Subject: interesting damping material
Posted by moray james on Mon, 14 Aug 2006 04:20:41 GMT
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interesting damping material Post #1 Just finished spending a day experimenting with box cavity damping. The speakers in question are ATC SCM10's which are factory damped with long fiber wool. This ia a small cavity sealed box with an impressive 5.5 inch bass/mid driver that has a very long linear excursion. A friend of mine attended the Hi Fi Show in Germany this spring and had an invite to spend the nite at a private showing of the new KEF Reference loudspeaker. One of the cool things about the KEF is that it is internally damped with activated charcoal. This is a neat idea as activated charcoal is very porous. Kef claim to have reached a virtually theoretical cavity volume increase of 28 out of 30 % using the charcoal. This got me thinking. Charcoal is messy and expensive. Pearlite is a heat expanded form of rock used in the gardening business usually white but comes in various colours. Pearlite is basically rock heated up like popcoarn or Rice Crispy's and ends up like small kernals of porous soft rock which is soft enough that you can crush it to powder with your fingers. Pearlite is more porus than activated charcoal and is clean and cheap to buy. I replaced all the internal wool damping with the pearlite in the ATC SCM10's. This resulted in a significant improvement across the band with especially improved midrange and more extended bass. You do need to take some precautions however. Pearlite must be sifted first to extract all the fine powder as you only want pieces the size of rice crispy's and larger. Further you need to insure that the pearlite is kept out of the driver/s. This done I would have to say that this is by far the best damping material that I have ever used. This is I think as a result of the fact that pearlite is so very porus and has high resistivity to passage of air and also in that it has tremendous frictional dissapation due to the partical vibrating against one another. Bug screen and fiber batting like polyester or acrylic will keep the pearlite where you want it and permit free air flow about the back side of the driver. For ported boxes you would want to keep a fair size area (should think a minimum of a 1/2 cu. ft.) around the reflex vent free of any damping material to insure correct vent resonance. There you have it cheap and SOTA damping material that works like a charm. For those who cannot readilly get thier hands on pearlite or who disbelieve a good second choice would be rice crispy's (dont laugh) but they will cost more than pearlite however if you are not fussy you can at least eat the rice crispy's after. You can expect the pearlite to be more effective than the rice crispy's as it is far more porous in structure. BE FOREWARNED you must properly prepare for using pearlite to insure that it only goes where you want it to. This is a real gem of a damping material especially for ultra small cabinet speakers and I should think the absolute bomb for TL's. I am sure that some will laugh till they hurt but do give it a try and for those to busy laughing well that's your loss. Very best regards Moray James.

Subject: Re: interesting damping material
Posted by Manualblock on Mon, 14 Aug 2006 15:22:36 GMT
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Don't they both degrade over time?

Subject: Re: interesting damping material
Posted by moray james on Mon, 14 Aug 2006 16:02:08 GMT
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I am sure that they do degrade. That said given how long I see perlite hang around in my garden soil I don't think that breakdown will be a serious issue. The simple solution to dust and particles is to place the perlite into sealed plastic bags and then install the filled bags int your speaker box cavity. Regards Moray James.

Subject: Re: interesting damping material
Posted by akhilesh on Mon, 14 Aug 2006 18:59:21 GMT
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Thanks for the tip, Moray! Should be helpful. -akhilesh

Subject: Re: interesting damping material
Posted by moray james on Mon, 14 Aug 2006 19:11:19 GMT
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Simple solution to general mess and possible driver contamination is to place the perlite into sealed plastic bags and then place the bags into the box cavity. Regards Moray James.

Subject: Re: interesting damping material
Posted by Manualblock on Mon, 14 Aug 2006 19:30:44 GMT
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But wouldn't that defeat the purpose? Don't you want the acoustic absorbtion propereties of the pearlite to work?

Subject: Re: interesting damping material
Posted by moray james on Mon, 14 Aug 2006 20:00:26 GMT
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Why do you think that the perlite would cease to work if placed into a plastic bag? Provided that the film used to make the bag is thin and light it will be as it the bag does not exist, it is only holding the perlite in place. The fact that thae bags are air tight may even inhance the damping action as in one of Ted Jordan's sealed membrane absorbors. Regards Moray James.

Subject: Re: interesting damping material
Posted by Manualblock on Mon, 14 Aug 2006 23:47:54 GMT
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That sounds good; can you say what those membrane absorbers are? How do they work by converting sound waves to heat?

Subject: Re: interesting damping material
Posted by moray james on Tue, 15 Aug 2006 00:40:24 GMT
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Works like this... the air pressure generated by the driver motion presses against the plastic film and that moves the air inside the bag which squirts through the perlite pushing them around and turns the acoustic energy into heat (caused by frictin) and so disipates the energy (particle friction also plays a disipative role here). The thinner the film of the bag the better. Ted Jordan published a series of articles in Wireless World back in seventies I think all about sealed membrane absorbers which used fiberous batting in a low 5 sided box with a sealed membrane on the 6th side, the batting has to be inside the box in contact with the membrane to work effectively.

Subject: Re: interesting damping material
Posted by wunhuanglo on Tue, 15 Aug 2006 10:01:31 GMT
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This discussion sounds like an apple-and-oranges thing to me.KEF's point was effectivey to substitute activated charcoal for fiberglass. I'm not sure I buy into that myself - the hydrodynamics of the situation have to be entirely different since the open area of the charcoal has characteric dimensions on the molecular scale as opposed to the open area of the fiberglass which is of a far different character.But once the charcoal (or pearlite) is in a bag it's now supporting a continuous reflective surface. That surface may be malleable, it may break up wavefronts, it may dissipate energy due to its lack of rigidity, but the mode of operation, if you will, is entirely different with respect to the air moving in the speaker cabinet.In the case of the loose fill situation it's more of velocity dissipation by hydraulic resistance (losing air pressure down a long hose) where in the baggie case it's analogous to using any other sort of non-rigid medium to absorb energy.I believe

one of the earliest uses of the pearlite-in-a-bag concept was in Jim Lansing's 1937 Iconic loudspeaker where he used mineral wool held to the back wall of the speaker cabinet with a sheet of cheese cloth-like material. This way air was free to move through the medium while dissipating energy through frictional losses.

Subject: Re: interesting damping material
Posted by noxo on Wed, 13 Sep 2006 19:52:54 GMT
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I have used, don`t laugh, womens nylon hosiery filled with kitty litter, for horn damping and I feel this would work better than sealing it in plasic bags which will seal off the porous material from absorbing and damping. Old socks work OK too, but nylons stretch, can be cut to size and will conform to the inside of the cabinet.

Subject: Re: interesting damping material
Posted by moray james on Wed, 13 Sep 2006 20:30:06 GMT
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not sure where you were placing your damping in your horn design can you elaborate? Moray James.
