



CHAPTER 2

Mass determination of factory materials

1. General

Mass determination of cane, mixed juice, press water mud (where applicable) and final bagasse shall be subject to the provisions of any agreement published in terms of the Sugar Act 1978, or any amendment thereof, or any provisions as may be agreed upon by the South African Sugar Association.

Only a person authorised in terms of the Trade Metrology Act is permitted to make adjustments to massmeters.

2. Cane

2.1 General

- (a) The massmeter shall be situated as near as possible to the off-loading site in order to minimise any loss or gain in mass after the cane has been weighed.
- (b) Massmeters shall be self-indicating and provided with a printing device for recording the mass.
- (c) Special attention is drawn to the following regulations of the Trade Metrology Act, 1973.

- (i) Part II, section 14 (1).

“Except as otherwise provided in any regulation of this Part, when the tare or gross mass of any container, railway truck or road vehicle or combination of railway trucks or road vehicles is to be determined for any prescribed purpose including the purposes of the provisions of any law or by-law, the measuring of such mass shall be carried out upon a suitable massmeter having a goods platform or platforms of such size as to allow of the mass of such container, truck, road vehicle or combination being measured as one complete unit and during such measuring the entire container, truck or road vehicle or combination shall be stationary on the platform or platforms and if a combination of trucks or road vehicles must be uncoupled to form separate units in order that their tare or gross mass be measured as prescribed herein, each such separate unit shall be entirely disconnected before the measuring takes place.”

- (ii) Part II, section 44 (3) (d)

“Except as otherwise provided in any regulation of this Part -

- (i) Any self-indicating scale, of a model approved after 1 September 1957, which is provided with a recording or printing device shall not record or print unless the scale is in equilibrium and unless any oscillation of the indication is within one half of the value of the smallest graduation above or below the point of equilibrium.”
- (d) An automatic device to ensure that the vehicle to be weighed is correctly placed on the massmeter platform shall be provided. This may be omitted at the discretion of the Cane Testing Service.
- (e) The mass of the cane shall be obtained by subtracting the gross tare from the gross mass of the vehicle and its contents.
- (f) Gross tare means the mass of the vehicle plus the mass of all loading poles and chains plus any delivered material still residing after unloading.

- (g) Cane massmeters shall be certified every off-crop by the Trade Metrology Department or their duly appointed deputies.

2.2 Road vehicles

- (a) There shall be at least 15 metres of straight and level road on either side of the massmeter platform.
- (b) The vehicles shall be weighed after unloading as often as is agreed upon by the miller and the grower, but at least once daily. The mass shall include side poles and chains used to transport the cane from the field to the factory. This constitutes the gross tare of the vehicle.

2.3 Tram trucks

- (a) There shall be at least 15 metres of straight level track on either side of the massmeter.
- (b) Tram trucks shall be weighed uncoupled and separately.
- (c) The gross tare, which shall be distinctly marked on the side of each truck, shall include the mass of the loading chains attached to the truck; such gross tare shall be determined at the beginning of each season and as often as necessary due to repairs and other causes, to the satisfaction of the miller and the supplier of the cane.

2.4 Railway trucks

- (a) There shall be at least 15 metres of straight level track on either side of the massmeter.
- (b) Railway trucks shall be weighed uncoupled and separately.
- (c) The net tares stencilled on the sides of the trucks have been found, in certain cases, to be seriously in error. The miller may re-tare each and every truck. Any delivered material which may remain in the truck shall be included in the gross tare.
- (d) Where unloaded trucks are not re-tared in the mill yard, the net tare, as stencilled on the side of the truck by the Railway Administration, shall be accepted but should the delivered material residing in the truck be significant then the mass thereof shall be determined and added to the tare mass of the truck.

2.5 Chains

The mass of loading chains constitutes part of the gross mass of the vehicle and consequently must be allowed for in determining the net mass of the cane. This can be done either by taking the average mass of a number of similar chains multiplied by the relevant number of chains or by loading the requisite number of substituted chains of the same type when taring the empty vehicle.

