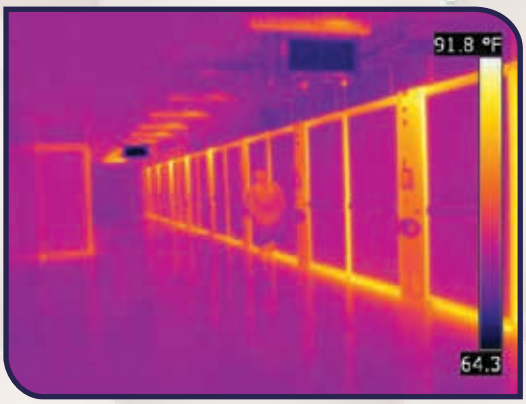
10

WHY MEASURE ROOM STATIC PRESSURE?

WHAT IS ROOM STATIC PRESSURE?

- "Room pressure" is the difference in pressure between the room itself and the reference it is being compared to.
- If the room pressure is measured at +5Pascals (Pa) / 0.02 Inches of Water Column ("WC), and the reference is to the outside, this means that the air pressure in the room is 5Pa / 0.02"WC higher than atmospheric pressure.
- A room will show a positive pressure if it is well sealed, and the volume of air being supplied into the room is greater than the volume of air being extracted from the room through the incubators and other exhaust systems.



WHY IS ROOM AIR PRESSURE IMPORTANT?

- Incubators are designed to operate with a certain pressure differential between the intake and the exhaust.
- Too high or too low pressure differentials across the incubator can impair the flow of air through the incubator. This will affect the performance of the incubator and may compromise embryo development.
- Most hatcheries operate on a slight pressure gradient between rooms to keep air from the dirtiest parts of the hatchery (chick and wash rooms) from getting into the cleaner areas (egg store and setters).

HOW TO MEASURE ROOM STATIC PRESSURE

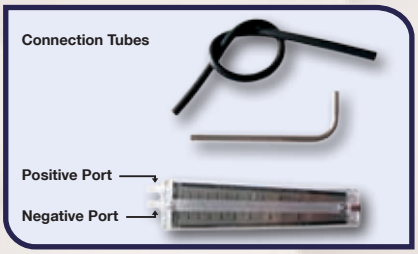
UNITS OF MEASUREMENT

- The most common units used to measure room pressures are Pascals (Pa) or Inches of Water Column ("WC).
- There are 2.5Pa per 0.01"WC.

Inches of Water Column ("WC)	Pascals (Pa)
0.01	2.5
0.02	5.0
0.04	10.0
0.08	20.0
0.12	30.0

PRESSURE METERS

- Pressure meters come in a variety of types and are known as *manometers*.



- A simple, portable and accurate meter is the floating ball meter. This can measure both positive and negative pressure.

- Dial type meters, calibrated to measure both positive and negative pressure are also useful.

- Digital meters are also suitable.

- Before buying a manometer, confirm the required pressure range of your specific incubator type.
- For example, do not buy a manometer with a range of 0-60Pa (0-0.24"WC) if your rooms are only going to operate at +5Pa (+0.02"WC).

REFERENCE POINT – OUTSIDE AIR PRESSURE

- Room pressure should always be measured relative to the outside atmospheric pressure.
- However, a room in the middle of a hatchery will often have several other rooms between it and the outside, all of them operating at slightly different pressures and none of them open to the outside. Here, measure room pressure relative to the roof or a passage, having first confirmed that the reference space is at ambient pressure.

***Note**: It may be impossible to have a reference room at equilibrium to the outside air. If so, find the reference room pressure relative to the outside air and then add this second measurement to the difference between the room of interest and the reference room. However, this method will increase the likely error in the measurement, so it is worth making every effort to create a proper reference room.*

OPTIONS FOR FINDING A REFERENCE POINT

1. Measure relative to the roof space

- It is often easiest to use the roof space as a reference point.
- Make sure the roof space is neutral by checking the pressure relative to the outside through a door or roof hatch.
- If the pressure reading is 0, then the roof space is at atmospheric pressure.
- If it is positive or negative relative to the outside, open doors in the roof space until the pressure is neutral.
- Once the roof space is neutral, measure the pressure of the room of interest through a small hole in the ceiling of the room.

