

Fast and simple method to shield a room against microwave radiation



How to quickly shield a room against mobile phone base stations, Wi-Fi/WLAN, smart meters and other sources of microwave radiation. This method is simple to do, costs little, can be removed again and is safe for most people with chemical sensitivities.

Keywords: how to shield, room, bedroom, microwave, cell tower, base station, Wi-Fi, WLAN, wireless, network, smart meter, how to build, Faraday cage, shielding, electrical sensitivity

Introduction

The walls of most houses provide no real shielding against the microwave radiation from cellular base stations, wireless networks (Wi-Fi, WLAN, etc.), smart meters, etc. These waves pass right through siding, plywood and drywall,

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and are barely slowed down by a brick wall. With the ever-increasing use of wireless services, the radiation levels continue to increase outside and inside our homes, and more people find themselves affected.

Shielding a whole house is a major project and a major expense. Hiring professional help is costly.

This article offers a simple low-cost method that can be used to shield a single room. It is typically used in the bedroom, since we spend a lot of time there and it is especially during sleep that the body needs a break from the radiation.

The shielding can be removed again easily so it can be used in rented apartments and by people who just want to see if this is a good idea before they spend money on a large shielding project.

The method is designed to work with almost any house or apartment and in any climate.

The materials are chosen to be low cost, safe for most people with chemical sensitivities and do not create a mold hazard. The total cost of the materials should be within \$250.

How well it will shield

Expect the shielding to reduce the radiation a hundredfold (20 dB) for today's common microwaves. If the shielding is installed diligently in a room with no special problems, a thousand fold (30 dB) reduction may be possible.

This may still not be sufficient for someone who is highly sensitive to live in a densely populated area or near a transmitter.

Better shielding is possible, but may require professional help and will be costly.

The tradeoffs

This shielding does not work for lower frequency magnetic radiation, such as from electrical wires, power lines, short wave, AM radio stations and wireless power transmitters. It may also be inadequate for higher microwave frequencies, such as from satellites and radar.

Electricity is not allowed inside the shielded room, except for built-in and battery-powered equipment. Examples of built-in equipment are light fixtures, baseboard

heaters and a smoke detector. A few battery-operated items, such as a clock, are fine.

This prohibition serves three purposes:

- eliminate most shock hazards
- improves the shielding
- discourages EMF emitters

You can have a telephone in the room, but it **MUST** be corded. Do not attempt to use a cell phone or a cordless phone inside, as the microwaves from these phones will be trapped inside the room and expose you to much higher radiation levels. The same goes for all other wireless devices.



*Do not attempt to use any wireless device
inside a shielded room.*

If there are special needs, such as an air cleaner or other medical equipment, see the section at the end of this article.

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The walls will be covered with aluminum foil, which is not very pretty. Some people get used to it, though there are various options for decorating the foil, which are covered later.

The window may be difficult or even impossible to operate, depending on how the shielding is installed. This may be acceptable for a short-term test.

A few people are sensitive to aluminum to the extent that they cannot live in such a room.

This is a very basic shielding method that can be modified. However, each modification will have its own tradeoffs that may not be obvious. The choices made here were to ensure it will work well and safely in almost any situation.

If it does not support your needs, please look at the more comprehensive information available via the link at the bottom of this article. There are many options, but they tend to be more complicated.

The basic method

The basic shielding method is to line the entire room with shielding materials, which are mostly aluminum foil. The shielding must be installed on all the walls, all the windows, all the doors and also on the ceiling and floor. This is called a Faraday cage.

Make sure to minimize any holes and slits in the shielding, as microwaves will pass through them. Pinprick holes are fine, since today's microwaves do not pass through them.

Buying the materials

The needed materials are:

- perforated laminated aluminum foil
- copper mesh
- aluminum tape
- fasteners

Tools needed:

- scissors
- tape measure (optional)
- chair or ladder (so you can reach the ceiling)

The perforated laminated aluminum foil is sold as a radiant heat insulator for houses and other buildings. There are different versions of it — the best for this purpose has aluminum foil on both sides with plastic or brown paper in the middle. Avoid the types that have aluminum on just one side.

The perforations are tiny holes that allow water vapors to pass through so the walls can breathe. It can be a mold hazard to use foil without these tiny holes, unless you have consulted with a local building professional.

The perforations are not needed for the interior walls, ceilings and doors. If the room is in an apartment building or a large house, the perforations may be needed for only one wall (the one with the window).

If perforated foil is not available, the holes can be made manually using a roller with tiny spikes on it, such as the “woodpecker” tool.



Perforated laminated aluminum foil. The tiny holes prevent mold by allowing the walls and ceiling to breathe.

