

Troubleshooting a shielded room or house



You've built a shielded room to protect yourself from the neighbor's wireless network or nearby towers, but it doesn't work. You may even feel worse inside. Here are some things to check.

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Shielding a room or a whole house can be done in various ways. For a discussion of the materials to choose from, and how to use them, see the articles on the link

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provided at the bottom. In the following it is assumed you've already installed the shielding and it doesn't work well somehow – either it doesn't reduce the radiation as much as expected or you even feel worse inside.

These are generic answers, every case is a little different and you may need a trained eye to come and look it over. We discuss hiring an expert at the end.

How well does it shield?

It's a really good idea to test the shielding with an RF meter. Be aware that ambient radiation fluctuates a lot, so if you just take a reading outside the room and then walk inside the room, that doesn't give you an accurate difference.

You will get better numbers if you put the RF meter on a tripod or non-metallic chair and set it to record MAX (or peak) value over a minute, and then measure both outside and inside the room. Even better is to do 5 such measurements, each of one minute.



Measuring the microwave radiation inside a shielded room. Here the level is so low the RF meter can't detect it.

You can also try to set up a strong source of radiation next door and measure how much the wall shields. A DECT cordless phone or its base is a good source, as it radiates continuously. Remember that the measurements must all be taken at the same distance and orientation to the source (most sources radiate differently in different directions). The distance is measured directly, as if the walls do not exist.

A mobile phone can be used to get a crude idea how well the shielding works. Watch how many "bars" the phone displays outside and inside the shielded area. But be aware that this does not say anything about the radiation level, since there can be many other sources of radiation.

The shielding doesn't work well

Decent home-made shielding should reduce radiowaves about 99% (20 dB). A professional job should do much better than that. A poor job may only shield 50%

If you have a poor shield, start looking for holes. Big holes or small holes, or slits. It's like a box with a light inside, placed in a dark room. If there are any holes, "light" will come through, possibly illuminating the whole room.

Common places with holes are:

- Slits around doors
- Slits around windows
- Electrical outlets
- Recessed lights
- Boxes for ceiling lights
- Ventilation holes
- Pipes coming through walls
- Hidden holes inside cabinets

And, of course, you need to cover all walls, all doors, all windows, the ceiling and possible the floor.

If you use aluminum foil, any thickness should work, as long as it is not so thin that light passes through it.

If you use some sort of mesh, the holes must be as small as possible. The higher the frequency, the easier it passes through a hole. Currently, meshes with holes

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about 2 mm (1/16 inch) wide works well. If you are using chicken wire, you're wasting your time.

If you use a painted-on shield, it may be a poor product or it may need a second coat.

If you use non-metallic shielding, such as carbon, bricks, concrete, etc., you can't expect much (see our test data).

If you use a material marketed as a special shielding material, demand to see a data sheet. If none is available, do not buy it. And remember: those data sheets are always very optimistic, you won't get as good shielding effect as the sheet says.

It is possible that the test you did wasn't done well. Using an RF meter is not just a matter of pushing a button and reading a number, just as doing a good paint job is more than just splashing paint on the wall.

Don't feel well in the new shielded room?

Some may actually feel worse after a room was shielded. There are several possibilities.

First of all, it may be the shielding material itself. If you used a shielding paint, it will need time to cure and offgas. For sensitive people that could mean months where fresh outside air is needed to slowly get rid of the fumes. Some of the shielding paints are quite toxic and even those marketed as "natural" can cause problems. There are no "really safe" paints available.

If you did multiple coats on the same day, the problem may be that the paint isn't curing well. It is best to allow each coat of paint to fully cure before applying the next layer.

Shielding fabrics are a notorious problem for some people, and putting them in a washing machine will ruin them, as the metallic coating will flake off. They are best avoided.

The safest materials are aluminum foil and stiff copper mesh. But even here there are people who get a headache from such a large area covered with a metal.

Try vigorously ventilating the room to see if it helps; at least to find out if the problem is the material itself.

The problem can also be that the installation actually increases the radiation level, though this is rare.

A common idea is that metal shielding "traps" microwaves. This is largely a myth, except for some special cases, which we'll discuss later.

A more likely problem is that the metallic foil or paint has somehow become connected to the electrical system so there is a voltage or current on it (called "stray electricity").

