

CONDUIT TECHNICAL DATA / FEEDABILITY TIPS

BULK ELECTRODE

Since its introduction over 20 years ago, the increased use of bulk electrode has been led by robotic and automatic welding installations. Both Semiautomatic (handheld) and Automatic (robotics, gantries, seam trackers) installations benefit from the use of bulk electrode systems by reducing down time from threading electrode.

WIRE FEEDERS AND DRIVE ROLLS

In most mild steel applications, a four drive roll feeder system is preferred. A two drive roll system may work in some conditions, but should be carefully tested.



Four Drive Roll Systems

- **Small Diameter Electrodes**

When feeding small diameter electrodes, a U or V grooved drive roll is recommended. Be careful when tightening the drive rolls to prevent deforming the electrode. Wire deformation causes wear and drag in the conduit system. Overtightened rolls may also cause wire flaking, which will eventually restrict the wire feed.

- **Medium To Large Diameter Electrodes**

Medium to large diameter electrode users should choose knurled drive rolls. Again, do not deform the electrode. Deformation of flux cored wires can deposit flux in the conduit, resulting in restricted wire feed.

- **Aluminum Applications**

In aluminum applications, the wire can be easily damaged because of its malleability, so be sure to use properly sized drive rolls. Knurled rolls can be used, but often causes wire flaking and electrode burrs, which leads to contact tip burnbacks. For best results, use conduit systems with a nonmetallic bore, and frequently monitor drive roll pressure and wire condition.

WIRE FEEDER CONNECTIONS

When choosing a feeder, familiarize yourself with the wire inlet style (threads, diameter, etc) for connection to the conduit system. Many feeder manufacturers sell an OEM conduit system. The OEM approach is easy for one installation, but if you plan to use more than one system, standardization is strongly recommended. Standardization saves time and reduces inventory by allowing use of common standard conduits.

- **Fast N Easy System**

The Fast 'N Easy® System offers the advantage of quick connection to a variety of conduits. Adaptors for all major

feeders are available, and adaption is a one-time expense. Using Fast 'N Easy® on all feeders, pay-offs, and torch heads, you can quickly connect your conduit and the electrode is ready for use. You can replace or install another conduit or make length modifications on the same system without major changes. The system is modular, so the tool crib or distributor can stock fewer parts and have less money tied up in inventory.

DRUM OR BOX COVERS AND DOMES

Whichever type of electrode packaging you use, there is a Dura-Dome® size and style to make electrode payout easier, as well as protect it from dust. All Dura-Domes® have an access flap for easy re-threading of electrode without removing the dome.

- **Dura-Domes for Drums**

Drums are ideal for payout of large diameter electrodes because the domes are secured in place by the cover clamp ring. [Clear Dura-Domes®](#) are the most popular, as they are strong and you can visually monitor the electrode in the drum. The round [Dura-Dome® also comes in black](#), which features higher impact resistance.

- **Dura-Domes for Boxes**

The [square Dura-Dome 500®](#) sits in place over the open flaps of the electrode box. If necessary, the dome may be secured by pinning it to the box.

- **Dome Connector Kits**

Dura-Domes® for drums and boxes accept installation of a ["Dome Connector Kit"](#), which provides quick connecting of the conduit - a benefit of standardizing your wire feed system and changing to a full package of electrode.

CONDUIT APPLICATIONS AND SIZES

A good conduit system provides insulation and isolation of the electrode, resists internal abrasion, and holds up to the rigors of the welding environment. Additionally, it has to have serviceability for the application, static or dynamic, ferrous or nonferrous. Electron Beam Technologies, Inc. pioneered flexible metallic wound conduits made from hard tempered wire in the form of a wire guide.

- **QCC and QCC-HD Conduits**

A universal conduit for both static and dynamic applications of mild steel are the [QCC® and QCC-HD® Conduits](#). Both conduits are constructed of a high carbon, flexible, wound wire core. The core is then reinforced with a helical metallic sheath. Both are jacketed with POLY-X® polymer, providing high dielectric insulation while maintaining flexibility.