In North America there are various laminated foil products available. One is Denny foil, which comes in 3 ft (1 m) wide rolls and is available in a perforated version. Make sure to buy enough foil to cover all walls, the ceiling, the door and the floor in the room.

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The copper mesh is used to cover the window and air registers. There are many options available, but we recommend a mesh made of pure copper. Meshes and fabrics that are not pure copper usually have polyester or other plastics under the copper and are often a problem for people with chemical sensitivities. Some of these products do not shield very well, either.

Copper mesh is a specialty item made for shielding purposes. A source in the United States is Less EMF (1-888-LESSEMF). Make sure to order a piece that is at least two inches (5 cm) wider and longer than the window hole, including the window frame.

If copper mesh is unobtainable, look for another transparent shielding material, or consider covering the window with foil or a removable piece of Reflectix (aluminized “bubble wrap”).

If the windows are of the low-E type (with a very thin metal film), then the copper mesh may not be necessary (see later).

Aluminum tape is used to hold the shielding together and to shield gaps between the materials. It is also used to shield smaller areas that are difficult to cover with foil. There are many brands available, and some have an adhesive that is a problem for people with MCS. Test which of the available brands is most tolerable. In America the Polyken brand was popular in the MCS community until they changed the product, though it is still one of the better. This author prefers the aluminum tape with acrylic glue from E.L. Foust in Chicago.

Two rolls should be sufficient for shielding one room. The 2-inch (5 cm) wide tape works well.

Fasteners are needed to attach the aluminum foil to the top of the walls and across the ceiling. There are a variety of fasteners available such as push pins, wide-headed short nails, aluminum tape and the 3M Command strips. The best choice depends on the situation.

It may be acceptable to make small holes at the top of walls and in the ceiling, as they are not so visible (ask the landlord).

Some surfaces, such as stucco, are too porous for using a glue fastener. Aluminum tape may leave a residue when removed again.

The American company 3M makes a product called Command, which has a special glue that is easy to remove without any residue or damage. The product is

available as “Velcro” type strips that work well for hanging sheets on surfaces that are smooth and not “crumbly.” They do not work on wallpaper.

Starting the installation

1. Turn off the electrical breaker(s) for all outlets and lights in the room.
2. Remove all furniture, or at least pull it out from the walls.
3. Remove anything hanging on the walls.
4. Remove or loosen any light fixture and smoke detector.
5. Remove any registers for heating, cooling or ventilation.

Installing the first sheet

Start in a corner to help keep the sheets straight.

Place the roll of foil flat on the floor and up against the wall. Pull foil from the roll as you step up on a chair or ladder and then fasten the foil to the top of the wall (using the chosen fastener). Make sure the foil reaches the ceiling.

At the bottom of the wall cut the foil off so it touches the floor and fully covers any baseboard.

An alternative method is to measure the height of the wall and cut off the foil before mounting it.

With the first sheet mounted and secured to the top of the wall, install the second sheet next to it in the same way. Make a small overlap between the two sheets — less than an inch (25 mm) is quite sufficient.

Then cover the seam with aluminum tape. It must be continuous coverage all the way from floor to ceiling. It is best if the tape doesn't touch the wall, as it can damage the wall when removed again.

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Taping the seam



Cut around any wall switches.

It is fine to use several pieces of tape, as long as they overlap each other.

If a wall switch becomes covered, poke around through the foil to find it. Then cut a small hole to let the lever pass through. Use aluminum tape to cover the hole around the lever. This both helps holding the foil and shields against microwaves.

Do the same for the telephone outlet if there is one in the room. Make sure to cover the front plate with aluminum tape. Do not cut holes for any electrical outlets. They should remain covered.

If there are wall-mounted light fixtures or baseboard heaters, work around them so they poke through the foil. It may help to let some of the foil in between the fixture and the wall, but make sure the foil doesn't touch any of the wires.



Then tape closely around the switch to maintain the shield.

Finishing the walls

Work all the way around the room by adding aluminum sheets as you go. At the door and window, try to get the material to cover the frame as well, if possible. Make sure all the vertical seams are taped, including all corners.

The window — method 1

Cover the window with the copper mesh by taping it to the foil around the window hole (or window frame). A few nails or thumb tacks may also be needed to support the weight.

This simple method may not allow the window to be opened. What it'll take to make the window operable depends on the specific situation. The basic principle is that there must be continuous metal contact from the wall to the mesh over the window. It may work to hang the copper mesh from some push pins so it can be lifted up while operating the window.

