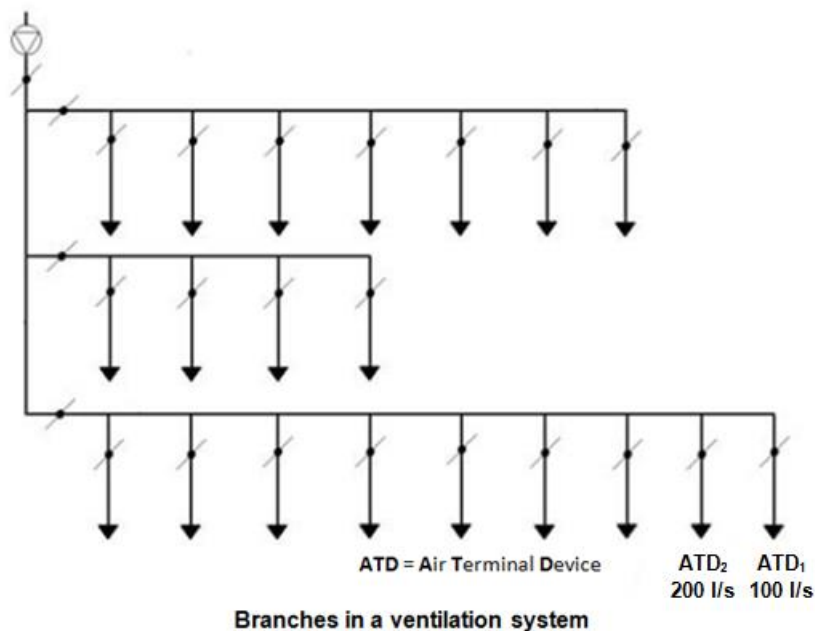


VENTILATION BALANCING Ę PROPORTIONALITY METHOD



PROCEDURE TO BALANCE A VENTILATION SYSTEM WITHOUT SWEMATWIN

1. Select the branch with the highest flow (Q_{measured}) in relation to the projected flow ($Q_{\text{projected}}$) for the ventilation system, in order to get the highest ratio

$$\frac{Q_{\text{measured}}}{Q_{\text{projected}}} \quad (Q = \text{flow})$$

2. Select the ATD, furthest away on the chosen branch to be the reference ATD (**ATD₁**), quite often this ATD, has the lowest flow in relation to the projected flow. If there is another ATD on the chosen branch with lower flow, this ADT is chosen as the index ATD (**ATD_i**). Throttle the reference **ATD₁** to have the same ratio as the index ADT (**ATD_i**). Keep **ATD_i** completely open during and after balancing.
3. Start adjusting the second ATD (**ATD₂**), to get the ratio as it has been done with the reference **ATD₁**. When **ATD₂** is throttled, the flow in **ATD₁** typically rises. Go back and forth between the **ATD₁** and **ATD₂**, to check on the influence of the adjustment of **ATD₂**. Keep on adjusting **ATD₂** until the expected ratio is obtained.

Example:

- The reference ATD, **ATD₁** is projected to 100l/s and **ATD₂** to 200l/s (i.e. the flow in ATD2 is twice the flow in ATD1).
- The measure flows in the unadjusted ATDs are 125l/s in **ATD₁** and 300l/s in **ATD₂**. The following ratios are calculated

$$\frac{Q_{\text{measured}1}}{Q_{\text{projected}1}} = 125 / 100 = 1,25 \quad \frac{Q_{\text{measured}2}}{Q_{\text{projected}2}} = 300 / 200 = 1,5$$

By throttling **ATD₂**, try to get the reference ratio 1,25 in **ATD₁**.

- What is then the flow in **ATD₁**? The measure flow is 135l/s. By throttling **ATD₂** some air flow over to **ATD₁**.
- Go back to **ATD₂** and adjust the flow to 270l/s. The flow in **ATD₁** decreases to 132l/s



- Once again, go back to **ATD₂** and adjust the flow to 264l/s, then the flow in **ATD₁** increases to 133l/s. Since the flow in **ATD₁** cannot be decreased anymore, the flow of 264l/s in **ATD₂** is accepted.
4. The same procedure above is repeated to adjust **ATD₃** using the ratio in **ATD₁** once again, as a reference, thereafter **ADT₄** and **ATD₅** and so on, until all ADTs on the branch are balanced.

$$Q_{\text{measured}} / Q_{\text{projected}}$$

5. The same procedure is repeated on the other branches until they are all balanced.
6. Thereafter the branches are balanced as if they were single ATDs. As measuring points the reference ATDs on each branch can be used.
7. At this point, all the ATDs on the ventilation system have been balanced.

$$Q_{\text{measured}} / Q_{\text{projected}}$$

8. Adjust the total flow by adjusting the fan.

Two operators reporting results directly to each other, by mobile phone or radio, are involved in this balancing task. One of the operators measures while the other operator reads in the reference.

PROCEDURE TO BALANCE A VENTILATION SYSTEM WITH SWEMATWIN

One operator instead of two carries on the balancing task, placing a Swema 3000md or SwemaMan 8 on the reference ATD and measuring with a Swema 3000md..

As in the example above the flow in the reference ATD1 changes when another ATD is adjusted. SwemaTwin always shows the relation between the ATD that is measured and the reference ATD₁ in %.

In the example, the reference ATD, ATD₁ is projected to 100l/s and ATD₂ to 200l/s, then the ratio between the two ATDs displayed on the Swema 3000md the operator is measuring with should be 200%.

$$Q_2 / Q_1 * 100\% = 200 / 100 * 100\% = 200\%$$

Regardless of the measured flow on ATD₂, ATD₂ should be balanced to measure double the flow of ATD₁, i.e. 200%.

Swema 3000md shows the measured flow on ATD₂ as well as the reference flow on ATD₁, therefore the operator does not need to run back and forth between the ATD to be balanced and the reference ATD. As in the example above continue the procedure balancing ATD₃ using the ratio in ATD₁ as a reference, thereafter ADT₄ and ATD₅ and so on, to continue balancing the branches proportionally, finally adjust the total flow by adjusting the fan to get the right flow in each ATD.

ADVANTAGES BALANCING A VENTILATION SYSTEM WITH SWEMATWIN

- Balancing in half the time
- Balancing performed by one operator
- Cost reduction
- High client satisfaction