2. Measuring relative to a passage

- First, check if the passage is at atmospheric pressure.
  - This can be done by opening all internal doors along the passage from the room to a point where the passage can open to the outside such as a window or door.
  - Measure the passage pressure at this point.
- If the pressure reading is 0, then the passage is at atmospheric pressure.
- If the pressure reading is positive or negative, open an external door or window in the passage to equalise the pressure to the outside and then measure again.
- Once the passage is neutral, go back to the room of interest (keeping all the inter leading doors along the passage open) and measure the room pressure through the door seal.

3. Measure directly to the outside

- If the room has an outside wall, then a small hole can be made in the wall directly to the outside.
- The outlet will need to be protected from the wind such that it is surrounded by still air.
- Measure the room pressure directly relative to the outside through the hole.

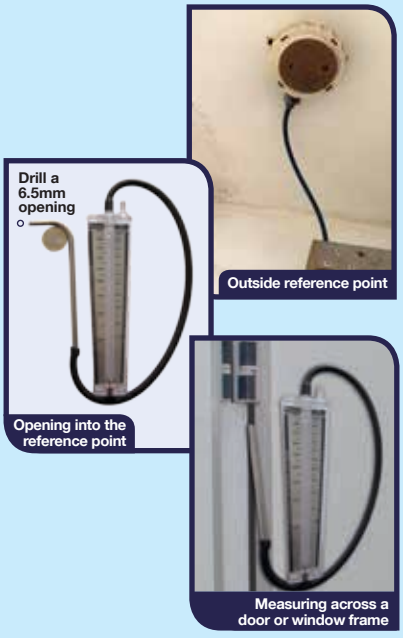
HOW TO USE THE PRESSURE METER

- Read the operating instructions, which will give directions on how to hold the meter while measuring, and how to calibrate it.
- The meter will have both a positive and a negative port, and either one or both of these will have a plastic tube attached.

- Start by assuming that the rooms will be operating close to their design specification, and will be running at positive or negative pressure relative to atmosphere accordingly.
- If measuring from within a positive room to the outside/roof, then attach one end of the tube to the negative port and put the other end through the hole/door so that it is outside the room.
- If standing outside a positive room (in the passage or roof) you want to measure, place one end of the plastic tube on the positive port and put the other end of the tube through the door/hole into the room.
- In both cases above if the meter shows a positive reading or the dial moves to the right, the room is positive.
- Connect the tubes opposite to the above if measuring a negative pressure room.

TAKE CARE!

- The **outside reference point** will need protection from the wind.
- The **opening into the reference point** should be small enough to prevent any airflow around the tube.
- If **measuring across a door or window frame**, make the opening as small as possible by closing the door or window against the tube, making sure not to pinch or squeeze the tube in the process.
- The manometer should be held vertically.



TROUBLESHOOTING

- If the pressure reading seems to fluctuate or is otherwise unstable.
  - Check the shield around the reference point opening to the outside air.
  - Switch extractor fans off in rooms being used as a reference point and check that the room still has a neutral pressure to the outside.
  - Make sure that the rubber tube of the manometer is not blocked from pushing it through the measuring hole.

- If room pressure is not as expected.
  - Check the reference point is correct.
  - Check air inlets and filters are not obstructed or dirty.
  - Check fan speeds, fan belts and fan blades are as they should be (bent or damaged fan blades will limit the effectiveness of the fan).
  - Check the ventilation dampers are working correctly.
  - Check the Air Handling Unit (AHU) filters and fan settings.


Dirty air filters


Worn fan blades