A simple way to detect stray electricity is to use a good gaussmeter to measure both the low-frequency MAGNETIC and ELECTRIC fields in the room. They should be similar to what is outside the shielded area.

If the shielding is connected to the ground prong in an electrical outlet, or a metal water pipe, or a metal air duct, or a steel wall box, that could be the problem.



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Use a gaussmeter to look for stray electricity. Measure both the MAGNETIC and ELECTRIC field. If the meter shows "zero" get a better meter; some meters are not sensitive enough to be usable. The shown meter records 2 nanotesla (0.02 milligauss), which is exceptionally low.

If the shield is connected to ONE or more grounds, there could be a voltage on the shield, which creates an ELECTRIC field.

If the shield is connected to TWO or more ground prongs (or other metal building parts), there can be a weak electric current running on the metal shield. This will create a MAGNETIC field.

If your gaussmeter shows "zero" it is not sensitive enough. Some gaussmeters are just too cheap to be useful.

Some meters that can measure the electric field are only usable for high-tension power lines, this includes the popular TriField meter.

About grounding the shield

Grounding the shield should do little to enhance its shielding effect against microwaves (the reason is the resistance in wires goes up dramatically with rising frequency).

Among electricians it is almost religion to ground everything, everywhere. Water pipes are "grounded" to the wiring ground, and on to the steel air ducts and steel studs, etc. The result can be stray electricity all over the place, causing high levels of low-frequency MAGNETIC and ELECTRIC fields.

Likewise, grounding the shield is a common suggestion for problems with a shield. Often people say "the more the better."

A reason to ground metallic shielding is that it is safer if there is an electrical short somewhere. Then the breakers may detect the short better. However, in houses protected with RFI/GFCI breakers, a short will be detected by them anyway.

Some people don't ground their shielding. Others do ground it, but connect it to JUST ONE grounding point, which much preferably is directly connected to the house ground rod. Don't use the ground prong on the electrical outlets, especially

not more than one, (they rarely are at zero volts, and different outlets can be at slightly different voltages, so connecting them will create a current).

You can ground the foil in different places, but use dedicated ground wires that all go to a single point.

To avoid these issues, some people suggest using non-metallic shielding materials, but they don't shield as well.

Trapping microwaves

There is a persistent myth that a metal room (or house) will somehow trap and enhance microwaves. Like many myths, there is a smidgen of truth here.

If you put a microwave transmitter *inside* a shielded room, the room will trap the microwaves, which will bounce back and forth between the walls and raise the radiation level quite alarmingly (the technical term is "standing waves"). But why would you do this? It may happen by accident.

Another possibility is a strong RF source is right outside the room, and there is a hole in the shield that it can radiate through. This could be a wireless network hub sitting up against the wall, and there is a plastic electrical outlet box making a hole in the shield.

Other than that, it's largely a myth that metal rooms and houses trap microwaves. They don't, and it is easy to verify using an RF meter. But the myth persists.

If there is a big powerline or substation outside

If there is a tall powerline, or a substation (transformer station nearby), that greatly complicates things. Then there will be strong low-frequency electric and magnetic fields coming through the air. There will probably also be ground currents in the soil below the house, which will radiate magnetic fields up through the floor.

Low-frequency magnetic fields are best shielded by steel plates or mumetal, but even with that it is difficult to get much shielding effect. Here a good ground connection – one only – can be helpful.

Aluminum, copper and silver are basically worthless against low-frequency magnetics, unless you invest in thick plates.

If this is your situation, the best and cheapest remedy is probably to move elsewhere. Otherwise, you'll need an expert to look at the situation in person.

Finding someone to help

You may need to hire an expert to come and diagnose the problem. Unfortunately, genuine experts are far between and not cheap. If you can afford it, search for an engineer in the field of "electromagnetic compatibility" EMC or "electromagnetic interference" EMI or similar wording. However, they are expensive and may scoff at your need for a shielded room.

There is an organization that certifies people to reduce EMF in people's homes. The requirement for their certification is limited, with no college level education required. The quality of their candidates vary dramatically. Some are quite good, some can only offer platitudes, in our experience. Get references and check them.

Social media is rarely useful. Opinions are cheap and their value likewise. There are a lot of myths about EMFs that float around these echo chambers and eventually become accepted "truth," just like in politics.

More information

Other articles about shielding are available on www.eiwellspring.org/shielding.html.