

## **What is a Steam Room ?**

Steam rooms and similar bath applications are known for more than 2000 years. Their origins can be found in the ancient Rome, Turkey and Russia. These baths are traditionally designed with tile and stone, since their purpose always has been to provide health support, relaxation of the muscular, dermal and respiratory system but also relaxation of the eye through beautiful design. All these benefits shall provide the “well being” of the user and steam rooms had been popular throughout the centuries until today where they can be found in Spa’s (SPA= Sanum Per Aquam (Healing Through Water)), Hotels and private residences. This industry is strongly growing and offers our tile industry investments made in tile steam room applications that can range from \$5,000 to \$150,000.00 for commercial installations. All of them are supposed to be equipped with beautiful (high price) tile and stone from bottom to top. Even the Romans already knew about the benefits of DENSE tile and stone in these wet area installations. In a steam room, one seeks to enjoy a climate with a temperature of ca. 115 °F and a humidity of up to 99%. The steam shall be visible. The warmth and the humidity is (today) provided by a steam generator, located outside the steam room, which boils water to steam and forces it through a copper pipe into the cabin. A thermostate controls the climate and the activity of the generator. To ensure that the generator system works cost efficiently and that the user can enjoy visible steam which cannot escape and cause heavy damages to the building structure, the steam room needs to form a steam/vapor tight cubicle from floor to ceiling.

## **Definition of vapor tightness and how to properly vapor proof**

Unlike waterproofing of showers, we need to vapor proof the tile substrate in steam showers. Steam or vapor molecules are much smaller than liquid water molecules and therefore penetrate a substrate much easier. The difference is also that steam, which occurs in combination with warm temperatures, can cause a high climate differential with the outside area of a steam room. Inside the cabin, we have a warm and humid situation under high atmospheric pressure whereas there is a low pressure and colder climate outside. The higher this differential is, the higher the pressure of the vapor inside gets and the more powerful it seeks to break through the cabin construction to mix with the low pressure and low humidity outside environment to equalize the climate. This natural desire of substances is given and the one-way penetration of the substrate, called diffusion, a question of time. If the vapor molecules successfully penetrate the substrate or cabin construction, they will eventually cool down (find its condensation point) and condensate within the material. The now liquid molecules stay within the construction because there is no more pressure power left to make it move again. The substrate will rot and cause mold. The only way to safely avoid these costly failures, which are known to the industry to happen extensively in steam room installations (some fail after 1 week, some after 2 years) is to apply a vapor barrier or a sufficient vapor retarder behind the tile on the warm inside of the cabin. Does a liquid waterproof membrane fulfill this job? No. It can protect against water but there are no regular dispersion membranes known which resist vapor under pressure. Manufacturers of these membranes might recommend their use on a CBU or other backer boards in a steam room but they often cannot provide ratings or documentation about the workability. Please feel free to ask for a perm rating (permeability measures the resistance of a material against penetration of vapor or other substances). A permeability of less than 1 (<1) is supposed to be sufficient for steam rooms. Please make sure that the manufacturer has measured the Perm rating under or equal to steam Room Conditions (115°F, 98 % humidity, test procedure ASTM E96 E ). The proper application of a vapor retarder (they might have different strengths) depends on how strong the use (commercially used?) of the steam room is and how high the climate differential in this job is (you might build a steam room incorporating a low insulated exterior wall of the building, the climate differential becomes huge eventually considering a winter in Northern Michigan). Proper vapor retarders are for example epoxy based resins, to be applied before tiling starts or epoxy grout filler and thin sets that lock the way for vapor penetration. A real vapor barrier, that will not allow any penetration under no circumstances, are aluminum and glass. You can

find foam insulation panels equipped with aluminum sheeting on one side in the exterior siding or pool building industry. Since it is not reasonable to prepare a aluminum surface for tiling, we recommend the use of epoxy based retarders as grout fillers and thin sets in combination with a waterproof backer board (wedi is waterproof and a vapor retarder but might fail if the vapor pressure increases that much that it destroys the foam cells). Next to the necessity of a proper vapor tight construction, you want to ensure that you install a thermally insulated cabin. The more insulation value you achieve, the lower the climate differential to the outside gets. The climate inside does not “recognize” the different climate outside that easy because it the environments are isolated better.

You will achieve a 100% safe application if you follow our recommendations for the different installation types. **We however highly recommend that you contact wedi technical services before installing a steam room due to the difficult and sensitive application and these recommendations can offer you only general requirements:**

### **1. Residential steam room (square size max 4 x 4 ft.)**

Install wedi like in a regular shower application using ½” panels with sealant in between joints and covering the fastener applications. Where you have a “cold”, exterior wall, install wedi 2” panels to ensure proper thermal insulation which minimizes the climate differential. When tiling commences, choose a dense tile or stone with low absorption. As setting material, you should choose epoxy based tile adhesive recommended by the manufacturer for steam room applications. Fill the grout joints using solid epoxy grout, recommended for steam room application by the manufacturer. Benefits of Epoxy thin sets and grouts are that they do not allow vapor to condensate between tile and wedi which will occur if standard thin sets and standard cement grouts are used. Cleanability and color sustainability are further advantages.

### **2. Commercial steam room (square size > 4 x 4 ft.)**

Install wedi like in a regular shower application but using 2” panels with sealant in between notch connection (shiplap) joints and covering the fastener applications. When tiling commences, choose a dense tile or stone with low absorption. As setting materials, you should choose solid epoxy based tile adhesive and solid epoxy grout, recommended for steam room application by the manufacturer. In applications > 6 x 6 ft. epoxy resin (Aquafin Products) is applied over the whole inside surfaces of wedi steam rooms in two coats before you start setting dense, low absorbing tile or stone using epoxy adhesive modified tile adhesive recommended for steam room applications by the manufacturer. Epoxy grout should always be used in steam room installations. .

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- Build a slope into the ceiling so that condensed water can run down toward a wall without dripping (hot)
- Lead the steam supply copper pipe into the cabin in the lower third of the cabins wall height so that the steam can rise (steam rises upwards). Make sure the pressurized incoming steam is not lead into the cabin where people are sitting.
- Properly insulate the copper steam pipe so that the high temperature does not touch the wedi

wall panel foam (wedi resists 175°F)

- Make sure that fresh air supply and exchange is given either through automated fans or an open space (1") between glass door and floor tile