

Improving Equipment Performance with Ground Line EMI Filter GLE30-1

OnFILTER' ground line EMI filters GLE30-1 provide EMI suppression on ground circuits. Grounding in the facility connects all equipment - electrical noise generated by one tool propagates throughout the entire facility. Unlike radiated emission electrical noise on wires (called *conducted emission*) does not drop off as quickly with the distance and can reach far.

The main purpose of grounding is safety, secondary purpose in some facilities (mostly electronic manufacturing) is reduction of ESD risk. Many factories employ both types of grounding - via power line ground and a separate ESD ground. Not discussing merits of this approach, it adds a parallel grounding network and creates ground loops which exacerbate EMI situation.

Grounding is a common electrical connection between every piece of equipment in the facility. If any of the tools is electrically noisy it supplies this high-frequency signal to its ground which then propagates to other equipment as Figure 2 illustrates.

Reduction of noise generated by equipment itself is a task that proved to be in practicality not successful. The properties EMI signals in real-life situations are quite different from the ones in a laboratory testing equipment for compliance with electromagnetic emission standards as explained in details in "[OnFILTER Advantage](#)" document found in our online [Library](#). Equipment manufacturer has little motivation to extend an effort and spend money on improving something that is not a part of regulations. The user of equipment is stuck with the task of providing an EMI-free environment in the facility.



Figure 1. GLE30-1 Ground Line EMI Filter

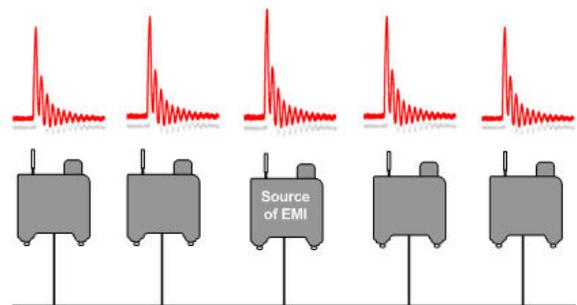


Figure 2. EMI and Conventional Facility Grounding

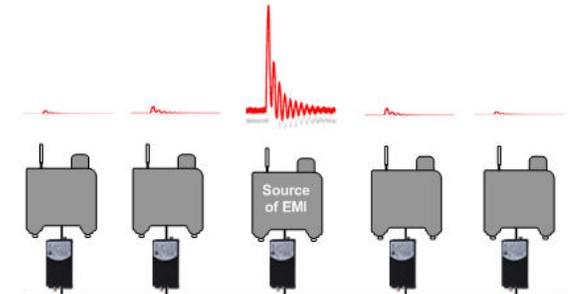


Figure 3. Ground filters GLE30-1 block propagation of EMI



Figure 4. Ground wire in subfloor



Figure 5. Ground bar
Source: www.copper.org

Attempts to reduce presence of electrical noise on ground in the facility by providing extra earth ground points inside or around the facility are seldom effective -

impedance of earth ground is quite large at high frequencies plus it cannot realistically be done near each noisy tool, especially in controlled environment such as cleanrooms and data centers.

Since it is practically impossible to reduce noise on ground from already-manufactured equipment, the only viable option is to prevent propagation of noise throughout the factory. Ground line filters GLE30-1 present very high impedance for EMI while retaining very low safety-compliant impedance for 50/60Hz mains' power and DC. Properly connected, ground line filters GLE30-1 break the flow of high-frequency signals on ground and confine them only to the noise source providing the rest of the equipment in the facility with clean noise-free grounding as illustrated in Figure 3.

Ground line filters GLE30-1 are connected between the equipment and shared ground wire. Any noise generated by the equipment (the one in the center in Figure 3) is first reduced by GLE30-1 through which it is connected to a common ground wire and then is further reduced by another GLE30-1 that leads to another equipment.

Facility ground is mainly implemented as ground wire, often in subfloor (Figure 4), or ground bars (Figure 5) or as a combination of both. Each individual equipment is connected to this ground wire or ground bar.

Figure 6 shows one of practical ways to connect GLE30-1 to common ground using ground bar/plate. As seen, GLE30-1 are connected between ground wires from equipment to a common ground plate. Noise from any of equipment connected such way will be greatly attenuated to the point of insignificance.



Figure 7. Connection of ground line filters GLE30 with long ground bars

Some facilities utilize long ground bars along the walls or on the sides of equipment.

In this case GLE30-1 can be connected as shown in Figure 7. In this configuration GLE30-1 provides break in the flow of noise through the ground bar.

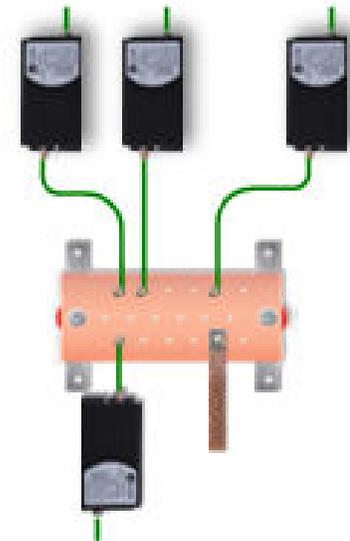


Figure 6. Connection of ground line filters GLE30 to a ground bar

Figure 8 shows placement of GLE30-1 in a subfloor when equipment is connected directly to ground wire without ground bar. In this case ground wires from equipment are connected to the main ground wire using appropriate clamps. GLE30-1 is connected in line with these wires.

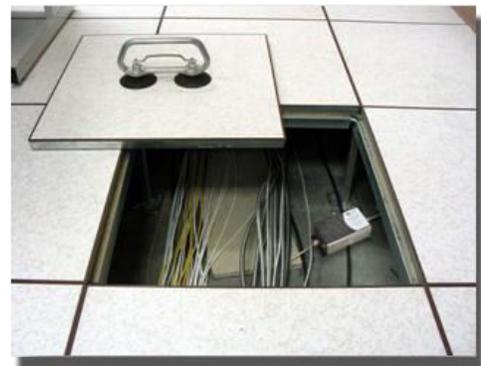


Figure 8. Connection of ground line filters

Applications

Wherever EMI is of concern, ground line filters GLE30-1 can help. Among the applications are:

- Industrial robotics
- Electronic manufacturing
- Medical
- Data Centers
- Communication

If you require reduction of noise on power lines, not only on ground please take a look at our [CleanSweep® AC EMI power line filters](#) which include ground filtering as well. For filtering of ground inside the equipment please consider [GLE04-01](#) (Figure 9).



Figure 9. Small Ground Filter for Equipment GLE04-01

Conclusion

OnFILTER' Ground Line EMI filter GLE30-1 improves uptime and reduces errors of equipment with minimum integration effort and at reasonable cost. Filters are easy to install and require no maintenance. Please visit www.onfilter.com for more detailed information. Contact us at info@onfilter.com with any questions.