

Memo

date: April 19, 2000

to: ES&H Coordinators and Building Managers

from: J.A. Curtiss, Laboratory Electrical Safety Officer

subject: Electrical Connections to Solenoid Valves

Electrically-operated solenoid valves are used in experimental equipment, most often in devices with vacuum systems or water cooling systems. The following guidance is provided for wiring of these solenoid valves.

Enclosures provided as part of a solenoid valve are either sheet metal with an opening for one-half-inch conduit, or a nipple with an internal one-half-inch thread. Both these arrangements present sharp edges to the solenoid lead wires.

For solenoid valves that are built into enclosed equipment, the enclosure provides one barrier layer to prevent contact with an energized conductor. The solenoid lead wires may be run without additional protection except that a bushing is required to protect the wires from sharp edges of the solenoid valve enclosure. Extending the lead wires through use of a crimped butt splice is acceptable; however, the preferred arrangement is termination of the wires in a connector, or at a terminal block which is covered to prevent inadvertent contact.

For solenoid valves that are not built into enclosed equipment, the valve must be powered through an appropriately-rated cable and not simply through the exposed solenoid lead wires. These wires provide only a single barrier to contact, while a cable provides two barriers in the wire insulation and cable jacket. The electrical connections between the solenoid lead wires and the cable must be mechanically enclosed and there must be a strain relief on the cable. A suggested arrangement would be a close nipple from the valve into an LB box, terminated with a flexible cord connector. OZ-Gedney part numbers are LB-50A for an aluminum box and BS-50A for an aluminum cover plate. These components weigh less than one pound, half the weight of their galvanized equivalents. The cord connector is OZ-Gedney part number C-11LS.

There are two options for the extension cable. Option A is use of a three-wire "S-Cord" cable with a green grounding conductor, which is fitted with a ring-type crimp terminal inserted onto one of the screws used to hold the cover plate in place. Option B is for those situations where control of grounding connections might be critical for signal processing. In this case, use of a two-conductor "S-Cord" cable is acceptable (zip-cord is not cable!), AND the object on which the valve is mounted must be adequately (and obviously) grounded to protect personnel in the event that a malfunction should cause a short of the energized wire to the equipment. If the cable terminates in a plug, then the plug must be two-prong so there is no assumption that a ground connection is provided through the valve wiring.