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*Copper mesh shields the window on the inside.
The mesh is mounted onto the aluminum shielding using a
couple of nails and lots of aluminum tape.*

The copper should not be mounted outdoors, as the rain will make it corrode. Make sure the mesh is in contact with the foiled walls all the way around the window.

The window — method 2

If the window has “low-E” glass, then it may be possible to use that as the shield instead of the copper mesh. Low-E glass is presently [2016] all made with a very thin metal film that also shields microwaves. Manufacturers are working on low-E glass that does not shield microwaves, as most people *want* microwaves to pass through.

With low-E glass, there just needs to be shielding added from the shielded walls to the glass — i.e. covering the window sill, around the window hole and the window frame. This can be done with a combination of aluminum foil and aluminum tape. It may be easier to use aluminum foil from the grocery store.



With low-E glass the window is already shielded, though foil must be installed to cover the frame, sill and the rest of the window hole. This window has an insect screen that does not provide any shielding.

If the window frame is of metal, then it does not need to be covered with the aluminum tape.

The window can easily be opened, but it will not shield microwaves while it is open, unless there is an aluminum insect screen. You may be able to replace the insect screen with one of aluminum.

The drawback of this method is that it uses aluminum tape that can leave marks in the window area when removed again, especially if it sits there for a long time.

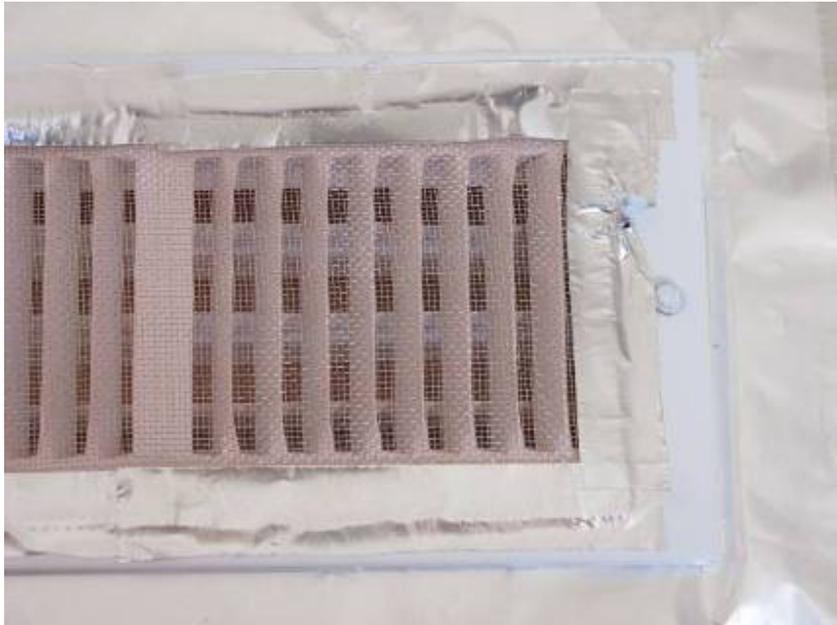
Registers for heating, cooling or ventilation

Any registers should have been removed from the wall before installing the shielding.

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When the hole for the air duct has been covered with aluminum foil, then cut a hole in the foil to allow the register to be replaced. Make the hole as small as possible.

Put the register back in place again, using the same screws and screw holes.



Register shielded with copper mesh.

It is best if the register is made of metal, as almost all of them are. However, the slits and holes are too big to block microwaves.

Install a piece of copper mesh over the ventilation slits/holes. Use aluminum tape along all four sides for a tight fit.

The ceiling

The ceiling is next and a little more difficult. It is best to have a helper for this part.

Cut off a piece of foil that is manageable and lift it up, while inserting the fasteners to hold it in place. Some people have used nailed strips of wood to hold foil in place.

For light fixtures, make a seam go through the fixture so the two pieces have half-moon shaped holes that are pressed in under the loosened (or removed) fixture. Make these holes as small as possible to keep the shield as intact as possible. A

metal light fixture is better than one of wood or plastic, as it'll help with the shielding. Make sure none of the wires touch the aluminum shielding.

If the fixture has a high-wattage light bulb, make sure it does not make the laminated foil so hot it damages or ignites the plastic or paper inside.



Seal all seams between walls and ceiling with aluminum tape.

The door

The door is shielded with foil and aluminum tape. The shielding is mounted on the room side of the door for best contact with the rest of the shielding.

The door can usually be covered by a single piece of foil (if using a 3 ft wide roll). Cut a slit and a small hole for the door handle to slide into. Fasten with aluminum tape that continues all the way around the edge of the door. Don't skimp on the tape or the foil will soon tear. Let the tape go around the edges, so it creates a good contact with the door frame when the door is closed.

