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Remimeo

HOW TO BUILD A SAUNA

Refs: HCOB 6 Feb 78RA THE PURIFICATION RUNDOWN

Rev. 4.12.79 REPLACES THE SWEAT PROGRAM

HCOB 6 Feb 78RA-1 HE PURIFICATION RUNDOWN—

Addition of 20.12.79 ERRATA AND ADDITIONS

ANYONE BUILDING A SAUNA SHOULD BE WARNED THAT IT HAS TO BE PROPERLY BUILT SO AS NOT TO CAUSE INJURY OR CASUALTY TO PERSONS USING IT.

The Purification Rundown is not only the initial necessary preliminary undercut to the majority of cases planet-wide, but orgs will find it in great popular demand in the immediate future as news of its remarkable results have already spread rapidly through word-of-mouth.

Every org must be able to deliver the Purification Rundown. In order to deliver the rundown an org will need the use of a sauna, and in order to deliver it most efficiently an org would have its *own* sauna.

The major part of the 5-hour daily period on the Purification Rundown is spent in the sauna bath, after working up the circulation by a period of running.

Thus, if the sauna bath is situated right on the org premises or adjoining or very close to the org premises, and operated under the org's jurisdiction, it will not only be more convenient and more workable but more economical as well.

This issue is written to provide the basic data on how an org can equip itself to deliver the rundown most ideally—via its own sauna bath.

SAUNA: DEFINITION OF

The word "SAUNA" is a Finnish word which describes the Finnish custom of bathing or deep cleansing by intense heat which induces perspiration.

Technically, the term "sauna bath" refers to a specially constructed wooden room, properly insulated, and heated to temperatures of between 140° and 200°F (or approx-imately 71° to 93°C) to induce profuse sweating.

It is equipped with wooden benches at different height levels on which the bathers sit or recline. As heat rises, the air is hotter around the higher benches and somewhat cooler around the lower benches, so one can take his choice, depending upon his heat tolerance.

The sauna room is also, necessarily, equipped with its own heat source.

BUILDING A SAUNA

In building a sauna, the two main factors to be taken into consideration are: (a) location of the sauna room and (b) the type of heat source to be used.

The choice of location of the room can depend upon what type of heat is available and most economical, and the location of the main source of heat.

With these two factors determined, one can then get into the other aspects of sauna installation which include size of the room, foundation and flooring, wiring, walls, ventilation, insulation, exterior finishes, safety measures and any accessories needed.

COST ANALYSIS: Before undertaking the building of a sauna, all of the following data will need to be taken into consideration and a cost analysis must be done, based on building codes and local prices and accessibility of materials and equipment.

In other words, cost analysis and planning is done first so that all the aspects of an effective, operational sauna are considered and provided for in advance. A properly targetted construction program can then be carried out rapidly.

In the PAC area a very workable sauna was constructed for approximately $1600 —$1200 of which was for construction and construction materials, $400 of which was for sauna unit heaters. With good planning, it is possible for any org to equip itself with a standard sauna room, vital to the delivery of the Purification Rundown. Its construction and maintenance should then more than pay for itself as the rundown is sold and delivered.

BUILDING CODES AND PERMITS: It will be necessary to check with your building department to determine what permits are needed for sauna installation, and what the local building codes require in the way of structural design and construction materials.

Most building codes in the United States set standards similar to or based on those of the Uniform Building Code and the National Electric Code for foundations, framing and wiring.

Zoning laws may enter into it. However, as you will not be in the business of operating a commercial sauna and as many home owners and even business executives now install their own private home or office saunas, there should be no difficulty in obtaining the necessary permit for installation.

Building codes and building permit requirements must be complied with, for both safety and legal reasons. It would be foolish for an org to endanger its tenancy of a building by any infraction of such regulations.

LOCATION OF THE SAUNA: A sauna room can be built inside another room. In other words, one could use a fairly small room for this purpose by insulating and paneling it properly, or one could partition off a part of a large room, with proper wall construction, insulation and interior finishing.

