

Required equipment and traceability

Average Quantity System inspections may require a variety of specialised equipment to assist the LMO to carry out the their visit efficiently and effectively

- Remember the 5 P's:
 - Perfect Planning Prevents Poor Performance

Required equipment and traceability

Inspection equipment

Make sure the weighing / measuring equipment you take with you is:

- Suitable for the type of goods you are inspecting, and
- Suitably accurate

Required equipment and traceability

Weighing equipment



Required equipment and traceability

Weighing equipment – Guidelines on scale interval size

Gross Weight (g) of Pre-package	Scale interval (d) in g
<25	0.01
≥25 to <1000	0.1
≥1000 to <5000	1.0
≥5000	2.0

Required equipment and traceability

Weighing equipment – Guidelines on scale interval size

- In general a weighing instrument is considered appropriate if it is verified and the maximum permissible error in service is no more than $0.2 T$ of the prepackage to be tested
- For example, prepackage with nominal quantity of 500 g

$$T = 15 \text{ g and } 0.2 T = 3 \text{ g}$$



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Weighing equipment – Setting up equipment on site

- Find a suitable location
- Convenient to inspection lot / production line
- Safe area; away from moving vehicles etc
- A good working height



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Weighing equipment – Setting up equipment on site

- On a stable and level surface
- Plenty of room for storing sample packages
- Dry, with minimal environmental disturbances



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Weighing equipment – Setting up equipment on site

- Test your weighing equipment on site prior to undertaking the inspection of any prepackage
- If errors are found in your weighing equipment, note the errors and determine if the equipment is suitable

Required equipment and traceability

Weighing equipment – Masses

- To verify the accuracy of the weighing instrument
- Appropriate class (M1 or better)
- Suitably accurate
- Traceable to national standards



Required equipment and traceability

Measuring equipment – Length

- Flexible tape measure
- Rigid length measure



Required equipment and traceability

Measuring equipment – Temperature

Thermometer

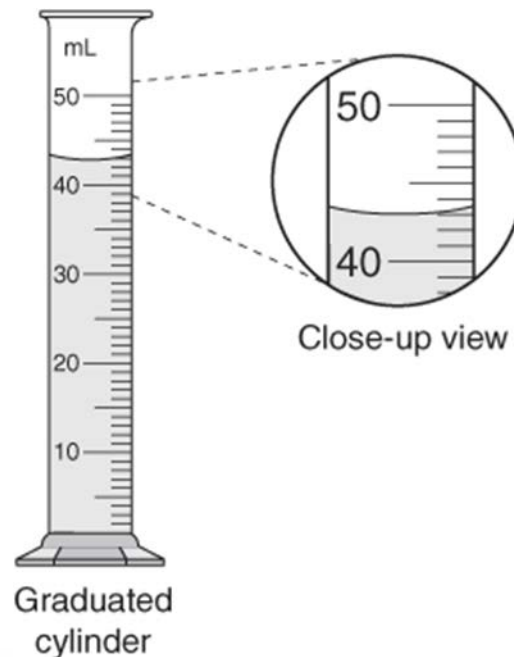
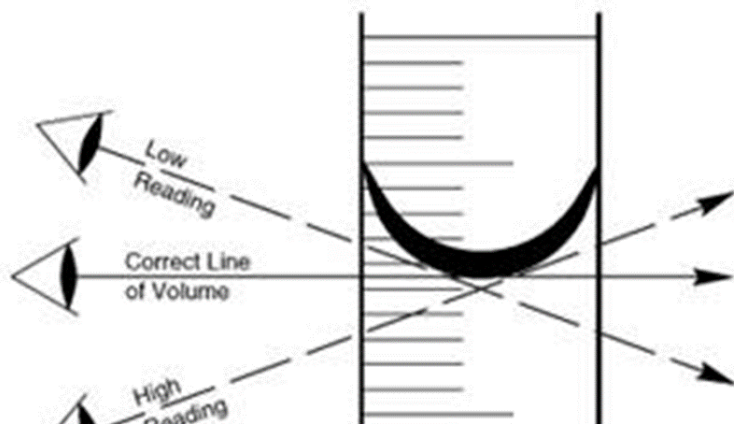
- Measuring the temperature of air or liquid
- Ideally resolution of 0.1 C
- Calibrated and traceable



Required equipment and traceability

Measuring equipment – Graduated cylinder

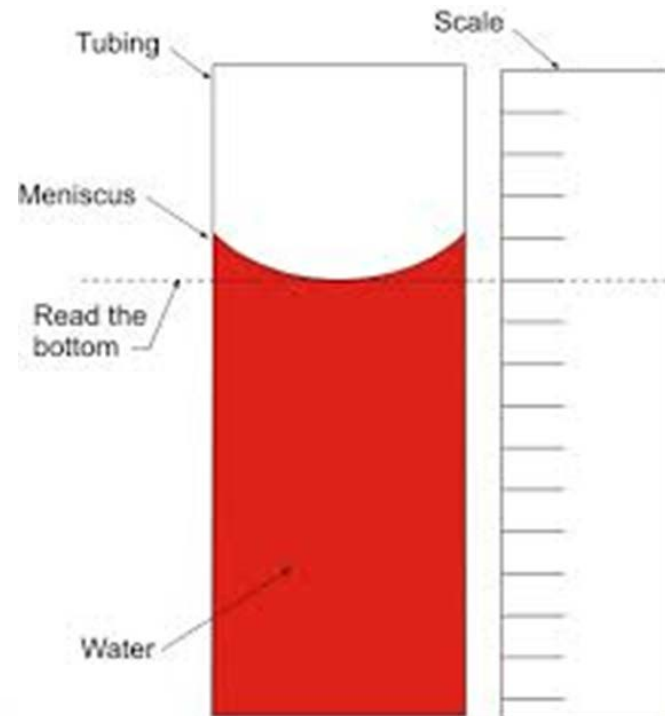
- To measure density or
- Direct volume comparison



