

HiFi LOUDSPEAKER DESIGN

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Onken Bass Relax Loudspeaker



1. In order to achieve an optimal quality ($Q_{tc}=0.707$), the so-called Thiele Aligement (n) is used - usually $n=5.7$
2. The total area of the tunnels is about 90% of the total area of the active diaphragm surface in the best case.
3. Moved air masses behind the driver and in the tunnels should be identical.
4. The resistance of the low-pass inductor is to be included absolutely also into the computation of the total quality factor (Q_{ts})!
5. To the housing volume (V_b) the tunnel volume has to be added.

Onken Loudspeaker Calculator

Based on research of M.Eijiro Koizumi, J.Mahul & J.Hira

Driver Parameters

all fields are required!

Fs	[Hz]	Free air resonant frequency of the driver	<input type="text" value="40"/>
Re	[ohms]	dc resistance of the driver	<input type="text" value="6.8"/>
Qms		mechanical Q of the driver	<input type="text" value="1.65"/> 2 - 16
Qes		electrical Q of the driver	<input type="text" value="0.61"/>
Mms	[g]	total cone assambly mass of the driver	<input type="text" value="14.97"/>
Sd	[cm ²]	effective radiation area of the driver	<input type="text" value="212"/>
Rg	[ohms]	total components resistance (xover-coiol, terminal, wires, etc.)	<input type="text" value="1.55"/>

Port width	[cm]	indicate the width of one port	<input type="text" value="1.2"/>	
Port height	[cm]	indicate the height of one port	<input type="text" value="10"/>	
Quantity		number of ports used (Onken speakers have 6 or 8 identical ports)	<input type="text" value="8"/>	
n		Alignment (best alignment = 5.7 , Onken alignmet = 6.34)	<input type="text" value="6.34"/>	*

* **Note:** you can change the aligement factor (**n**) to maintain the corrected Portlenght under **61 cm**

If the corrected Portlength is above **61 cm**, your speaker is **not suitable** for the Onken speaker application!

Calculate

Onken Loudspeaker Calculations

Qts = total Q of driver at fs Cms = m/N driver suspension compliance
Vas = air volume driver compliance (liters)

F₋₃ = box cutoff frequency at -3dB (Hz) F_b = box cutoff frequency (Hz)
Cab = acoustical box compliance Map = acoustical mass box
η_o = driver reference efficiency (%) Qtc = total Q of the speaker in an enclosure including all system resistances

Port Calculations

S_{port} = (cm²) total port area (S_{port} should be equal or max. 15% less then S_d)
Port volume = total volume occipied by all ports in the box (liters)
Port length = effective port length (cm)
Port length corrected = corrected effective port length (cm)

Note:

If the corrected effective port length is **over 45 cm**, your driver is **not suitable** for the Onken Loudspeaker!

Onken Loudspeaker Properties

V_b = total internal volume of box (liters)
V_b total = total internal volume of box plus the required volume for the vent (liters)
F₋₃ = box cutoff frequency at -3dB (Hz)
SPL = total efficiency of the system including R_g (dB 1W/1mtr)

View Plot



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