An ideal selection for a sauna would be a room with a drain in the floor or one where a drain could be easily installed. It should be located near a shower (which may also need to be installed), as cooling showers may be necessary for a large majority of people during the hours of sweat out. In any case, a nearby source of running water is a must, as sweaters should drink plenty of water to prevent dehydration and this must be easily available. It is also needed for convenience in taking salt or potassium gluconate tablets and vitamins.

Ideally, two showers and two locker rooms, one each for men and women, would be located conveniently near the sauna.

Depending upon the type of heat to be used, it may be advantageous to select a room fairly close to the heat source to prevent the necessity for extensive additional wiring or piping. For example, if steam heat is used, the closer the room is to the steam furnace or boiler the better, as steam pipes, all well and properly insulated, would need to be run from the heat source to the sauna steam heaters. The more such piping is needed the greater the cost, naturally, and there is also the additional factor of it taking longer to get the steam actually coming through to the sauna heaters.

Choosing a room with the least outside wall or window surface is also desirable.

This is due to the fact that the more outside wall surface there is involved, the more insulation and heat is required to maintain proper sauna room temperatures.

It may be necessary to select the sauna room according to local building code and permit regulations.

Where an org simply does not have the space for building a sauna right on the org premises, it may be necessary to rent or purchase additional space in a nearby or adjoining building for the installation of its sauna.

SIZE OF SAUNA ROOM: A sauna room must not be too large, for the sake of economy. Too large a room is too expensive and too difficult to heat.

An org. however, will want a sauna room that can accommodate between 10 and 15 people at once, as the traffic will require it. Some suggested sizes are: 12 x 10 x 7 feet; 14 x 14 x 7 feet; or 12 x 16 x 9 feet. The height of the room is never more than 9 feet, and most often 7 feet is best, as a high ceiling simply results in loss of heat, because heat rises. Thus a low ceiling prevents the heat from rising into space where it won't be used.

The size of the room should be determined by the number of people you expect to be using it at any one time. It is usual to allow 65 cubic feet of space for each person.

A rectangular or square-shaped room provides the optimum shape space for arrangement of the tiered benches.

It should be kept in mind that the size and power of the sauna stove required to heat the room will depend directly upon the size of the room.

SOURCES OF HEAT

By far the biggest single factor to be taken into consideration in installing a sauna is the source of heat to be used.

The types of sauna stoves available are:

1. Gas

2. Electric

3. Wood burning (which would not be practical for an org), and

4. Steam heaters can also be used, where the org has a year-round supply of steam, such as would be routinely supplied for dish-washers, laundry or hot water heating. Otherwise, where steam is used only for central heating of the building, it would be far too expensive to run a steam boiler in the summer for sauna use only. Additionally, there would be heat loss, even with shut-offs to different areas. In a large building, however, where steam is required

all the time for other purposes, steam would probably be the most economical. Or, it might be practical to purchase a small steam generator for sauna heating purposes only.

The choice of the type of heater to be used should be determined by the most economical heat available to the org. Cost comparisons should be made locally to determine installation costs and operating costs of different heating systems.

ELECTRIC STOVES: Electric sauna stoves are by far the easiest to install and the cleanest. They are efficient but they may not be the most economical to operate, depending upon the cost of electricity in the area.

With an electric stove, you will need at least a 220 volt supply of electrical power to the sauna. This is the same voltage that operates a kitchen stove or a clothes dryer, but it must be determined that the existing power supply in the org can safely support the *additional* power required for the sauna heater. If not, you may need to install na additional power supply.

The size of the stove is important—it must be the correct size, power-wise, to produce the required sauna temperatures. The size will depend upon the size of the room and the location of the room. Less power, for example, would be required for a small room or a room with no outside wall exposure.

The power of an electric stove is measured by the number of kilowatts needed to heat the stove elements. One kilowatt (kw) = 1000 watts. Prefabricated electric sauna stoves come anywhere from 2.2 kilowatts to 18 kilowatts in power.

To compute the size electric stove needed, allow I kilowatt for every 45 cubic feet of room space.

Find the number of cubic feet of room space by multiplying the length by the width by the height of the room. This gives you the total cubic feet, or *volume.* of the room.

Divide the volume by 45 to get the number of kilowatts needed to heat that room.

Example: The volume of a 12 x 10 x 7 foot room = 840 cubic feet.

