



When determining the "conductivity" of any material of construction - you must first define if you are wanting to establish the *thermal* conductivity of that material, or the *electrical* conductivity. Especially for FRP composites these are distinctly different properties.

**Thermal Conductivity:** All materials will conduct heat (or cold) to some degree. Stainless steel, copper, aluminum, and glass are all considered good thermal conductors. This is why cookware is usually made of these materials. Wood, foam insulation, and most plastics are considered poor conductors of heat.

In our "Series" bulletins for each type of FRP composite construction - Table #1 of Properties provides the thermal conductivity for that laminate. This thermal conductivity is given as BTUs per hour, per square foot of laminate, per degree F. of temperature difference between the two sides of the laminate, per inch of thickness of the FRP composite laminate.

**Electrical Conductivity:** This property of a material is defined by its ability to transmit an electrical charge. Copper is an example of a material that is very electrically conductive. This is why the electrical wiring in your home is copper cable. Aluminum and steel are also considered to be electrically conductive. (Though some grades of stainless steel have poor electrical conductivity.)

Glass, most thermoplastics, and most thermoset FRP composites are considered to be poor electrical conductors. Thus, these materials are typically classed as "non-conductive"; and are often used as electrical insulators. Examples of non-conductive FRP laminates would be our Series 2000/4000 epoxies and our Series 5000/9500 vinylesters.

There are times when you may want FRP composites to be conductive. Examples include FRP composite pipe for loading and unloading of oil tankers, jet fuel piping, FRP composite fume duct that is conveying potentially explosive gasses, and certain FRP composite scrubber applications. For these applications we modify the FRP composite materials to provide some limited electrical conductivity. One FRP pipe manufacturer uses continuous aluminum fibers that are wound integrally with the pipe wall to provide that electrical conductivity.

For FRP composite fume duct that will be handling explosive fumes, we provide a conductive inner corrosion liner, that can be grounded during installation, to "bleed off" any static charges. That liner is reinforced with a conductive carbon mat. And to obtain the best possible electrical conductivity, we further use a graphite additive in the resin for the liner. Examples of conductive FRP composite pipe and duct would be our Series 5800-G and 9800-G furan composites.

**Summary:** We welcome the opportunity to work with our customers to provide them either conductive or non-conductive FRP composite equipment - depending upon their specific project requirements.