

# Salt Water Disposal (SWD) Site Bonding Guide For Lightning Protection

*September 2013*



**Typical SWD site with oil, gunbarrel, sand and salt water tanks**

*This guide was developed through compiling information based on our experience. We have not independently tested, evaluated or verified the accuracy of any information or the soundness of any judgments contained in this guide other than directly with respect to the products we design and install.*

## **Introduction**

Electrical storms create a charge on an SWD site. This induced charge includes the surface of the earth, fiberglass tanks, steel tanks, and other structures and operating systems at the site. When there is a nearby lightning strike to the earth, which can occur over 100 meters from the site, the charge that was induced on the earth is discharged to the point of lightning termination in a matter of microseconds. The surrounding structures and tanks may discharge at a slower rate than the earth and other bonded and grounded conductive surfaces. This difference in discharge rate, especially between isolated metallic bodies and other bonded and grounded conductive surfaces, will result in a difference in electrical potential. As the built up charge on an isolated metallic body seeks a path to the point of lightning termination, the charge flow across bodies or structures with different electrical potentials can create an arc or spark which could lead to a tank explosion and fire.

In order to reduce the potential of an arc or spark within the containment wall tank area, all isolated metallic bodies on top of fiberglass tanks should be bonded and connected to the unified ground system. The ground system should have the most efficient earth interface possible, including both a low resistance and low impedance. This may be achieved by utilizing a chemically charged grounding electrode, such as the Chem-Rod™, in order to account for the high-frequency transient nature of the lightning event.

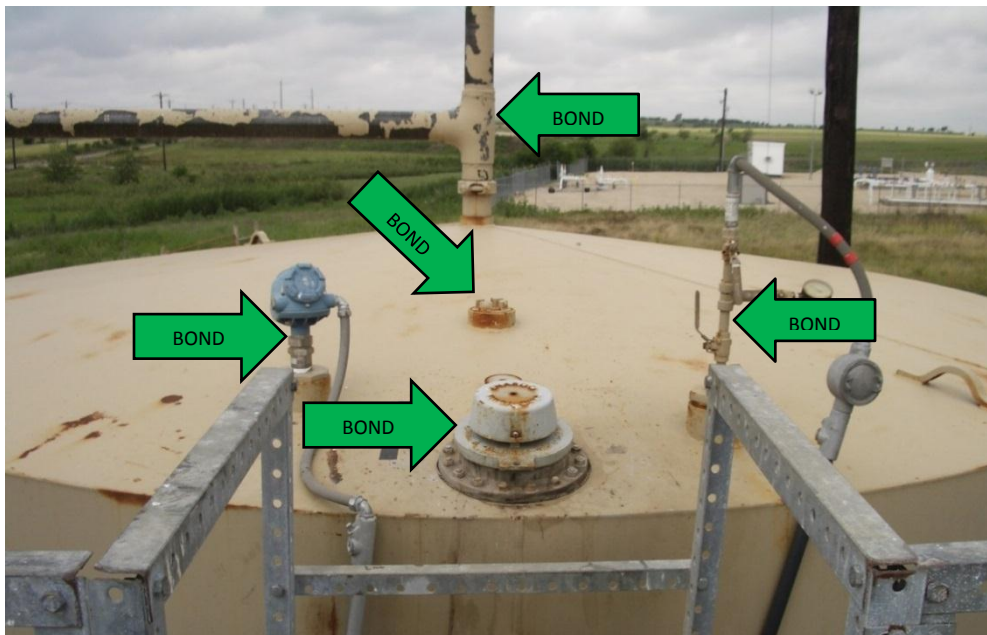
In our experience, no two salt water disposal sites are identical, and proper bonding and grounding will vary from site to site. This guide is intended to illustrate isolated metallic bodies of a typical salt water disposal site that should be bonded and grounded, but does not necessarily show all of the required or recommended bonding and grounding for any particular salt water disposal site. The user of this guide should consult with a qualified engineer familiar with the particular salt water disposal site for which an LEC system will be installed, and that qualified engineer should assure that all isolated metallic bodies have been properly bonded and ground to avoid an arc or spark.

Buyer has been informed that LEC has limited experience, knowledge, and expertise in the requirements for adequately “bonding” the equipment and machinery to which LEC’s products, services, systems or solutions will be affixed. Accordingly, Buyer agrees that it shall not be entitled to rely on information, guidelines, or other materials relating to bonding which LEC has provided to Buyer. Further, Buyer agrees that LEC shall not be responsible for, and waives and releases any right it might otherwise have to assert a claim for, any damage, loss or expense resulting, in whole or in part, from any incomplete, or nonexistent, or insufficient bonding on any of Buyer’s machinery or equipment. LEC strongly advises Buyer to consult its own expert regarding bonding.

