Extended enclosure calculation:

On this page you can calculate enclosures with up to 3 chambers and up to 6 ports. If all Thiele Small parameters are known, then you can calculate:

- sound pressure frequency response
- step response
- group delay time
- velocity of diaphragm air in port
- displacement of diaphragm and air in port
- impedance response.

Here you can find examples for:

1. **Bassreflex enclosure**
2. **Compuond enclosure (Bandpass enclosure)**

1. Bassreflex enclosure

The easiest ported enclosure uses only one chamber and one port. That means that in this case the online calculator uses only chamber V_{R1} and i.e port 1. All other chambers V_{R2} and V_{F1} must be deactivated by using very high volumes (i.e. V_{R2}=V_{F2}=1e9 liter).

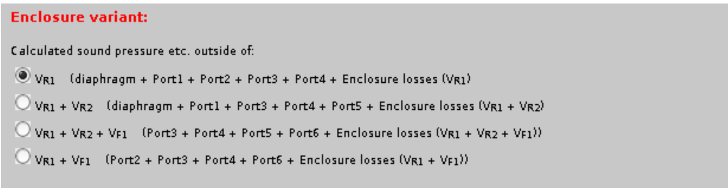
Because we are using only port 1, all other ports must be deactivated. To do this you must make all of these other R_{AP}'s very high (i.e. 1e30 acoustic ohms).

Enclosure variant:

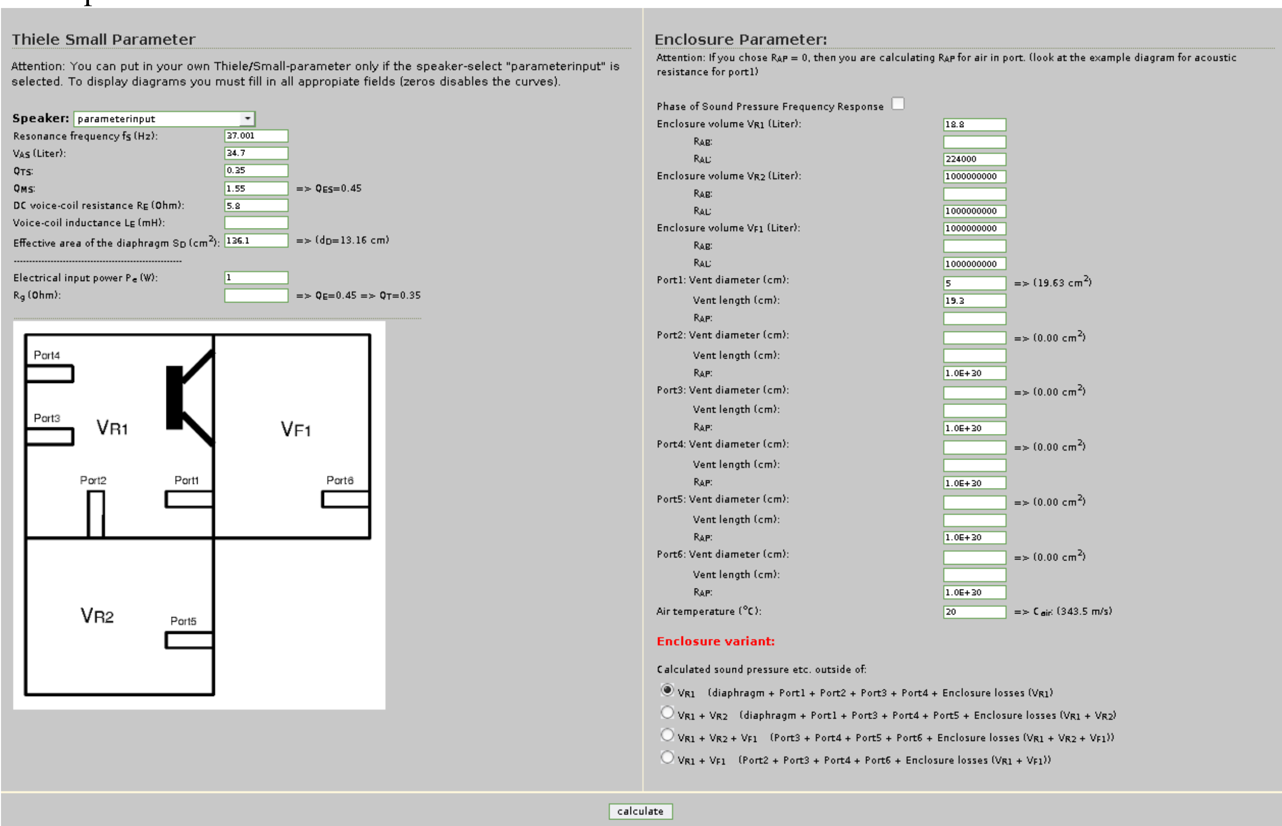
To calculate the sound pressure frequency response, step response etc. you must declare which chambers you are using.

