
Subject: 4.75" diameter

Posted by [Wayne Parham](#) on Fri, 14 Nov 2003 18:46:44 GMT

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A Helmholtz resonator of 5.5ft³ having a 4.75" diameter duct that's 1" long is tuned to 42.8Hz. The same size resonator with a 5" diameter duct that is 1" long is tuned to 41.5Hz. This isn't much of a difference, and so both vent sizes would probably work well. But honestly, I'd rather err to a lower tuning frequency than a higher one. The other suggested port sizes for various baffle thicknesses are all tuned to between 41Hz and 42Hz. Having 5" diameter on a 1" baffle is probably OK too, especially with a little more insulation - I can see myself running a quick check and finding Helmholtz frequency of 42.x and thinking it would be OK. It wouldn't be bad, but I think the fact that a 5" port tunes closer to 43Hz than 42Hz might make the slightly smaller port a better choice. To tell the truth, it really doesn't make sense to fine tune the box to a resolution of +/-1Hz, let alone +/- 0.1Hz. Loudspeakers shift all over the place, from varying power levels, to varying ambient temperature, humidity and barometric pressure to the age of the driver and its loosening suspension. But you see the idea - we're looking for low 40's here. Insulation shifts resonance down, and we're trying to hit a pretty narrow window of 38Hz to 42Hz, maximum of 45Hz. Other alignments are more tolerant of shifts, and have a wider range of acceptable

sensitive alignment. In this configuration, cabinet tuning above 45Hz results in peaked response, and the onset of peaking is rapid and severe as frequency rises above 45Hz. On the other hand, if you go down much below 38Hz, then the deep bass falls off quite a bit. This alignment is tight, in an attempt to squeeze flat response down to 30Hz out of it. It can be done, but the room for error is small. Honestly, I don't like discussing values that are this closely spaced. I don't believe we can "hit the mark" that closely with a loudspeaker system. Parameters move too much. I think it is best to find a median point, and expect some parameter shift. So probably both ports are just fine, with the smaller port better suited for low power levels and the larger port for higher power levels. At higher power, voice coil resistance goes up, which increase Q and therefore peaking. Having the system tuned a little lower will be better, because it will be slightly underdamped and then the peaking from Q rising will bring the alignment in. At lower power, voice coil resistance is lowest, so Q is lowest too, and the system needs to be tuned a little higher to make sure that it isn't underdamped, which reduces bass output.