While not specifically addressed in this document, we recommend that active lightning protection equipment utilizing charge transfer technology and surge suppression devices (SPDs) be installed in order to provide a comprehensive lightning protection system. This may include DAS (for total strike prevention) and/or SBIs, SBTs or SDATs for varying degrees of risk reduction. This may also include Data Line Protectors (DLPs) for low voltage signal lines, as well as the Facility Guard (FG) or Transient Limiter (TLX) for higher voltage electrical service entrances, transformers, distribution panels, pumps, etc. Further, this document does not cover the necessity of a static drain device that is immersed in the product housed inside a fiberglass tank or insulated steel tank. These products are intended to transfer the electrical charge that is induced on the stored liquids to the earth grounding systems. In high soil resistivity environments, chemical ground electrodes may also be appropriate.

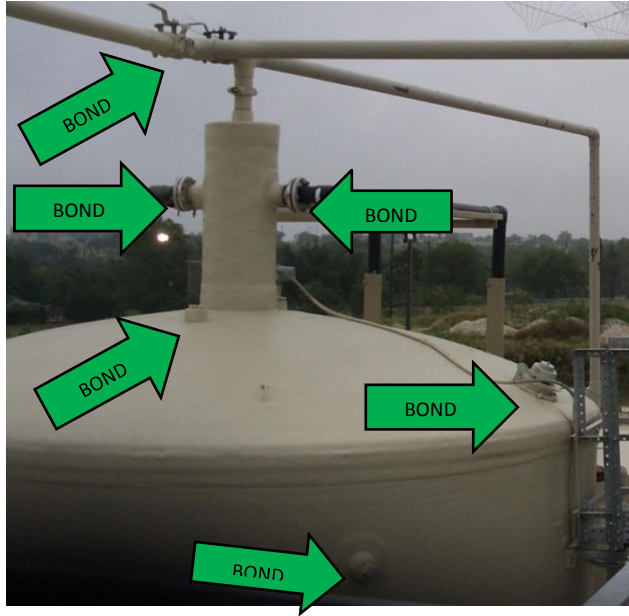
### Top of Tank Bonding

All isolated metallic bodies on top of fiberglass tanks should be bonded together and tied to the common ground system. This includes bonding the metallic thief hatch flange to the catwalk, as well as the thief hatch flange to the thief hatch lid. The catwalk should be continuously conductive and bonded at both ends to the common ground system. Bonds from isolated metallic pipe fittings, valves, meters, and plugs may be tied to the thief hatch flange or directly to the catwalk. Alternately, metallic plugs may be removed and replaced with non-conductive plugs if feasible to do so. For example:

