Fall, 2004 Issue No. 12

EPG CONNECTION

Your Resource For Environmental & Industrial Solutions

INSIDE

EPG COMPANIES INC.
19900 County Road 81
Maple Grove, MN 55311
Phone (763) 424-2613
(800) 443-7426
Fax (763) 493-4812
www.epgco.com

Effective Grounding Systems

Effective grounding, one of the most important and least understood aspects of an electrical power system, is often overlooked during installation. Unfortunately, this oversight has lead to equipment failures, higher operating costs, electrical noise, fire, personnel injury and even death. Conversely, a properly designed and well maintained wiring and grounding system will help ensure optimum equipment operation and personnel safety. To that end we must clearly understand what the differences are between an earth-grounding system and an equipment-grounding system. People often confuse these two. Such confusion can result in the misapplication of earth- and equipment-grounding practices and lead to a system that is expensive, inefficient, unsafe and/or fatal.

EARTH-GROUNDING SYSTEM

The earth-grounding system, consisting of an electrical connection(s) to earth by way of an earth-electrode(s) provides:

- Protection from lightning, line surges, and/or higher voltage systems
- Protection from static-charge build up
- Zero-voltage reference point needed for proper system performance

The quality of the earth-ground connection determines its resistance and can be improved by:

- Increasing the surface area of the electrode(s)
- Increasing moisture or conductive mineral content of the soil
- Increasing the land area covered by the grounding system

The National Electrical Code (NEC) specifies a maximum earth-ground resistance of 25 ohms or less. A value of 1 ohm or less is desirable for sensor circuit operation.

(continued on page 2)

New EPG Landfill Design Catalog

Our new, 285-page Landfill Design Catalog is now available for all those involved in the designing and specifying of leachate, liquid, gas handling or process control systems. Topics covered include:

Sec. 1 SurePump™ Sump Drainers
Sec. 2 Pump Discharge Disconnects
Sec. 3 Miscellaneous Accessories
Sec. 4 PumpMaster™ Control Panels
Sec. 5 Level Monitoring & Control
Sec. 6 Flow Metering & Control
Sec. 7 Data Acq., SCADA & Telemetry
Sec. 8 Breakout Junction Boxes
Sec. 9 Design Guides
Sec. 10 Technical Information

The catalog may be obtained by submitting a request form at www.epgco.com or by calling EPG at 800-443-7426.

New Landfill Design Catalog

3-Ring Binder or CD Format

If you would like more information about EPG products, services and/or capabilities, please call us at 1-800-443-7426, visit our web site at www.epgco.com or e-mail us at info1@epgco.com.

Effective Grounding Systems: continued

EQUIPMENT-GROUNDING SYSTEM

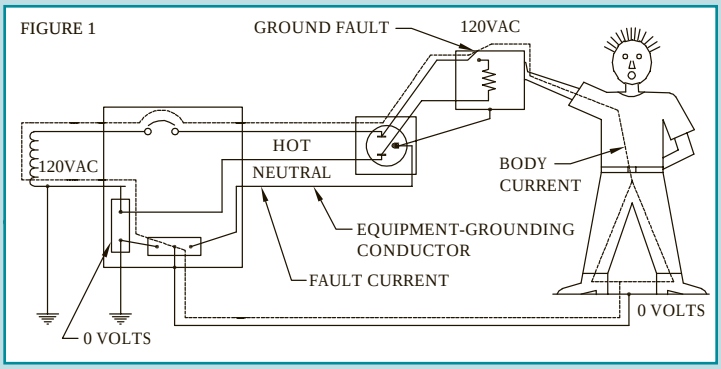
Equipment grounding serves several functions including:

- Protects personnel from serious shock or electrocution
- Protects equipment from damaging noise or faults
- Provides an intentional path of ample current carrying capacity and low-impedance to insure rapid operation of the circuit's over-current device protection during ground fault conditions
- Provides a common link for all equipment to operate at the same zero-voltage reference point

The National Electrical Code (NEC) Section 250, describes an effective grounding path as -- the path to ground from circuits, equipment, and metal enclosures for conductors -- shall;

1. Be permanent and continuous.
2. Have capacity to conduct safely any fault current likely to be imposed on it.
3. Have sufficiently low impedance to limit the voltage to ground and to facilitate the operation of the protective devices in the circuit.
4. The earth shall not be used as the sole equipment-grounding conductor.

Equipment-grounding systems must meet all NEC code requirements to be considered safe, effective grounding. Effective equipment-grounding conductors must have sufficient capacity to insure low impedance throughout the AC distribution system, enabling instantaneous operation of the over current



devices (fuses and circuit breakers) when a ground fault occurs. Figure 1 above illustrates a 120VAC circuit under a ground fault condition. Under normal operating conditions, the load current flows on the hot and neutral conductors, and no current flows on the equipment-grounding conductor. The equipment-grounding conductor to the equipment enclosure extends the zero-voltage reference established by the earth-grounding electrode at the main service supply. Maintaining zero volts on the equipment enclosure protects the operator against electrical shock. The equipment ground also provides a zero-voltage reference for the logic circuits in the equipment.