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*The shield must go snugly around the door handle.
The door frame should also be shielded.*



*The foil is attached with aluminum tape all around the door edge.
The room side of the frame is shielded with aluminum tape.*

The door frame is most easily shielded by covering the room side with aluminum tape so there is continuous aluminum from the door to the frame to the wall when the door is closed. This method may ruin the paint on the door frame, however. An alternative is to use small pieces of foil that are attached with aluminum tape, though there may still be some harm to the paint. If foiling the frame is unworkable it can be omitted, though the shielding will be less effective.

The floor

The floor is done last to protect it against tear from the use of a ladder when working on the ceiling.

If the room is on the lowest floor of the building and there is no crawlspace or basement below, then it is not necessary to shield the floor. The soil below the floor provides sufficient shielding.

Installing the sheets on the floor is straightforward. Make sure there is an overlap between the sheets and to cover all seams with aluminum tape. The seams with the walls must also be taped.

To protect the foil against wear, avoid using shoes inside the room or cover the floor with a throw rug, sheets of sturdy plastic or loose porcelain tiles (ceramic tiles are not strong enough). Be aware that these floor coverings will gather dirt over time and must be fully removed for cleanup.

Using other types of foil

It is possible to use other types of foil materials, such as aluminized “bubble wrap” (Reflectix, Astro Foil) and plain aluminum foil from the grocery store. These materials are a little more difficult to install.

If using foil from the grocery store, get the thickest (“heavy duty”) variety and the widest roll possible. Avoid the Teflon-covered “non-stick” version.

The grocery store foils are much lighter than the laminated versions so they tear easily and may ruffle on windy days. Use pieces of aluminum tape to reinforce where fasteners are used. More fasteners are probably needed to support the thin foils.

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*Room shielded with foil from a grocery store.
The floor needed no shielding.*

It may be necessary to perforate the foil manually to allow the walls and ceiling to breathe.

Use of electricity

Leave the breakers off for the room, if possible, except where needed for a ceiling light.

This method discourages the use of any other electricity in the room because of safety. First of all, a person who needs a shielded room also needs a break from electricity.

There is also a potential safety issue with electrical equipment in the room and with allowing the electrical outlets to penetrate the shielding. In case there is a short, the shield might become electrified and cause shock to anyone who touches it.

Many houses have poor grounding of their electrical wiring. If the shielding is connected to the electrical ground via the electrical outlets, it may negate the health relief from shielding the microwaves. In rare cases people could receive electrical shocks.

How to safely use electricity inside a metallic room depends on the specific situation and is beyond this simple how-to article. Try to make it work without electricity in the room — other than the ceiling light and a few other essentials, such as a smoke detector, a battery clock, a corded telephone and perhaps a battery powered radio (if it will work inside). Consider using a flashlight or battery powered camping lantern if necessary.



This simple method discourages the use of electrical equipment of any kind inside, both for health and safety. However, medical equipment may be allowed.

If you must have a medical device inside the room, such as an air cleaner or a CPAP breathing device, it may be possible to do so. Electrical motors should not be any worse inside the shielded area than outside, since the aluminum foil does not reflect magnetic radiation like it does microwaves. Electric motors are still a problem for many sensitive people and many medical devices come with built-in electronics (even Wi-Fi) that can be less tolerable inside a shielded room.

If you must have a medical device, choose one outlet to expose through the shield. Only one! Try to find an open minded electrician to check the outlet. It may be safe to connect the shield to the outlet's ground, so a short should make the

breaker trip. But some people may be affected if the ground is not of good quality (determining that is beyond most electricians).

An alternative is to install a ground fault switch. In America these are called Ground Fault Circuit Interrupters (GFCI). In other countries they are known as Residual Current Device, RCD, FI, HFI and other names. Be aware that these devices contain electronics and do radiate and create dirty electricity.

Decorations

Bare aluminum walls are not very pretty. Some people choose to leave them like that — after some time the alu-look becomes less noticeable. However, others choose to decorate in various ways.

Simple decorations, such as large posters, can be hung on the walls. Some people have hung colorful cloth bed sheets. It is best to use tape, self-adhesive fasteners or push pins. Do not use nails as they can accidentally electrify the shielding if they hit an electrical cable inside the wall. Nails can also act as an antenna, bringing microwaves in through the shield.

It may be possible to paint the aluminum, using paints that are flexible enough, though we have no experience with this. Less-toxic paints, such as clay paints, will likely flake off the flexible aluminum foil.

More information

There are several other methods for shielding a room or a house. Some of them allow for much better shielding than described in this article, though they are more costly and complicated.

For additional articles about shielding, go to www.eiwellspring.org/shielding.html.