

**Dogbones in a Cable System**

In a double containment system, the Dogbone fitting is used to lock the inner pipe together for proper restraint or for the control of thermal expansion. Unlike low point systems, creating compartments in the system is not practical. If Dogbone fittings are required in the system, the use of the annular style is required to allow cable to pass through.

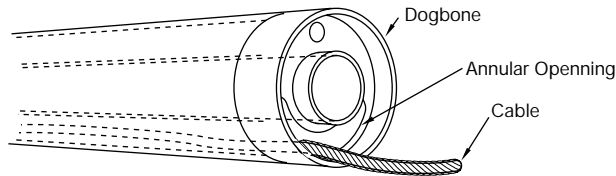


Figure D-35. Annular Dogbone with cable

**Sensor Cable Requirements**

**Sensor Cable**

Proper selection of the sensor cable is imperative to the successful operation of any leak detection system. Most systems use a specially designed coaxial cable for sensing leaks. Some cables are designed to sense only water, others are designed to sense corrosive chemicals, and some are designed to sense the presence of hydrocarbons. There are also combinations of these available that can sense corrosive water-based liquids while ignoring hydrocarbons and vice versa; or there are some cables that can sense water and hydrocarbons. These selections increase the flexibility of system applications. The chemistry of the media must be considered to ensure proper selection of the sensing cable.

**Jumper Cable**

Jumper cable is used to connect sensor cable segments and probes together to form the sensing string. Jumper cable is not affected by contact with water. However, installation in conduit is recommended to prevent physical damage. If needed, jumper cable can be direct buried.

**The Connectors**

The cable connection is perhaps the most critical component to a hassle free commissioning of the system. Factory training of all personnel installing connectors is strongly recommended to save many hours troubleshooting a system with poor connections. The connectors are typically standard UHF coaxial cable connectors that are connected together with an adapter. Since there is the possibility of the connection getting wet in the event of a leak, each connection must be carefully sealed with shrink tubing upon commissioning of the system.

**The Control Panel**

The control panel is the heart of the leak detection system. It is typically mounted in a location that is convenient for an operator to monitor its status. The control panel can be ordered in several configurations. Some are multi-channel devices that are

capable of monitoring several systems simultaneously. Care must also be taken to specify a panel that is capable of monitoring the required length of sensor cable. The control panel should have a visual readout of some sort, as well as a keypad for operation. It should also provide provisions to interface with a computer to use diagnostic and programming tools that are available.

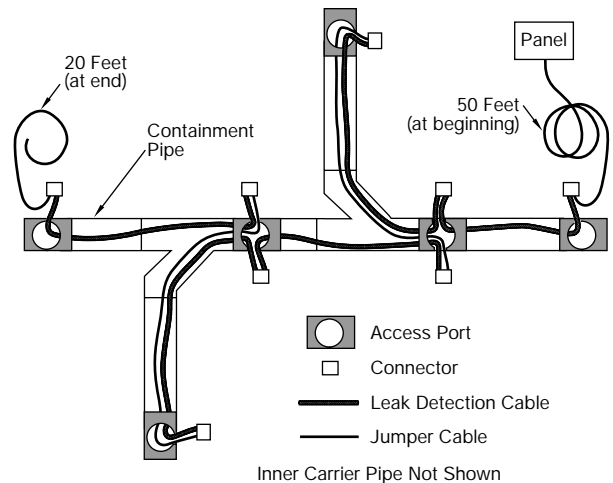


Figure D-36. Layout of the cable with jumpers

**Visual Inspection Monitoring**

In drainage only applications, an alternative method to automated leak detection is manual inspection. As long as monitoring can be accomplished every 30 days and recorded, manual inspection is allowed. For manual inspection, low point drains are placed at collection points in line as required. By designing in wells, systems can be opened and the annular space inspected to sight a possible leak. Manual inspection can also be accomplished at the end of the line. Figures D-37 and D-38 show two possible designs for manual leak detection. Probes can also be placed in wells as a manner of automated detection with a view point.

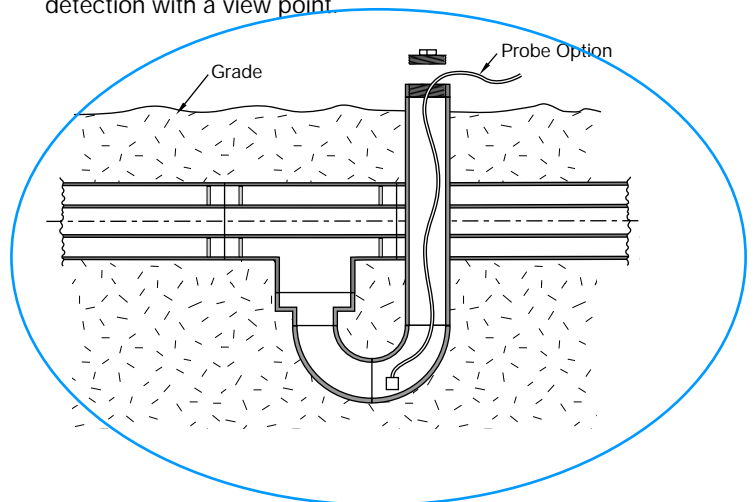


Figure D-37. In-line inspection well