2.6 Loading poles

- (a) Loading poles should be approximately 2.5 m long and 90 mm butt end diameter. The mass of each pole should be not less than 7 kg nor greater than 18 kg.
- (b) If the mass of the poles for taring purposes is not determined by a separate weighing, the average mass per pole as determined by mutual agreement between the miller and the Mill Group Board shall be used in conjunction with the total number of poles used per truck to determine the tare for poles in each truck.

2.7 Maintenance and checking

Exposure to the elements makes these massmeters subject to errors due to accumulation of debris on the platform and debris and water in the massmeter pit. Proper maintenance

requires that accumulations be kept to a minimum through regular cleaning of both the platform and pit and by the provision of adequate drainage for the latter.

Maintenance and checking shall be as follows:

2.7.1 *At every mass determination*

2.7.1.1 Mechanical scales

- (a) Always check the mass printed on the massmeter card against that shown on the dial. If there is a discrepancy report immediately to the scales officer.
- (b) Check that the dial needle swings freely. If not, report immediately to the scales officer.

2.7.1.2 Electronic load-cell scales

- (a) Check that the mass displayed on the digital display is the same as on the printer connected to the assize controller.

2.7.2 *Once per shift*

2.7.2.1 Mechanical scales

- (a) Check that the platform is free from debris - clean if necessary.
- (b) Check the massmeter zero, adjust to zero if necessary and print the reading on a ticket as confirmation.
- (c) Check that the "anti-fraud" device is operational, i.e. that the printer does not print while the dial needle is in motion - if not operational, report the matter to the scales officer.
- (d) On a multiple range massmeter ensure that when the range setting is either too high or too low for the mass being measured, the needle rests in the ungraduated section of the chart. If not, report immediately.

2.7.2.2 Electronic load-cell scales

- (a) Check that the platform is free from debris - clean if necessary.
- (b) Check that the massmeter is at zero (adjust if necessary). Print the reading on a ticket as confirmation.
- (c) Check that the "anti-fraud" device is operational, i.e. that printing of a mass is only possible when the "motion" indicator light on the massmeter display is on, indicating that the scale has reached a stable reading. If not, report immediately to the scales officer.
- (d) Push the "test" push button on the massmeter display and check that all digits show the figure 8. If not, report immediately to the scales officer.

2.7.3 *Once per day*

- (a) Check the clearance between the platform edges and the pit walls - this must be not less than 5 mm and not more than 20 mm.
- (b) In the case of railway and tram massmeters check that there is sufficient clearance (as specified in (a) above) between the ends of the platform rails and main rails.
- (c) Check adjacent massmeters by weighing the same vehicle on each massmeter. Print a ticket showing the mass of the vehicle on both massmeters. Under the Trade Metrology Act the following scale errors are allowed when conducting a checkmass test.

- (i) Where the scale is new, or has not been used after repair or maintenance, the error allowance shall be as follows:

Mass applied	Error allowed
Up to 500 times the value of the smallest graduation.	0.5 of the value of the smallest graduation.
Above 500 times and up to 2 000 times the value of the smallest graduation.	The value of the smallest graduation.
Above 2 000 times the value of the smallest graduation.	1.5 of the value of the smallest graduation.

- (ii) These allowances shall be increased by half if the massmeter is checked after it has been used since the last repair or maintenance.

In the industry, scales with 5, 10, 20 and 50 kg divisions are in use and thus under the circumstances described in (i) above the allowances given in Table 1 shall apply.

Table 1: Permitted tolerances for newly checked massmeters

Error allowance	Scale with 5 kg div	Scale with 10 kg div	Scale with 20 kg div	Scale with 50 kg div
	Mass applied	Mass applied	Mass applied	Mass applied
0.5 div	0 - 2.5 ton	0 - 5 ton	0 - 10 ton	0 - 25 ton
1.0 div	2.5 - 10 ton	5 - 20 ton	10 - 40 ton	25 - 100 ton
1.5 div	above 10 ton	above 20 ton	above 40 ton	above 100 ton

Under the conditions given in (ii) above the error allowance shown in Table 2 shall apply.

