

WELDING AND CUTTING

er are loose, or if ground connections are poor

If a holder of the correct size for the electrode cannot be used, an extra holder should be provided so that one can cool while the other is in use. *Dipping hot electrode holders in water should be prohibited.*

On light or medium heavy work, where light, extremely flexible cables are used, holders may be attached directly to the work lead running to the machine. On heavier work, welders generally prefer a short length, which is more flexible than the main work lead. Properly insulated cables of weight and flexibility which will not inconvenience the welder are available.

Machine welding

Arc welding may also be done automatically or semiautomatically to increase the speed of welding and provide more uniform weld quality. Machine welding is especially efficient for long welds or where a high rate of production is involved and the work can be jigged. The rate of electrode feed and arc length are controlled by mechanical or electrical means.

If speed of travel or feed of the work is controlled manually, the operation is semi-automatic. If the work is fed or the arc traverses the work automatically, the operation is automatic.

Insulation of current-carrying parts, cables, etc., applies to machine welding as well as to manual welding.

Mechanical power-transmission apparatus, such as gears, shaftings, couplings, and clutches, and other moving parts to which operators may be exposed should be guarded (see Chapter 22, "Principles of Guarding and Transmission Guards").

Protection against electric shock

Although open-circuit voltages on standard arc-welding units are not high compared to those of other processes, they cannot be neglected as a potential hazard. Normally, the work setup is such that the work is grounded, and unless care is exercised, the welder or operator can easily become grounded.

The voltage between the electrode holder and the ground, during the "off" arc or "no load" period, is the open circuit voltage. Unless the welder or operator is properly

instructed and uses the equipment provided for his protection, he can become exposed to this voltage while changing electrodes, setting up work, or changing working position. The danger is particularly great in hot weather when he is sweaty.

He should develop the habit of keeping his body insulated from both the work and the metal electrode and holder. He should never permit the bare metal part of an electrode, the electrode insulation, or any metal part of the electrode holder to touch either his bare skin or any wet covering on his body.

Consistent use of well-insulated electrode holders and cables, dry clothing on the hands and body, and insulation from ground will be helpful in preventing contact.

Some specific precautions for prevention of electric shock are

- 1 In confined places, cover or arrange cables to prevent contact with falling sparks
- 2 Never change electrodes with bare hands or wet gloves, or when standing on wet floors or grounded surfaces
- 3 Ground the frames of welding units, portable or stationary, in accordance with the *National Electrical Code*. With a small welding unit, a primary cable containing an extra conductor, one end of which is attached to the frame of the welding unit, can be used. By means of the proper polarized plug, this ground connection can be carried back to the permanently grounded connection in the receptacle of the power supply.
- 4 Arrange receptacles of power cables for portable welding units so that it is impossible to remove the plug without opening the power supply switch, or use plugs and receptacles which have been approved to break full load circuits of the unit.
- 5 If a cable (either work lead or electrode lead) becomes worn, exposing bare conductors, cover the exposed portion with rubber, plastic, or friction tape equivalent to the cable covering.
6. Keep welding cables dry and free of grease and oil to prevent premature breakdown of the insulation.
7. Suspend cables on substantial overhead supports if the cables must be run some