The sound pressure frequency response of a vented enclosure is calculated from shares of sound pressure of the speaker, the ports and of enclosure leakages.

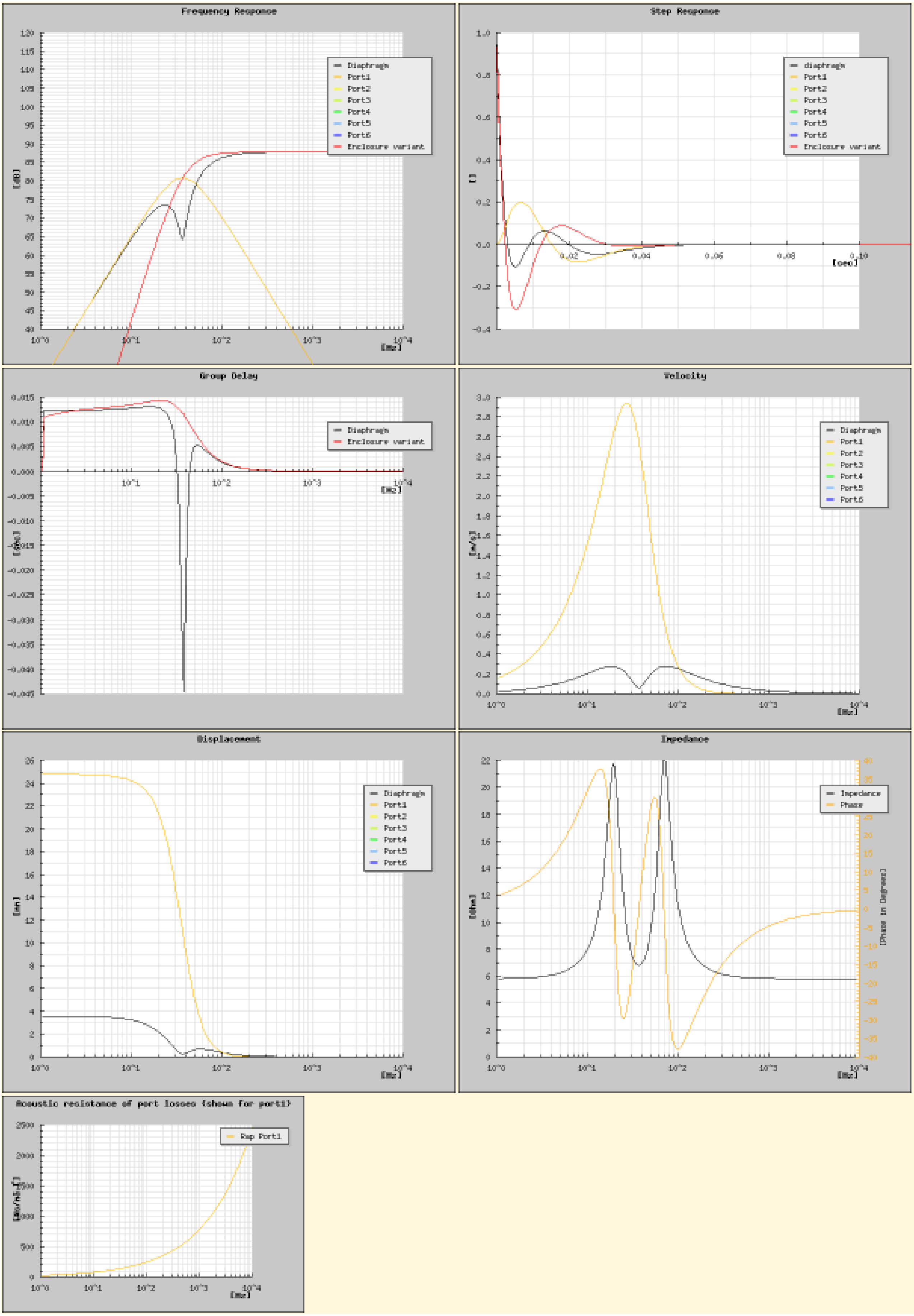
Finally for a vented enclosure you must check mark V_{R1}:



The input fields now look like this:



As a result you will see the following diagrams:

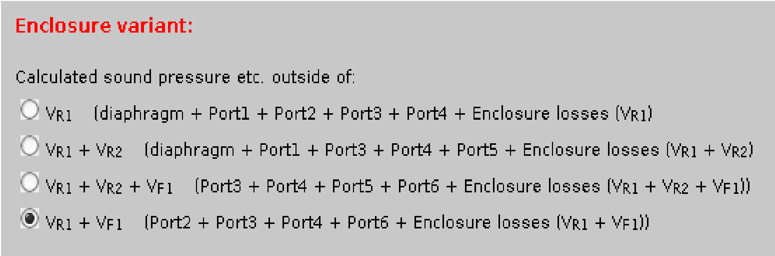


2. **Bandpass enclosure**

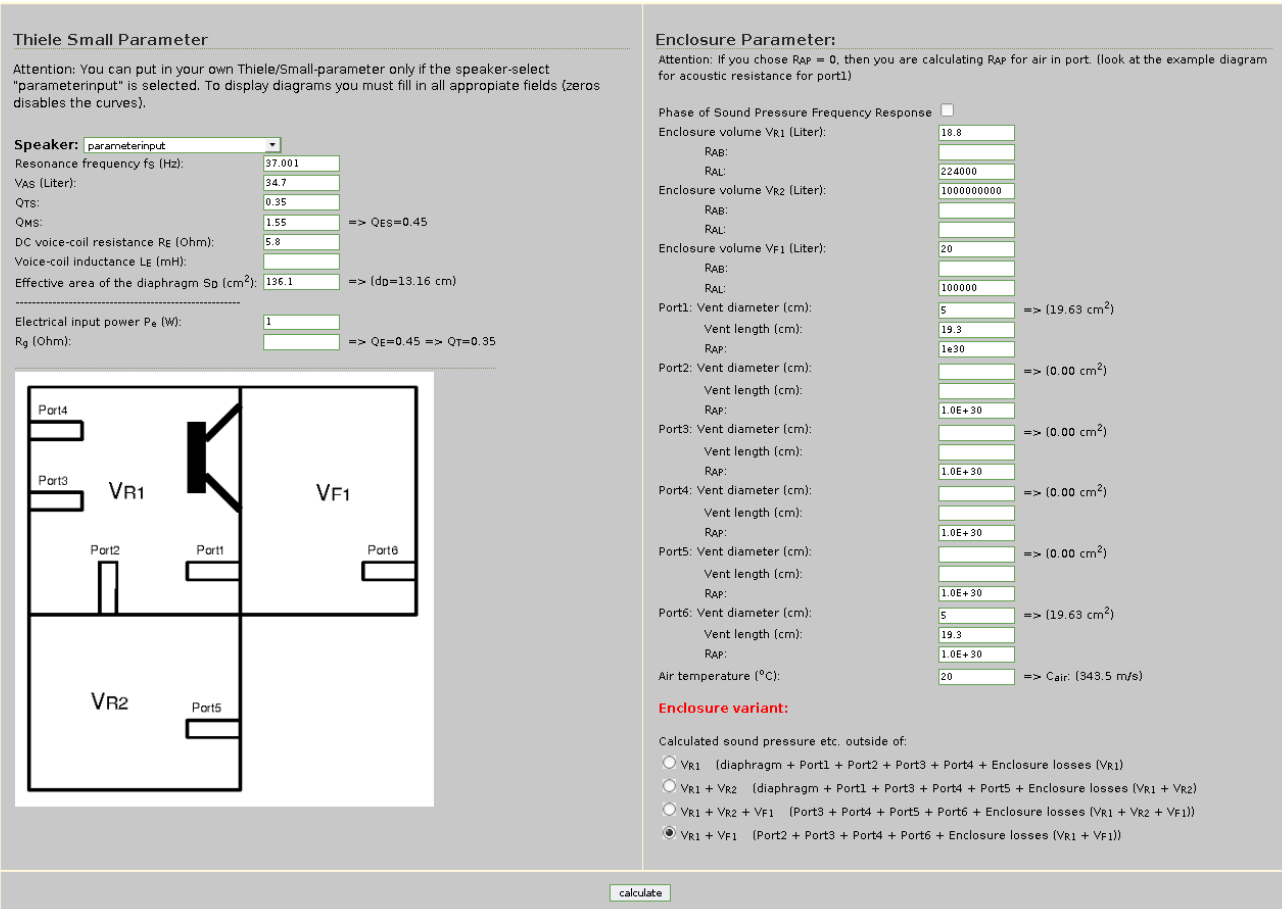
For an easy compound enclosure you can activate only chambers VR1 and VF1.

V_{R2} is not needed and therefore the volume V_{R2} must be very high (i.e. 1e9 liter).
For the easiest compound enclosure only port 6 is used (for more complex variants you can also use ports 1 to 4).

