-1300-G and it is capable of measuring the texture of a number of products including peas. The second is the FTC TU; a downscaled version that reads only peas. (Refer to the FTC operating instructions included in this manual.)

UPGRADE CONSULTING LTD field testing kits are maintained in the main office in Kingsville, ON, as well as the master testing kit.

The three kits are verified for accuracy against the master kit once per year or as required. Each kit is housed in its own tool case. The kit consists of a three piece mated set (Force Transducer, Shear Blades, and Test Cell) with a matching number. Do not interchange parts between sets. These parts are fragile so take care not to bump or drop them, especially the Force Transducer; otherwise it may require recalibration.

When comparing test results against the processor's unit, the UPGRADE CONSULTING LTD equipment is assumed to be correct. If for some reason you doubt the accuracy of your kit, return it to Leamington for a repeat verification. Another option would be to run an unofficial comparison trial against another FTC unit in your area.

### **B FMC Tenderometer**

The FMC Tenderometer also measures pea tenderness by forcing a set of grids through a sample of peas. However, the FMC uses mechanical rather than electronic means to measure the resistance of a sample. The resistance causes a counter weight to rise and also a pointer to move across a scale. Greater resistance causes the weight to move higher, the pointer to move further across the scale and a higher tenderometer reading.

The FMC has been in use for several decades and as parts and maintenance become more expensive, the accuracy of the FMC has been questioned. Currently, the industry is moving towards replacing the remaining FMC tenderometers with the

FTC units. Payment by processors to growers may be made on the basis of results by either the FMC or FTC and therefore UPGRADE CONSULTING LTD staff must ensure the accuracy of both machines through inspection reports.

## **Sampling for Tenderometer Certification**

Peas selected for tenderometer verification should be washed, screened, uniform in size and maturity, free of foreign material and preferably of a mid tenderness value (approximately 100-120).

Obtain a large pail full of peas (10-20 lbs.) off of the production line inside the plant. Remember to keep mixing the sample as you go since small peas tend to settle to the bottom.

The peas should be at room temperature. Keep them well drained (not standing in water). The pail should have drain holes in the bottom.

## **FTC T-1300-G Checklist**

Before starting the verification procedure, run the processor's complete FTC through a simple diagnostics check. The directions are as follows:

1. Turn on the MAIN POWER and the PWR to the texture gauge. The red OVERLOAD light may appear. Depress the ZERO switch and then push the black RESET switch to continue.
2. Activate the blue CAL toggle switch and note the value displayed - make sure it matches up with the calibration number stamped on the force transducer.
3. Activate the red ZERO toggle switch to confirm that the starting point on the display is zero.
4. Inspect the shear blades and test cell for cleanliness
  - hardened juice or adhering broken peas could affect the next reading
  - **Note:** these parts should not be left sitting in water
5. Make sure that the PEAK HOLD feature is working properly
  - this will require running a sample
6. Check for drag or binding by conducting a dry run test with an empty test cell
  - there should be no appreciable reading on the display
7. Check the oil reservoir to ensure that the level of hydraulic oil is satisfactory

Mark your results on the inspection form along with any pertinent comments.

## FTC-TU Checklist

1. Check that the POSITION SWITCH is in the STOP position, the PEAK SWITCH is OFF and the MODE SWITCH is in the COMP position, then turn ON the MAIN POWER and the PWR to the Texturegauge.
2. The red OVERLOAD light will appear. Depress the ZERO switch and then push the black RESET switch to continue.
3. Allow the unit to warm up for a few minutes while checking to see that the force transducer is plugged into the top of the Texturegauge and that the unit is level.
4. Attach the force transducer to the ram by means of the securing pin, attach the top part of the test cell to the transducer and lock it by turning the small tab on the bottom front of the transducer. Slide the bottom "box" portion of the test cell into its holder in the lower end of the columns.
5. The box of the cell should slide into place easily. If it does not, check the machine to see that it is level. An adjustment screw located on the backstop plate of the press columns controls how far the bottom part of the cell slides into the press. This is adjusted at the factory but may be reset if moved so that the top blades slide down the centre of the box.
6. With the PEAK SWITCH OFF and the cell and transducer in place, turn the ZERO KNOB until the display reads zero (the negative sign should be blinking on and off; this indicates the closest adjustment to zero).
7. Now depress and hold the CAL SWITCH, loosen the locking ring, and turn the CAL KNOB until the display reads the CAL number indicated on the transducer calibration/serial number sticker. Remember that the transducer and the test cell are calibrated as a set, and they must be used together as a set when making Tenderometer tests. Some processors may have more than one test cell mated to a single transducer. Check the numbers on the cell and transducer to ensure the calibration is correct.
8. Remove the test cell and rinse in cool water (the cell should not be dry during Tenderometer testing) and then replace the cell as before and recheck the zero and cal settings. Their positions may be locked in place by holding the knobs and turning the locking ring behind them clockwise.
9. Run an empty chamber test (no peas in cell) to ensure no reading occurs which could indicate a misalignment of the grids.
10. Place the waste tray under the Tenderometer below the cell.