840 / 45 = 18.44 kilowatts

18.44 kilowatts is the power required to heat a 12 x 10 x 7 foot room to proper sauna temperatures.

The above is the formula that would be used in temperate climates. In a colder climate, a stronger stove would probably be required.

Prefabricated electric sauna stoves have a control unit that is always installed *outside* the sauna room, as the controls are not built to withstand high temperatures.

These stoves usually also include a safety device that cuts off the electrical current should there be a malfunction of any kind.

GAS STOVES: The power of a gas stove is measured by the number of British Ther-mal Units (BTUs) of heat the stove generates. (A British Thermal Unit is the amount of heat necessary to raise I pound of water I degree Fahrenheit.) Gas heaters are graded according to the number of BTUs they provide in one hour.

To compute the size gas stove required, allow 1000 BTUs for every 15 cubic feet of sauna room volume.

Example: The volume of a 12 x 10 x 7 foot room = 840 cubic feet.

840 cubic feet divided by 15 cubic feet ((81450)) = 56.

Multiply 56 x 1000 BTUs = 56,000 BTUs needed from a gas heater to heat a 12 x 10 x 7 foot sauna room.

Gas heaters usually cost less to operate than electric heaters. They are a bit more complicated (but not necessarily more expensive) to install. The heater would need to be connected to the building's gas supply line by approved gas piping. Standard approved galvanized steel pipe with threaded ends and standard galvanized steel fittings for any bends (elbows) in the pipe, with approved thread sealout, would be required.

Such piping would need to be done professionally, possibly contracted, or inspected professionally when completed.

Old gas heaters, however well-renovated they might be, are *not* permitted for this purpose. Modern gas heaters for sauna use are built with special safety shut-off valves and safety pilot flame, designed to cut the gas supply off should the pilot light go out.

If an org is to use gas heat in the sauna, *on/v* a modern gas heater with these safety features is permissible for org installation.

With a modern gas heater, the gas is piped in to a small burner in a sealed combustion chamber in the stove. Air is drawn into the chamber from outside the sauna and expelled through the flue.

Gas heaters, especially, require an adequate air supply and suitable venting.

SOAP BUBBLE TEST FOR LEAKS IN GAS LINES: The following test can be done to detect leaks in a gas pipe line, particularly at the elbow joints or any place where two pieces of pipe are spliced together with threaded ends. Mix I part liquid detergent with 4 parts water, in a cup or can.

Pressurize the line by opening the gas line valve. With a soft brush, mix up the soap solution and daub it well around any joints of pipe. If there is the slightest leak, it will show up in big soap bubbles. If any such leaks are found, the pipe connections would need to be redone, and then thoroughly reinspected.

Both gas and electric prefabricated sauna stoves are metal-encased, usually with two or even three layers of noncorrosive metal with air between them. The outermost layer of metal, which is usually of stainless steel or baked enamel, prevents the surface from becoming too hot and inhibits the loss of heat from the front and sides of the stove. Both the gas and electric type stoves are thermostatically controlled.

SAUNA STONES

Prefabricated sauna stoves are designed with a metal tray at the top to hold and heat a pile of stones or rocks called konno rocks. Konno rocks, technically known as peridotite maim, are quarried in Finland. They are ideal for the sauna as they store heat well, help to distribute a soft heat evenly throughout the sauna room and help to maintain the required sauna temperature. Another virtue of these stones is that they can withstand high temperatures and do not crack or explode when subjected to high heat pressure.

To allow for good air circulation, the stones should be loosely packed in the tray.

If one wishes to add steam to the sauna, a long-handled ladle is used to pour water on the hot stones, resulting in bursts of steam which fill the sauna room.

A supply of konno rocks or stones is usually included with the purchase of a pre-fabricated sauna stove. The stones will usually last through five years of routine use.

They may also be purchased separately, commercially.

WOOD BURNING STOVES: Although the wood burning stove is in the best Finnish sauna tradition, it is highly impractical for org use. It takes a good quantity of wood to heat a sauna adequately and routine stoking would be required, as well as a convenient storage space for the wood supply. Further, the cost of wood as fuel can be high, and there is a wide variance in the heat-producing qualities of different woods. It takes considerable time to heat a sauna room to the required temperature with a wood burning stove, and the ashes from a wood fire must be removed periodically.

