

THE COAX CONTACT

Many underwater applications require coax cable and contacts. While the topside or non-underwater cable and connectors/contacts, are fairly easy to find and match to the application, the underwater cable and connectors/contacts are not.

The standard SEA CON® coax was introduced in 1973. They were originally manufactured with teflon as the dielectric material. In 1977, the requirement to achieve full ocean depth capability was adopted. The dielectric material Teflon® (Registered Trademark for DuPont) would move or cold flow when under pressure. Many iterations later the problem was still there at the higher end of the pressure ratings required by the SEA CON® connectors (20,000 psi). The dielectric material was switched to the glass reinforced epoxy, GRE. All the cold flow problems disappeared. The final results are shown in Figure 1

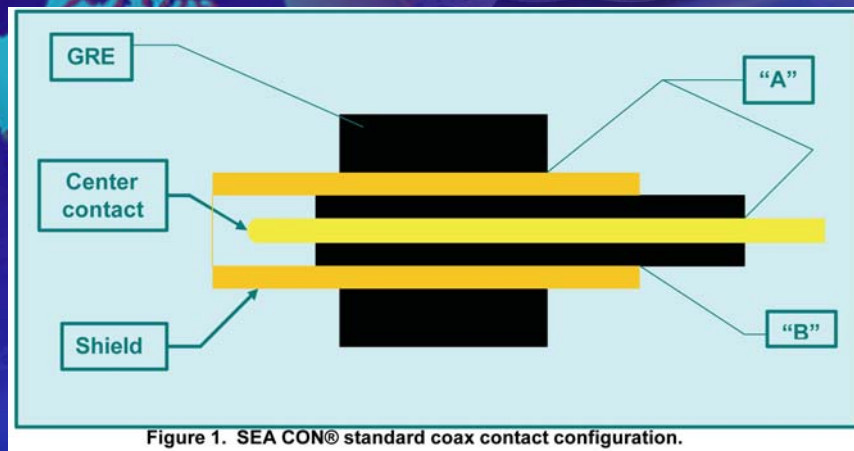


Figure 1. SEA CON® standard coax contact configuration.

The introduction of the GRE into the coax contact changed the characteristic impedance from 50 Ω to 20 Ω. This is a function of the dielectric constant of the insulation material and the outside of the center contact to the inside diameter of the shielding conductor. Since the socket side of the coax contact is larger than the pin, the impedance changes unless the inside diameter of the shield contact is also increased in accordance with the impedance formula.

$$\text{Impedance} = \frac{138}{\sqrt{\text{DC}}} \log \frac{\text{ID}}{\text{OD}}$$

DC = Dielectric Constant for the insulating material
ID = Inside Diameter of the shielding element
OD = Outside diameter of the center conductor

Figure 2: Formula for the impedance of a contact

Open Face Pressure (OFF) and Pressure Balanced Oil Filled (PBOF) options are not available with the standard SEA CON® coax. This is best shown in figure 1. GRE shrinks during the curing phase of fabrication. In the cases labelled "A", the GRE shrinks down on to the brass conductors. This action combined with the appropriate manufacturing techniques produce a sealed interface or seam. On the other hand, the case labelled "B" has the GRE shrinking away from the brass conductor. This action combined with the appropriate manufacturing techniques only sometimes produces a sealed interface or seam. Thus the OFF and the PBOF options are not available with the standard SEA CON® coax.

SEA CON® does offer a solution to this predicament; special glass to metal seal coax contacts. One of these is a 50V coax contact designed for 20-24 AWG coax cable. These coaxes are not interchangeable with the standard SEA CON® coax and are considered special components. This simply means the parts are not kept in stock and any order for these parts are priced and sold accordingly.

For additional information, contact our Technical Sales Department at (619) 562-7071.