

Hi ____

Before you order; please make sure that you understand what kind of material these panels are made of. EPS has a lot of advantages but one major drawback: durability. Please see the text below for some pointers regarding coating (to increase durability) and mounting.

Also, due to some difficulties for the factory to precision cut the dense version of EPS originally used (42 kg/m³) for these panels; I had to step down to 30 kg/m³ EPS. The difference is not very noticeable since it's still very dense compared to normal EPS used in general construction or packaging. I've seen diffusers from other manufacturers that use 15 kg/m³ EPS or even less. The difference might however matter to some degree if you plan to use them as part of a membrane absorber, since the mass of each panel is slightly different, so please let me know if you plan to use them in conjunction with membrane absorption and I'll help you calculate the parameters based on your specific needs.

Please let me know if you need any help regarding how to use diffusers (or other treatment options as well for that matter) in your room, but also please understand that I cannot give detailed advice without a full understanding (based on measurements and on-site analysis) of how the room behaves, and a clear picture of the desired acoustic response. I can however make qualified guesses and that might be better than nothing.

For information regarding **placement of diffusers** (and other treatment options); please see this: <http://resonatorstockholm.com/optiffuser/#comment-984>

Coating the panels:

There are pros and cons with diffusers made of EPS: The advantages are low cost, the ability to produce complex shapes and light weight (and thus the possibility to combine them with membrane absorption to efficiently combat modal and SBIR related low frequency issues). The obvious down side is durability, especially if not coated, and coating EPS diffusers is a bit tricky for two reasons:

1. The porous texture of EPS (that literally sucks paint).
2. The shape of any high-performance diffuser is naturally not as easy to paint as a flat surface.

There are many options to consider when deciding on how to paint them, and unfortunately, I haven't been able to try them all. Specialized coating options designed for EPS do exist, but I've so far only tested "normal" paints and PVA glue as "primer".

EPS cannot stand certain solvents (used in some paints), so if you want to be sure not to melt the material; use water-based paint/glue. If uncertain *whether or not* the paint/glue works on EPS; try some on the back of a panel first.

The biggest problem with trying to coat EPS is the porous structure (the small holes in between the EPS balls) and if you want the texture of EPS to be completely hidden; you first need fill these holes, and the easiest way I've found so far is to use normal PVA glue ("white glue") and this can be found relatively cheap (10-15 € for 5L).

When applying the first layer of PVA glue, one can be quite generous with the amount of glue applied since the EPS sucks it up fairly well, as long as it doesn't drip; it will vanish into the surface before dried out and this actually helps strengthen the EPS. If you end up with dried drip marks; simply use a light sandpaper and remove them before applying the final 1-3 layers (depending on the method used). One method to fill the porous surface of EPS quicker; is to add filler to the mix. "micro-balloon filler" (like for example the "TOOLCRAFT Microballoons 240044 500 ml" found at Conrad) or cement-based powder to the glue for the first 1-2 coatings. Add as much filler as possible without making the glue too hard to apply with a brush. If you want an extra strong surface; use water-based epoxy paint for the first 1 or 2 coatings (and preferably with some filler in it as well). If you want to try this; make sure to first test some epoxy on the back side of a panel to make sure that the paint doesn't melt the EPS since even if water-based epoxy; the hardener component might still contain solvents that melts the EPS. In Sweden; the "NM Klarlack FS 023" is known to work well on EPS. It should also be possible to add pigment to this, but I have not tried this myself yet. Other fillers might also be useful, like for example "EPOXY-POLYESTERHARTS 3 MM" but this is not yet evaluated. Please contact me if you like to try different coating strategies.

I've tried many different paints and the ones that almost always work well (even if cheap brands, although pricier is normally better but not always) are acrylic wall paint, but latex or "carpenter paint" (I don't know what to call it in English) also work. The qualities we seek are; good coverage on porous surfaces but still fluid enough so it's easy to apply (even if you might need to thin it with some water).

My normal approach is to first add a coat with only PVA glue with some cement-based filler in it (not too much so it becomes difficult to paint with a brush), and then one coating with about 50% PVA glue and 50% paint and some filler, and normally it looks ok after this layer but if not; one last coat using about 30% PVA and 70% paint.

A word on mounting:

When gluing (use illbruck PL200 or similar glue, use a putty knife to distribute the glue in a thin even layer and use a cheap brush to remove excess glue that might get pressed out on the front face) the panels together; make sure to also glue the sides of the panels together (and also to the frame if any) in order to prevent possible noise caused by panels rubbing against each other (or frame) when vibrating, especially if mounted as a membrane absorber since this is supposed to vibrate at resonant frequency.

If you want a seamless seal between the diffusers (the long sides in particular), make sure to accurately match the front shape when attaching them to each other. If there's even a tenths of a millimetre mismatch between them on the front edge, it's hard to make the joint completely disappear by coating, even if many layers of paint are applied. Gaps between the short sides however are easily sealed with latex/silicone or other fillers before painting them but it's good practice to first glue panels that are positioned on top of others (assuming normal horizontal alignment of the panels, wells of the diffusers in vertical plane, as seen on the pics on the product page) together first, and once the glue has settled; then glue sections together side by side. If you didn't manage to achieve a perfect fit, and experience an ugly joint between panels; consider covering the joints with thin slats as seen on the photo on the product page. This can also be used to protect the panels from mishaps.

Also consider whether you should attach the framing (if any) for the panels before painting, depending on if you want it coated in the same style as the panels or not. In order to avoid an ugly gap in-between the end of the front shape (top and bottom if normal orientation) and the frame (can be tiresome to fill with filler due to the complex shape); it is usually best to mount the top frame (that meets the long side of each panel if used in normal alignment) after the panels are attached to the wall/membrane.

If you have the need to protect the diffusers further from impact; either consider professional coatings designed for EPS (although standard water-based epoxy solutions are often enough to provide sufficient protection), or use any solid perforated panel (or framework), for example a perforated metal plate, in front of them but make sure that the open area of this protective arrangement is at least 50%, (preferably higher). If bars/slats or other thicker grids are used; the width of each bar should be no greater than about 20-30 mm, with at least the same but preferably wider (double or more) spacing between them, or it will change the performance of the diffuser (although perhaps not dramatically but still needs to be taken into consideration). Avoid fabric in front of diffusers since this will drastically increase absorption for higher frequencies.

Do not hesitate to contact me if you have any questions or feedback on different coating options you might have tried.

Sincerely Jens Eklund

Resonator Stockholm AB / Holonor AB

+46(0)760-159999

jens@resonatorstockholm.com