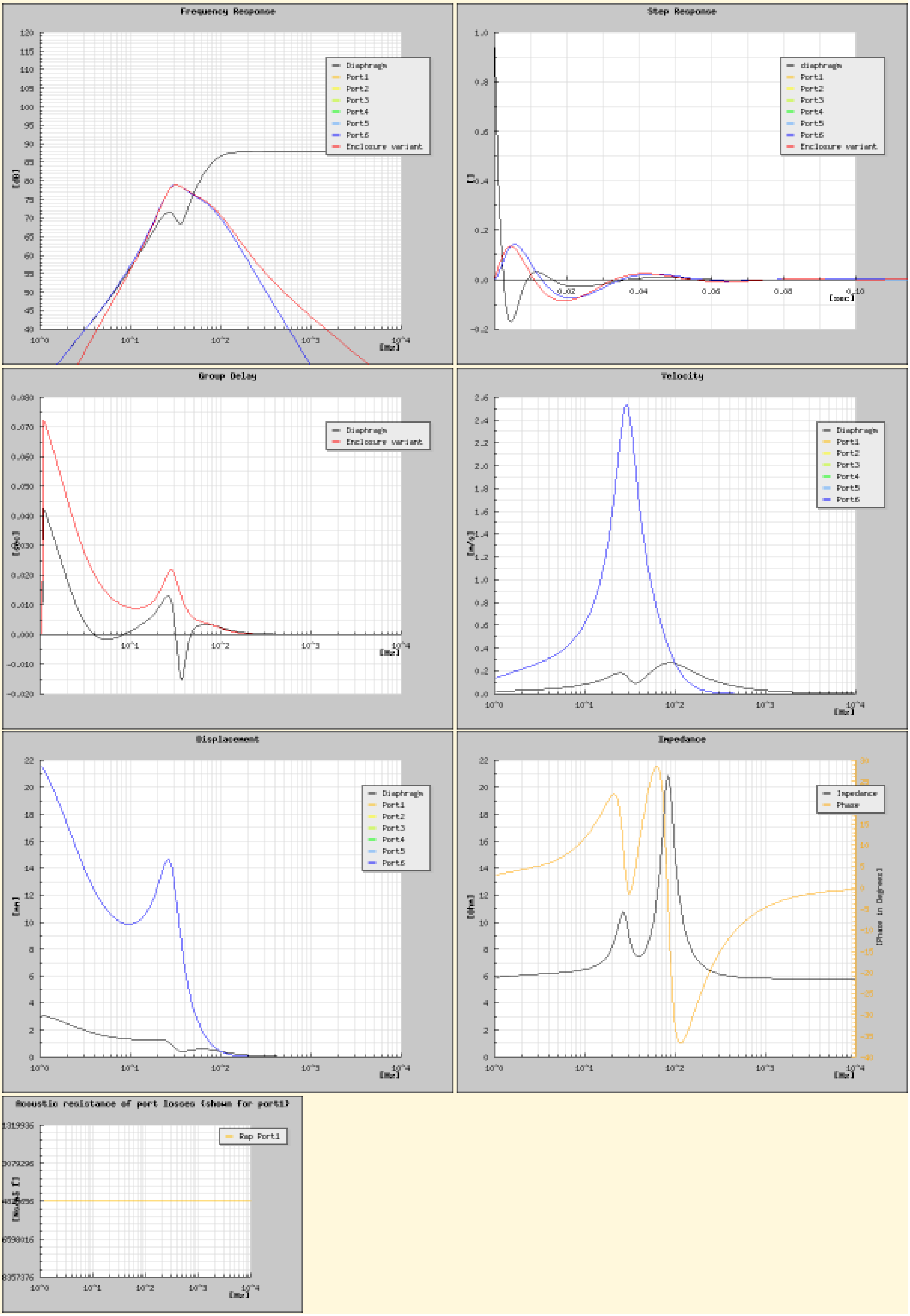
Now check mark chamber V_{R1} + V_{F1} as your enclosure variant:



The input field looks like this:



As a result you can see following diagrams:



In the above diagram for the sound pressure frequency response, you can see that the expected sound pressure is not identical with the sound pressure of port 6.

The reason for this is that the losses of the enclosure are taken into account.

These enclosure losses are taken into account:

- Losses caused from enclosure leakages are represented through a resistance R_{AL}.

  The appropriate Q_L can be calculated to:

  $$Q_L = 2\pi f_B R_{AL} \frac{V_X}{\rho_0 c^2}$$

  (ρ_0=1,18 Kg/m^3, c=345 m/s)

  Q_L from 3 to 20 are common. If you have a tuning frequency of f_B=30Hz and a net enclosure volume V_X=50 liter (V_X one of the volumes V_{R1},V_{R2},V_{F1}) than R_{AL} can have values between 45000 and 220000 (acoustic ohms).

- Absorption losses are represented with a resistance R_{AB}.

  The appropriate Q_A can be calculated to:

  $$Q_A = \frac{\rho_0 c^2}{2\pi f_B V_X R_{AB}}$$

  For unlined enclosures Q_A can have values over 100 (R_{AB}<150).

  Usually, lined enclosures have a Q_A between 30 and 80 (R_{AB} between 500 and 190).

- Losses in ports are represented with resistance R_{AP}.

  If you choose R_{AP}=0, then R_{AP} is calculated for air in the port (now the resistance is frequency dependent).

  You can also give R_{AP} a value (independent from frequency).

  Q_P can be calculated to:

  $$Q_P = \frac{\rho_0 c^2}{2\pi f_B V_X R_{AP}}$$

Much Fun!

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