Required equipment and traceability

Measuring equipment – Graduated cylinder

- Reading a meniscus
- A meniscus is the curved surface at the top of a column of liquid
- The volume should be read from the bottom of the meniscus.



Required equipment and traceability

Measuring equipment – Hydrometer

- The function of the hydrometer is based on Archimedes principle that a body suspended in a liquid will be buoyed up by a force equal to the weight of the liquid displaced

Thus, the lower the density of the substance, the lower the hydrometer will sink



Required equipment and traceability

Measuring equipment – Hydrometer

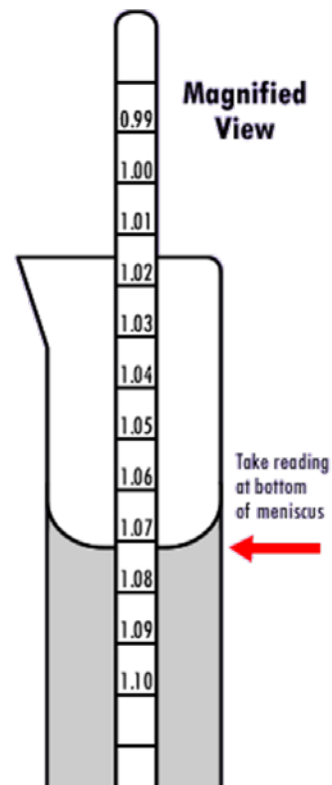
- Used by filling a cylinder with enough product to allow the hydrometer to float
- Carefully lower the hydrometer into the cylinder and gently spin while releasing



Required equipment and traceability

Measuring equipment – Hydrometer

When reading the density from a hydrometer always take the reading at the bottom of the meniscus

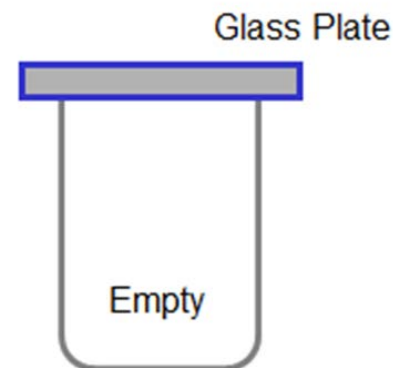


Required equipment and traceability

Measuring equipment – Density cup

Used for determining the density of a liquid

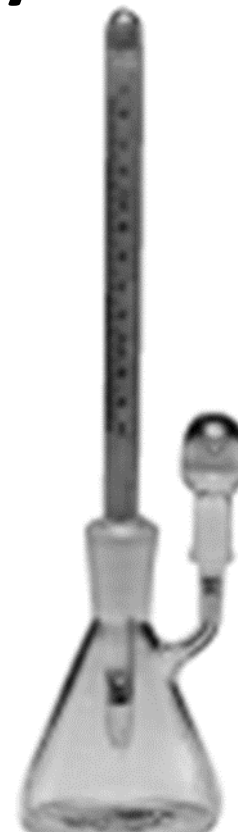
Used with a weighing instrument and traceable masses



Required equipment and traceability

Measuring equipment – Pycnometer

- Glass Pycnometer
- Used for determining density of a liquid
- Used with a weighing instrument



Required equipment and traceability

Measuring equipment – Electronic density meter

- These instruments calculate the density and display it on the digital read out
- Easy to use
- Require only a small amount of product
- Easy to clean



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Required equipment and traceability

Other equipment

- Tablet
- Laptop
- Stopwatch
- Calculator
- Camera
- Suitable Personal Protective Equipment (PPE)





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Traceability

Property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties

Required equipment and traceability

Traceability

- Metre
- Kilogram

Unit name	Unit symbol	Quantity name	Dimension symbol
metre	m	length	L
kilogram	kg	mass	M
second	s	time	T
ampere	A	electric current	I
kelvin	K	thermodynamic temperature	Θ
mole	mol	amount of substance	N
candela	cd	luminous intensity	J



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Traceability

- Metre; current defined as:
 - The distance travelled by light in vacuum in $1/299,792,458$ of a second
- Kilogram; currently defined as:
 - Being equal to the mass of the international prototype of the kilogram



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Traceability – New Zealand

New Zealand Hierarchy of Standards of Mass	
International prototype kilogram	
New Zealand standard kilogram	
Departmental standards	
District standards	
Inspector working standards	Accredited person working standards