Table 2: Permitted tolerances for used massmeters

Error allowance	Scale with 5 kg div	Scale with 10 kg div	Scale with 20 kg div	Scale with 50 kg div
	Mass applied	Mass applied	Mass applied	Mass applied
0.75 div	0 - 2.5 ton	0 - 5 ton	0 - 10 ton	0 - 25 ton
1.5 div	2.5 - 10 ton	5 - 20 ton	10 - 40 ton	25 - 100 ton
2.25 div	above 10 ton	above 20 ton	above 40 ton	above 100 ton

When checking two massmeters against one another by weighing the same vehicle or mass on each massmeter, the mass difference found between the masses indicated on the respective dials may not exceed the summation of the error allowance applicable to each massmeter.

2.7.4 Once per week

- (a) Check massmeters against one another by weighing the same vehicle or mass on each massmeter. Print a ticket showing the mass of the vehicle on each massmeter.
- (b) Inspect the massmeter pit and ensure that the water drain is unobstructed.

3. Imbibition water

The mass is not required for payment purposes. The use of a water meter gives sufficient accuracy for factory control.

4. Mixed juice

4.1 General

The mass shall be determined by weighing, using massmeters of the variable load type. The mixed juice massmeter check masses shall be certified every off-crop by the Trade Metrology Department or their duly appointed deputies.

4.2 Maintenance and checking

- (a) The massmeter shall be adjusted only by a registered scale mechanic.
- (b) Massmeters shall each be provided with two tip counters.
- (c) During operation the inlet valves should be inspected hourly for leaks. To facilitate this operation the necessary walkways and inspection hatches must be provided. Leaks must be reported to the mill scales officer.
- (d) Once per day the total of ten consecutive batch tip masses must be compared with the total indicated on the massmeter totalizer. The maximum difference allowed between the totals is 0.5%. When calculating the percentage error, use the sum of the batch masses as the true mass.
- (e) On scheduled maintenance stops or whenever it is deemed necessary, apply the check mass ten times and from the total shown on the totalizer determine the arithmetic mean recorded for the check mass. The difference between the arithmetic mean mass recorded and the certified capacity of the scale is the error and the maximum error allowed is given below.
 - (i) Where the scale is new or has not been used after repair or maintenance, the error allowance shall be as follows:

Certified capacity	Error allowed
Up to 500 times the value of the smallest graduation.	0.5 of the value of the smallest graduation on the totaliser dial.
Above 500 times and up to 2 000 times the value of the smallest graduation.	The value of the smallest graduation on the totaliser dial.
Above 2 000 times the value of the smallest graduation.	1.5 of the value of the smallest graduation on the totaliser dial.

- (ii) Where the scale has been used since the last repair or maintenance the error allowance indicated in (i) above shall be increased by half except that where this works out to be greater than 0.5%, the error shall be limited to $\pm 0.5\%$.
- (f) Where there is a second massmeter and facilities exist, it is recommended that once per month water be cycled through the two massmeters in series and a comparison made of the respective totalizer readings after a minimum of ten batch tips of the larger massmeter. The maximum difference shall be $\pm 1.0\%$ of the lower of the two totalizer readings.
- (g) The massmeter should be cleaned at least during the mill maintenance stop.

5. Press water mud

The mass shall be determined by weighing except in situations where the mud is returned to the mixed juice.

The provisions of items 4.2 (a) to 4.2 (e) and 4.2 (g) for mixed juice above concerning maintenance and checking of the massmeter shall also apply to the weighing of press water mud.

6. Final bagasse

The mass shall be calculated from the mass of cane, the fibre contents of cane and bagasse and the mass of insoluble solids in mixed juice:

$$\text{Tons final bagasse} = \frac{(\text{tons cane} \times \text{fibre \% cane} - 100 \times \text{tons insoluble solids in MJ})}{\text{fibre \% bagasse}}$$

Note: In situations where press water mud is weighed and not returned to the process before the mixed juice it is necessary that the tons insoluble solids in the press water mud be included with the tons insoluble solids in mixed juice in the above final bagasse mass calculation.