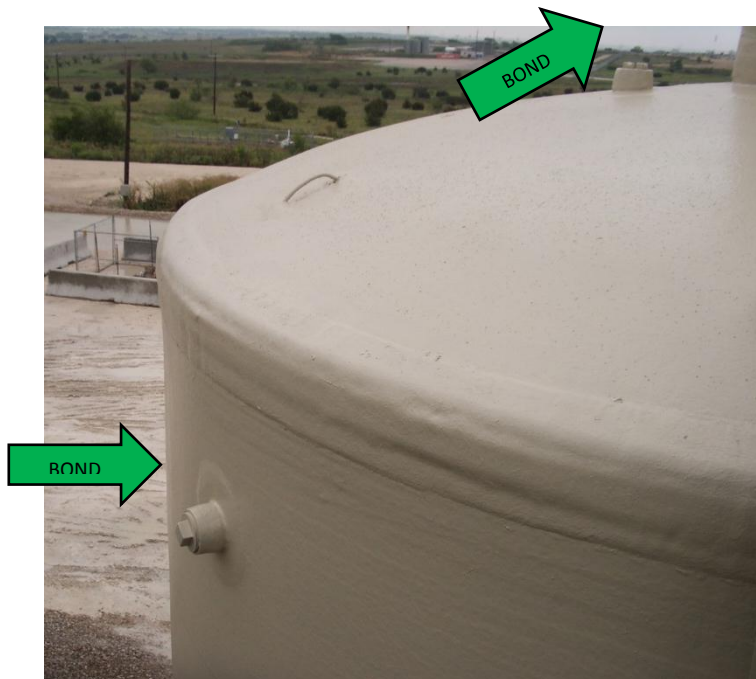


Top of typical fiberglass salt water tank

**Top of Tank Bonding (continued)**



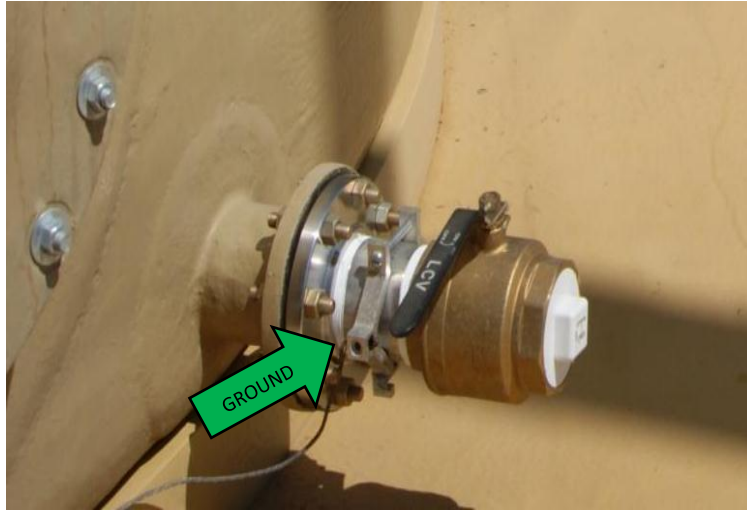
**Top of typical fiberglass gunbarrel tank**



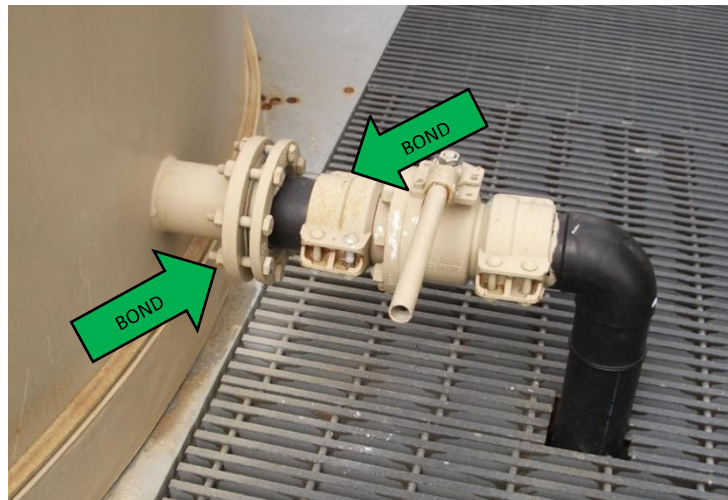
## Bottom of Tank Bonding

All isolated metallic piping at the bottom of fiberglass tanks should be bonded to the common ground system. This may include the short section of metal inlet pipe connected directly to the fiberglass tank, as well as any other inlet or outlet metal pipe sections such as those used for tank blow-out.

Additionally, all isolated metallic flanges and couplings, such as those separated by short sections of non-conductive fiberglass or poly pipe, should be bonded together and tied to the common ground system. For example:



**Inlet/Outlet piping at bottom of typical fiberglass tank**

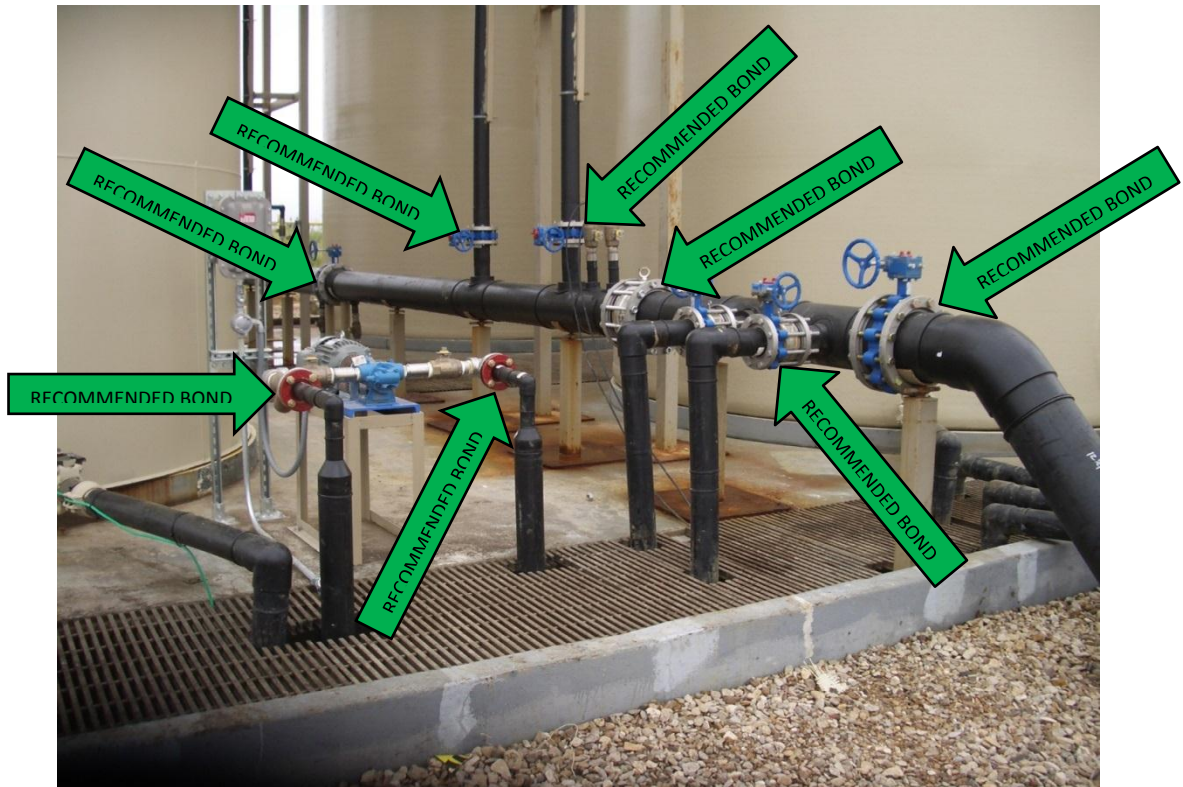


**Bottom of typical fiberglass tank**

## Phase II

### Recommended Bonding within Containment Wall may include:

To further reduce the risk of unintended arcing or sparking within the containment wall and tank area, all isolated metallic bodies within 3 feet of a bonded or grounded metallic body or bonding or grounding wire should also be bonded and grounded. Typical locations for this recommended bonding are illustrated below:

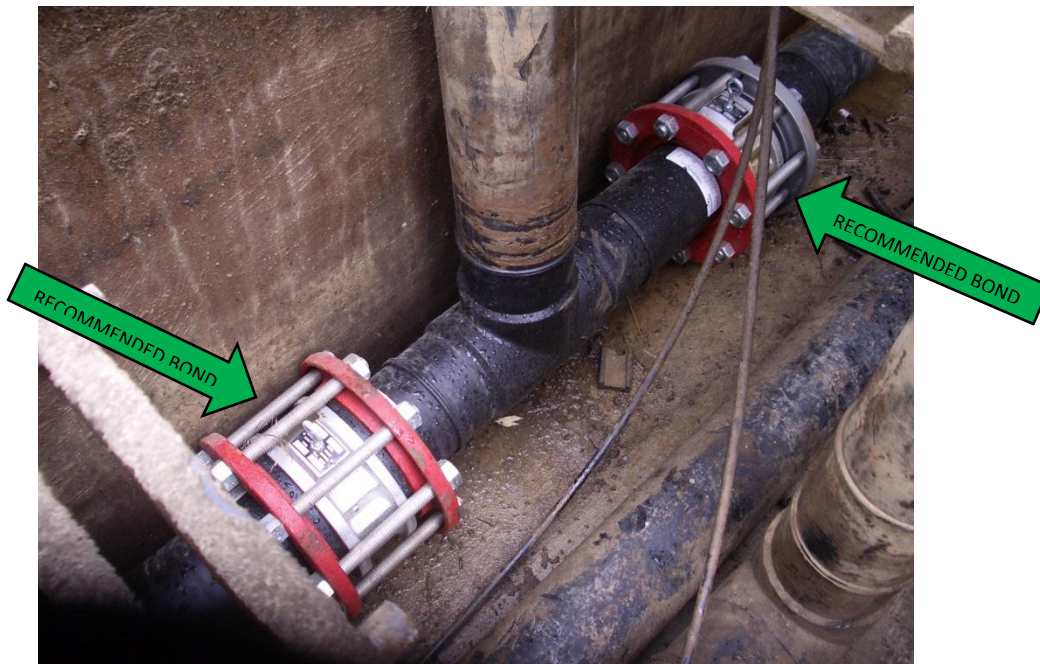


Isolated metallic objects within containment wall

**Recommended Bonding within Containment Wall (continued)**



**Isolated metallic objects within containment wall**



**Isolated metallic objects within containment wall**