For all of the above reasons, a wood burning sauna stove is not recommended.

STEAM HEATERS: Where steam is available the year round, steam "unit heaters" can be used, as was done in the sauna built in PAC, and this is probably the most economical method of heating the sauna.

A unit heater is a combination heater and fan, so arranged that the fan blows air through the heater, thus speeding the transfer of heat from the heater to the room air.

Steam unit heaters are rated according to the number of BTUs they will produce when supplied with 60 degree F. entering air and 2 pounds per square inch steam pressure. As entering air becomes hotter, the heater puts out fewer BTUs. But by increasing the steam pressure to the unit heater you can increase the amount of BTUs it puts out. Check the steam capacity of the unit (which is probably 150 pounds per square inch). By adjusting the pressure reduction valve and so admitting more or less steam pressure to the unit heater, you can raise or lower the temperature of the sauna. A safety valve is used to protect the unit heater in the event that the pressure reduction valve should fail (though this is quite unusual). One should insist on clear instructions on how to mount any safety valve that is purchased.

Actually, the unit heater can be heated by electricity, gas, steam or hot water. An electric unit heater is the easiest to install (depending upon the existing voltage supply, as described earlier) but an electric heater will use around 1/3 of a watt to put out one BTU per hour. To heat a room 14 x 14 x 9 feet high, this would require upwards of 18,000 watts per hour which, depending upon the geographical location, can be quite an expensive operation.

Hot water heaters require high water temperatures, around 180 degrees F. mini-mum.

Gas or oil heaters, depending upon local availability of fuel, can be fairly inexpensive to purchase and use, but they require sufficient air supply and the proper venting to be safe.

REMEMBER THAT ANY COMBUSTION INCLUDING ELECTRICAL COM-BUSTION CONSUMES OXYGEN AND AS OXYGEN DIMINISHES IT WILL GIVE OFF CARBON MONOXIDE, WHICH IS QUITE A DEADLY POISON.

Perhaps your best bet, from the standpoint of safety and economy, would be a small steam generator, external to the sauna and well vented, providing steam to a unit heater in the sauna.

SPECIFICATIONS FOR STEAM FITTINGS: If steam is used, the following specifi-cations might be used as a guide in the selection of steam fittings:

For Steam Piping, maximum pressure 150 pounds per square inch, use standard weight black steel pipe, ASTM A53 or A-120, Grade A or B. Use screwed fittings of 150 pound black malleable iron. Use unions of 250 pound malleable iron, ground iron to bronze seat. Use RP 8 C shut-off valves, 30 ITF, bronze body ball types with Teflon seats. For pressure reduction valves and safety valves use C.M. Bailey.

For Condensate Return. use seamless copper tubing, drawn temper, ASTM B88, Type "L," fittings of wrought copper solder joint ASA B16 22; unions wrought copper screwed Nibco

No. 633; shut-off valves Nibco-Scott S-595-Y bronze body, solder end, ball type with teflon seats; check valves Nibco Y-type brass body screwed. Solder, Easy Flo or equivalent with melting point higher than 1000 degrees F., suitable flux.

The basic hook-up is: steam main to higher elbow (for drainage), to shut-off valve, to strainer, to union, to pressure reduction valve, to union, to shut-off valve, to safety valve, to elbow, down to union, to elbow, to unit heater. From unit heater to scale pocket (a short capped length of vertical pipe same size as exit hole from unit heater into which scale from the heater can fall), to union, to strainer, to "Float & Thermostatic Trap," to shut-off valve, to check valve, to elbow, to condensate return pipe.

Again, the foregoing should be considered a guide only, as installation instruc-tions for your heating system should be available from the manufacturer.

The unit heaters described above, whether heated by steam, gas, electricity or hot water, provide a dry heat sauna of a less sophisticated type than the specially designed prefabricated gas or electric sauna stoves.

You will need to check the various systems and costs with your local dealer to determine the most suitable sauna heater for your area.

CONSTRUCTION OF THE SAUNA

FOUNDATION AND FLOORING: The floor of the room you are converting into a sauna serves as the foundation.

