

Calculating display case airtightness – example

1. Install the data logger software.
2. Connect the data logger to your PC and use the software to configure the settings (start time, measurement interval) and start the data logger. For example, select a measurement interval of 10 seconds (so that the device always displays the current value quickly on the display) and a memory interval of 10 minutes (to avoid too much data).
3. Place the data logger in the display case
4. Close the display case almost completely, leaving only a small gap open – just enough so that you can still spray into the display case with the sprayer
5. Spray into the display case for approx. 5 seconds (depending on the size of the display case...)
6. Close the display case and wait for the ppm value to be reached
7. If necessary, open it again until a value of approx. 3000 – 4999 ppm is reached (the device has a measuring range up to 10.000 ppm).
8. Wait 0.5–5 days for the measured value to decrease. The new measured value should differ significantly from the original measured value, i.e. be closer to < 2000 ppm.
9. Open the display case, remove the data logger and connect it to the PC.
10. use the software to read out the measurement data and display it as a curve.
11. Find 2 points on the graph where the curve is reasonably linear.
As an example, we select values from a customer measurement:
14.11.2015 0.00h (2897ppm) to 14.11.2015 at 12.00h (2207ppm).
The measurement period is therefore 0.5 days.

12. insert values into the formula in the publication, see

<https://ilfa.eu/mwdownloads/download/link/id/91>

We set the CO₂ concentration of the environment at 400 ppm (current CO₂ concentration of the atmosphere):

Now we can insert the values into the formula:

$$N = [\ln(\text{Cint } t_0 - \text{Cext}) - \ln(\text{Cint } t_1 - \text{Cext})]/(t_1 - t_0) \quad (1)$$

where

N = number of air changes

Cint t₀ = internal concentration of tracer gas in enclosure at start

Cext = external concentration of tracer gas in room

Cint t₁ = internal concentration of tracer gas in enclosure at end

t₀ = time at start (days)

t₁ = time at end (days)

ln = natural logarithm

Then the result is

$$N = [\ln(2897 - 400) - \ln(2207 - 400)] / 0.5 \text{ days}$$

$$N = [\ln 2497 - \ln 1807] / 0.5 \text{ days}$$

You can calculate the natural logarithm of 2497 and 1807 using a calculator or from a table on the Internet or from a calculator on the Internet

$$N = [7.82 - 7.50] / 0.5 \text{ days}$$

$$N = 0.32 / 0.5 \text{ days}$$

$$N = 0.64 \text{ air change per day.}$$

The customer's display case can therefore be categorised as moderately tight. Very tight showcases achieve values of up to

0.1 - 0.2 air change per day