## **FTC Test Procedure**

11. Fill the cell box full of peas without pressing them. The lid of the cell box can be used to scrape off any excess from the top.
12. Slide the cell box into the cell guides of the Texturepress.
13. Turn the PEAK switch to ON.
14. Turn the MOTION switch to the DOWN position.
15. Record the reading obtained after completion of the downward stroke.
16. Switch the MOTION switch to the UP position to raise the ram.
17. Reset the Texturegauge to zero by depressing the ZERO switch or turning the PEAK switch to OFF.
18. Remove the cell box and wash by immersing in water or spraying after each test. Wash the blades at intervals frequent enough to prevent drying. Empty the waste tray as needed.

## **FTC T-1300-G and FTC-TU Verification**

In order to run a verification, it will be necessary to take over the use of the processor's FTC for 1-2 hours. A contingency plan should be developed so that the receiving of peas can continue uninterrupted. For example, the processor could use their old FMC until the test is finished or UPGRADE CONSULTING LTD test results can be used for grower payment providing the identity of the peas is maintained.

The verification is accomplished by running repetitive tests on uniform peas. The average of the processor's figures is compared against the UPGRADE CONSULTING LTD test average.

The procedure is as follows:

1. Run 10 successive readings on the processor's equipment - note the value on the form under Test 1.
2. Carefully remove the processor's testing kit and replace it with UPGRADE CONSULTING LTD's kit
  - this will require repeating the checklist, especially programming the proper calibration number for the Force Transducer
3. When switching transducer kits, turn off power to the texture gauge but not the main power switch.

4. Without undue delay, run 10 successive readings using the same sample of peas
  - make sure to keep it well mixed throughout the testing
  - record the values on the form
5. Discard the high and low readings for each set of 10
  - calculate an average for the remaining 8 and write it down
  - round the average number to the nearest whole number (.49 goes down and .50 goes up)
  - write down the rounded value on the form
6. Compare the two averages (whole numbers) - they must be within 2 “tenderometer units”.
7. If the results are acceptable, restore the tenderometer to its original condition and complete the form.
8. If the “2 TU” tolerance is exceeded, repeat the test in its entirety with a new sample and mark your results on the form under Test 2.
9. If the second comparison also exceeds “2 TU”, the company unit should be taken out of service until it can be corrected (UPGRADE CONSULTING LTD unit assumed to be right).
10. The processor is responsible for taking corrective action, i.e., service call, re-calibration, etc.
11. The UPGRADE CONSULTING LTD testing kit may be left with the processor until their own components are returned to service.
12. The old FMC may be used as a back up - make sure it is properly standardised.
13. Complete the form in full and mark the appropriate action taken - under the Comments section, note any pertinent information.
14. The results of Test 2 are final - do not average them with Test 1
  - if Test 2 is satisfactory, the unit passes inspection regardless of Test 1's results
15. Failure of a company owned tenderometer warrants the initiation of an Infraction Report by the Inspector.
16. Obvious discrepancies due to poor samples should be discarded and the test repeated.
17. If a processor FTC unit fails to meet the UPGRADE CONSULTING LTD certification for no obvious reason such as stone damage, bent grids, etc., it is permissible for UPGRADE CONSULTING LTD inspectors to adjust the calibration of the processor FTC so that it matches the readings of the UPGRADE CONSULTING LTD transducer unit. Another comparison test must be conducted to ensure both units are reading the same.

The recalibration should be considered as a last resort measure. It would be preferable to use one of the following interim measures until the processor transducer unit can be serviced.

- Use of the UPGRADE CONSULTING LTD transducer on a loan basis.
- Use of another processor's transducer on a loan basis.
- Use of a backup FMC unit.

## **Appeals - FTC Models**

The processor may dispute the outcome of your verification procedure. If warranted, arrange for a verification check of your UPGRADE CONSULTING LTD kit against the master unit in Leamington. In extreme cases, it may be possible to transport the complete master unit to the processor's premises for a direct comparison.