If it's a concrete floor, all you would then need to do would be to add wooden slats, in a duckboard construction. Duckboards are easy to remove for cleaning pur-poses.

Or you could cover the floor with ceramic tile.

If the original floor is wood, the handling would be to install a wood frame, made of 2 by 4 sleepers, add some good thermal insulating material *(not* fiberglass), and put down a subfloor of plywood over that, The plywood floor could then be covered with ceramic tile or seamless sheet vinyl, for waterproofing.

Only waterproof adhesives would be used. Ideally the floor would be slightly sloped toward a drain, as it will need to be scrubbed down routinely to be kept clean.

FRAMING: The first walls put up can be sheets of sheet rock.

The room is then framed with 2 x 4 studs, spaced to permit insertion of 3-inch thick insulation batts. The studs are nailed to the wooden 2 x 4 sleepers below the subfloor. If the floor is concrete they are attached with anchor bolts or concrete nails.

The studs may be 16 or 24 inches apart, according to building codes.

The ceiling, lowered to 7 or 9 feet, is constructed exactly as the walls are, with the rafters spaced for insertion of insulation batts.

NOTE: At this point, although the wall construction is not yet complete, any needed holes for conduits for electricity or other heat should be drilled in the sheet rock and studs.

INSULATION: Good insulation is important in a sauna, as-it helps retain the heat and keeps the cost of heating down. The best insulation is expanded polyurethene. The insulation batts, 3 inches thick, come in strips, with flanges which can be stapled (do not use glue) to the framing studs. The 3-inch thick part of the insulation batt is inserted between the studs.

FINISHING OF THE WALLS: With the insulation installed, a vapor barrier (of con-struction plastic) is then nailed or stapled to the studs. The vapor barrier prevents moisture from collecting inside the walls.

The same insulation and vapor barrier is also installed in the ceiling.

Walls and ceiling are then covered with one-half inch gypsum board.

For the final covering, walls and ceiling are paneled with saw textured l-inch by 6-inch wood paneling, with the smooth face exposed inside the sauna. Kiln-dried redwood is commonly used for such paneling, where it is easily available. This and cedar are especially popular because of their high insulation factor. They make the sauna easier to heat and remain cooler to the touch. Other low-density softwoods that resist heat can also be used, such as white pine, sugar pine, ponderosa pine, spruce and hemlock.

Care should be taken to select finished, vertical-grain woods, as free of knotholes and resin pockets as possible. Any knotholes or resin pockets must be placed near the floor, never on the ceiling or high on the walls, as the melting resin could drip and burn the bathers.

Any nails or staples used in the construction should be of rust-resistant, hot-dipped galvanized finish.

VENTILATION: The sauna needs to be properly ventilated to provide enough oxygen, a free flow of air and an escape for the bad air, while still retaining the room heat. Poor ventilation in the sauna can cause dizziness or even asphyxiation.

Building requirements usually call for a vent area of 1/20 the floor area, but not less than 1 1/2 square feet, but this must be checked with your building department.

The intake vent is located near the floor and can be approximately a 1/2-inch slit under the door. The outlet vent would be on the opposite wall, near the ceiling, and could be a vent of about 4 inches in diameter. With this arrangement, the good air is pulled in low in the room and can circulate, while the bad air leaves through the vent near the ceiling. It is a good idea to provide a slide cover for the outlet vent so it can be adjusted to control the amount of air leaving the room.

WIRING: Any wiring to be done, will have to meet very strict electrical standards for complete safety. The installation of wiring and electrical circuits to handle an electric stove (should your sauna have one), control panel, thermostat and lighting for the room, will probably be required to be done professionally. In a sauna wiring must be used that can hold up under 200 degree F. or higher temperatures and also withstand moisture. Also, the wiring must be located in the dry areas behind the insulation. All switches and controls are installed outside the sauna, as these do not withstand high heat.

SAUNA DOOR: The recommended door is a solid-core Philippine mahogany slab door. This is not a true mahogany and should not be too costly. It should be solidly mounted with 4 hinges and not too tight in the frame, as it will expand slightly, (or shrink), with changes in temperature.