- **QCC-R Conduit**

[QCC-R® Conduit](#) provides high strength with extreme flexibility. QCC-R® is ideal for small diameter electrodes in articulating arms where tight bends are encountered, or in situations where the QCC® has limited acceptance due to a tight bend radius.

- **ERC and ERC-HD Conduit**

In applications with minimal movement, the [ERC® and ERC-HD® Conduits](#) are recommended. The ERC® systems incorporate a high carbon, wound wire core that is coated with a thick wall polymer jacket providing both insulation and environmental resistance. This polymer coating also controls the bend radius, limiting its flexibility, which keeps the electrode free flowing.

- **BLUE PE and BIG BLUE PE Conduits**

Non-ferrous conduits may be used with aluminum, other soft metals, and in some cases, small mild steel electrodes. [Blue and Big Blue PE Conduits](#) are extruded from Polyethylene, providing strength and lubricity with a non-ferrous base. Used in static and moderately dynamic applications, it is easy to install, and is a cost-effective system.

CONDUIT LENGTH

Avoid premature fatigue at the terminations by observing conduit movement and adding strain reliefs as necessary. [Strain reliefs](#) are available factory installed, or can easily be applied in the field. Typically, measure conduit length allowing for generous radii. However, the longer the length, the greater the friction, and the harder it is to pull the electrode through the conduit.

- **Combined Conduit Systems**

When longer runs are necessary, consider a combined conduit system. This set up uses a length of flexible conduit (usually near the feeder), combined with a large I.D. semi-rigid conduit for areas that do not see movement. Simple connectors are available to make this combined application. Replacement cost savings can be realized by replacing only the length of conduit that requires service instead of the entire system.

- **Easy Balance**

The rapid acceleration/deceleration on robotic systems or gantries adds stress on the conduit by “whipping” it. Reduce or eliminate whipping with an [Easy Balance](#) to dampen the conduit rebound. Reducing the robot’s acceleration/deceleration speed should be considered, versus using the highest speed, decreased cycle time, and damaging components. Strain reliefs are helpful, but may not eliminate this root cause.

CONDUIT BENDS

It is good practice to make as few bends as possible, and with a generous radius. Any bend creates a higher drag than a straight conduit. A good rule of thumb is that any 90° bend in the conduit creates an increase in drag almost twice that of a straight section. The tighter the bend radius and/or the larger the degree of bend, the higher the drag which will reduce conduit life and sacrifice performance. Tighter bends are possible, but not recommended. If a bend cannot be accomplished with the wide variety of conduits available, consider using an insulated sheave to make the turn. Insulated sheaves add complexity to the system and are subject to safety issues if not properly installed and guarded.

CONDUIT CONNECTIONS

Users with more than one system should standardize with a common connection, such as the Fast ‘N Easy® system. A [QCA Adaptor Kit](#) supports 90% of wire feeders and the [Dome Connector Kit](#) adapts to most domestic domes. Mix and match conduits and connectors to adapt the system to any installation.

CONDUIT RETENTION

Mount conduit to prevent stress on the terminations. A rigidly mounted conduit may create excessive wire drag as it attempts to straighten the wire, causing excessive wear and higher feeder loads. Conduits will move as the helix of the electrode passes through it, so make your mountings in excess of two electrode cast circumferences for long runs. Short runs may be self supporting with no retention needed. For simple retention, use mounting blocks and conduit balancers.

ELECTRODE CAST AND HELIX

Wire feeds best with zero cast and helix in the electrode (zero cast and helix means the wire is straight with no twist). However, with zero cast and helix, processing and use would not be practical because the electrode would not lay evenly in the box or drum, would not pay out properly, and would not sufficiently load to the contact tip. Without cast, power transfer to the contact tip may result in burnback. Too much cast (usually exhibited as drag or arc wandering) can be corrected by installing a [Straight ‘N Easy® Wire Straightener](#) at the payout package with quick connections. Adjust the straightener to reduce cast before entering the conduit, and the drag will be reduced within the conduit.