## **FMC Checklist and Verification**

1. Make sure that the tenderometer is level on the floor.
2. The needle should read zero on the scale with the weighted arm hanging straight down.
3. Turn the grid handle to the right to ensure that the grids move freely and there is no binding.
4. Partially close the cover and remove the pointer needle.
5. Open the cover to the extreme left.
6. Replace the pointer.
7. Raise the weighted arm until it is perfectly horizontal and block it with an adjustable support - double check the arm with a carpenter's level.
8. The needle will swing from left to right and should stop at 200 on the middle scale.
9. If the needle does not read 200, it can be corrected by bending the mild steel clamp at the back of the grid.
10. Check that the counter weight is properly positioned. Use the test arm and 101 lb. weight to ensure the counter weight balances exactly. Adjusting the counter weight up or down the weighted arm makes corrections to the balance.
11. Lower the weighted arm.

12. The hydraulic brake should allow the counter weight to return to a vertical position with a slow, steady motion. Abrupt drops can be corrected by changing the hydraulic oil to remove any water in the reservoir.
13. Remove the pointer.
14. Close the cover.
15. Replace the pointer.
16. Run the tenderometer empty to check for binding - there should be no appreciable reading on the scale.

**NOTE:** Steps 4 - 6 are necessary or the lip on the lid will damage the pointer when the weighted arm is raised.

## **Certificates**

Each visit to a processor to check tenderometers is documented on a Pea Tenderometer Inspection Report.

This form has three sections. The first section is common to the inspection of both the FMC and FTC tenderometers and deals with Sampling Procedure and Weighing of Loads and Tare Weight Deductions.

Sampling Procedure documents - The five key factors in selecting random samples for representative tenderometer readings:

- Method of Selection
- Size of Sample Selected
- Method of Cleaning Sample
- Number of Readings Per Load
- Time Lapse Between Threshing and Grading

By observing the processors routine in selecting samples, these five points can be ascertained.

Weighing of Loads and Tare Weight Deductions is a checklist of six factors that establish the load's net weight and tare values.

- Certification within the last two years of all scales by the Weights and Measures Directorate of Consumer and Corporate Affairs or proof that the scale has been

serviced within the last year. A sticker should be on the scale to indicate this servicing. Proof from office files would also be acceptable.

- Weigh Bills must include gross, tare and net weights. Check the processor's copies from the previous day.
- Tare values must be established according to the Agreement for Marketing Peas for processing.
- Variety: Check either Alaska or other. If other, state the variety.
- Screen Size for Alaska Type - The screen size must not be over 3/16 inch. For other varieties, the screen size must not be over 1/4 inch.
- Determine if a repodder is used.

The next two sections document the verification of both the FMC and the FTC tenderometer. A processor may have one or the other or a combination of both. Up to three FMC models can be documented on one certificate but each FTC unit requires a separate certificate.

These two sections are a documentation of the procedures used to verify the accuracy of the tenderometers as discussed earlier.

Any corrective action or adjustments made should be listed in the comment section of the bottom of the certificate.

Any tenderometer not certified by UPGRADE CONSULTING LTD should be clearly identified by a red detention tag listing the inspector's name and telephone number and the date of the tenderometer's removal from service.

## **Infraction Reports**

Minor infractions or corrections that are resolved during inspection visits should be noted on the Pea Tenderometer Inspection Report. Serious incidents of non-compliance will require that the inspector complete a detailed Infraction Report. An example of what would constitute a serious infraction includes:

- use of an uncertified tenderometer
- removing a faulty tenderometer or transducer assembly from service
- failing to take adequate tenderometer samples
- improper tare collection such as mixing different growers' tare, including waste from the floor in tare

- use of wash water to empty trucks (as stated earlier, a small amount is permitted to clean out trucks after dumping)
- use of uncertified scales to weigh trucks or tare
- improper or incomplete records of weights or tenderometer values
- any other major violation of the terms of the Marketing Agreement for Peas

The Infraction Report must be completed accurately in sufficient detail to fully describe the incident immediately after the inspection visit. As this information is the basis for identifying and correcting the problem, the completeness and accuracy of this document is vital.

Advise the UPGRADE CONSULTING LTD Manager as soon as possible (same day preferably) and fax the Infraction Report with a covering memo to explain the issues surrounding the incident.

The UPGRADE CONSULTING LTD Manager will notify the Ontario Food Processors Association and the Ontario Vegetable Growers' Marketing Board at the time of the infraction. A copy of the infraction report with corrective actions and follow-up procedure will be forwarded to OFPA and OPVG as soon as possible.

## **Dispute Resolution**

It is the responsibility of UPGRADE CONSULTING LTD to monitor the tenderometer and tare procedures of processors when receiving peas to ensure that provisions of the Marketing Agreement for Green Peas for Processing are met.

If the inspector identifies a violation, it will be resolved through consultation between the processor, the OPVG and UPGRADE CONSULTING LTD. The inspector may or may not indicate the corrective action to be taken but shall, in any event, notify all parties of the violation as soon as possible.

Each dispute will be handled individually depending on the facts surrounding the incident. The inspector should expect to provide full details based on the Infraction Report.