When a solid core door is used, you would also add a frame, insulation and paneling to it.

CAUTION: Sauna doors should always open out and must *never* be fitted with any type of latch that could get caught or stuck and lock you in. Ball or roller catches are probably best for this purpose. There is never an outside lock installed on the door.

Wooden handles must be used on the door, never metal as it becomes too hot to touch.

One should avoid using any metal frames or hardware in the sauna wherever possible, for the same reason. Any metal fasteners or lighting fixtures that must be used should be

noncorrosive and placed well away from where bathers could touch or brush against them accidentally, as they could cause burns.

SAUNA BENCHES: The sauna benches are preferably made of redwood, 2 x 2 and 2 x 4, as other materials can leak hot pitch or give off toxic fumes when heated.

Bench sizes vary but the best approximate size is about 15 3/4 inches wide, 32 inches high with an 8 inch step. Benches are installed in tiers at various levels in the room. The lower benches should be a bit wider than the upper ones to provide room for people's feet.

Benches can be located on three sides of the room, but would never be placed against the wall where the stove is located.

ADDITIONAL SAFETY MEASURES: Whatever the choice of a sauna stove, it must be mounted according to building department regulations, whatever distance from the wall is required and with whatever type wall insulation behind it that is required.

A wooden railing is placed around the front and sides of the stove for bathers' protection.

ACCESSORIES: You will need a thermometer that reads at least up to 200 degrees Fahrenheit, and you will probably want to install a clock in the sauna. These acces-sories should be of the type that is manufactured for sauna use.

CURING THE SAUNA: Curing the sauna means preparing it for its first use. When your sauna is complete, sweep down and vacuum all walls, ceilings, floor, benches and corners. Next wipe all walls, ceiling, benches, fixtures, stove, accessories, etc. with a damp cloth and warm water. With the sauna door propped open, turn the heater on for about half an hour. (The stove may smoke a bit if it is burning off its protective coating.) Finally, close the sauna door, bring the room temperature up to 200 degrees F. for about 5 or 6 hours. Your sauna will then be ready for use.

HYGIENE: The sauna must be scrubbed down routinely to keep it sanitary and free from perspiration odors. Any duckboards on the floor should be removed and scrubbed and then replaced. It is also a good idea to routinely fully ventilate the room, particularly after heavy use, so wood surfaces can be given a chance to dry.

HOW TO TAKE A SAUNA: Before going into the sauna, all jewelry, wristwatches, eye glasses or contact lenses should be removed, as these could become uncomfortably hot or be damaged by the heat.

It is best to shower briefly with warm water just before going into the sauna and after the running period which has brought up the circulation.

The period of sweat out in the sauna would then be followed by another cleansing shower.

In an org sauna, used by all, swim wear (not too tight-fitting) or loose shorts and a tank top, for women, would be worn. Ideally, an org would have two saunas for its public, one for men and one for women. The same dress could be worn in this case, if preferred, or the bather could simply sauna in a large towel.

Complete, prefabricated saunas are available on the market, and possibly these should be priced, but an org in any area will probably find it more economical to build its own.

With careful planning and costing, economical use of materials, but without stint-ing on safety measures, a very workable, pleasant sauna can be built for the org's use in delivering the Purification Rundown.

As saunas are becoming more popular by the day, there are numerous reference books or magazines, which can be found in the library, or on newsstands, which would give you further data on saunas.

Two of these are:

HOW TO BUILD A SAUNA. by Carlton Hollander, a Drake Publication of Ster-ling Publishing Co., Inc.. New York.

HOT TUBS. SPAS & HOME SAUNAS. by the Editors of Sunset Books, Lane Publishing Co., Menlo Park, California.

And the 3-volume *HEATING. VENTILATION & AIR CONDITIONING. By* James E. Brumbaugh, published by Theodore Audel & Co., a division of Howard W. Sams & Co.. Inc., 4300 West 62nd Street, Indianapolis, Indiana, 46268" (catalog 23227) will provide valuable data on routine heating and determining heat requirements.

With the issue of this bulletin as a guide, each org should now get busy and acquire its own sauna in very short order—to be able to deliver the Purification Rundown !

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LRH:WBR:GS:MM:dr