When a ground fault occurs, the equipment-grounding conductor becomes the return path for fault current to flow back to the source. The equipment enclosure will have a shock voltage resulting in a dangerous, potentially lethal current flowing through the operator's body until the fuse or circuit breaker opens the circuit.

(continued on page 3)

EPG Sales Representative Highlights

Charles Reich (pictured on the right), owner of the Reich Company, has provided treatment equipment for the landfill, remediation, air, and water and wastewater markets, for nearly thirty years. He and his team represent EPG Companies in Texas, New Mexico, Oklahoma, Arkansas, Louisiana, and Mississippi. His travels include educating sites about the advantages of using EPG equipment and reinforcing the fact that EPG equipment is built right, tested at the factory, shipped as a system to the site, is the best in the industry and lasts a long time if it is installed and maintained properly. In addition, Chuck offers his customers cost-effective EPG wireless data acquisition and control systems and maintains excellent customer communication.

Recent projects include the installation of a wireless system for Waste Management covering all aspects of operation, i.e. sump level, storage tank shutdown, flow, bioreactor recirculation, and weather station. Thanks Chuck. Keep up the great work!

Jim Markgraf and Chuck Reich provide EPG equipment sales.

Effective Grounding Systems: continued

A low impedance equipment-ground path is essential to insure the instantaneous operation of the fuse or circuit breaker. This impedance value must be much less than one (1) ohm. It is critical to note that this reading (in ohms) is impedance and not resistance. Measuring it requires the use of an (AC) impedance tester that measures the impedance of a conductor from the point of test back to the main electrical service. Do not use an ohmmeter or digital multi-meter (DMM). While DMMs are capable of quantifying DC resistance values, they cannot measure impedance in AC electrical systems.

GUIDELINES TO FOLLOW

1. Write clear, concise specifications to cover both earth- and equipment-grounding requirements and document all test results to establish a benchmark for any future testing.
2. Use proper test equipment and always verify that the earth ground, equipment ground and neutral conductors conform to NEC standards.
3. Conduct a wiring verification test. Measure all voltages, current, phase rotation, load balance, equipment-grounding conductor impedance, neutral impedance, and the presence of the required neutral-ground bond at the service equipment.
4. Test for wiring errors at the panel or outlet of interest. Check for missing connections, including open equipment-grounding conductors, open neutrals, and open-phase conductors.
5. Test for poor quality or improper connections including reversed phase/neutral or reversed neutral/equipment grounding.
6. As circuit breaker ratings increase, the impedance values become lower.
7. Purchase power-conditioning and power-protection products only after determining that the facility wiring and grounding are trouble free and of high quality.
8. Follow the guidelines found in the book: EC&M Understanding NEC Rules on Grounding and Bonding.

During visual inspection, ask the following:
1. Are the earth-grounding and equipment-grounding systems properly installed?
2. Are proper wire sizes used for the feeder and branch-circuit conductors?
3. Is an insulated equipment-grounding conductor installed with the feeder conductors?
4. Are individual branch circuits installed to supply only electronic loads?

Remember to perform verification and routine testing of electrical wiring and grounding with specialised earth-ground resistance and impedance testers. It is the final, critical step to ensure optimum system/equipment performance and the safety of your personnel.

To read or print the full version of this article, please visit our web site at www.epgco.com and see “Featured Articles” on the bottom of our home page.

EPG People...

Maybe they thought they were losing a skilled worker and were reluctant to let a good man go. Fortunately for us, Canada finally processed his paper work and after 90 days of waiting, Howard Lester became a permanent US resident, husband, step father and newest addition to EPG's Customer Service/Tech. Support department. Now after six months of service, we think it was well worth the wait.

Howard's background in electrical systems and pump repair has provided the testing, repair, field service and troubleshooting expertise needed to support customers from Michigan to Saipan.

If you have a technical support issue, call Howard. He's got the right answers and most likely, a few stories to tell.

Howard enjoys his new US residency, mountain and trail biking, fishing and hiking along with his new wife and two children.

Howard Lester

Product Highlights

Web Site for Landfill Service Providers

Do you need a dependable landfill service provider? We now feature an online listing of individuals who have completed our SWANA accredited, EPG Advanced Service School training and/or the EPG Pumps and Controls Service School training. The individuals and companies represented in this online listing qualify as dependable landfill service providers. Training and field service expertise include the installation, maintenance and/or repair of liquid or gas handling control systems.

For more information, visit our web site or call EPG today.

New & Improved 2” Disconnect

EPG has recently completed development on an improved 2” NW Series Disconnect Adapter used for leachate, monitoring and remediation piping applications. The extended length discharge allows the adapter to fit through thicker riser or sump walls, facilitating quick and easy pump connections and disconnections. The new cast, 316 stainless steel disconnect adapter is stronger and more reliable than cast brass or plated models, tested to 330 psi and comes with 2 gaskets and a locknut used to create a vapor tight seal. The 2” NW Series Disconnect Adapter can be ordered as a complete assembly or as a separate head or tail unit.

EPG Upcoming Events

EPG Pumps & Controls and Advanced Field Service School - March 2005 -	Look For Us at a State or Regional Show Near You - 2005 -

Keep Your Connection to . . .
Landfill, Remediation, Industrial and Water & Wastewater Solutions

P.O. BOX 427
ROGERS, MN 55374