Electrical Hazards

INTRODUCTION

Electric shock from welding and cutting equipment can result in death or severe burns. Additionally, serious injury can occur if the welder falls as a result of the shock.

All of the following are electrically energized when the power is "on": the welding circuit (including the electrode and workpiece), input power and machine internal circuits, the wire, reel of wire, drive rolls, and all other metal parts touching the energized electrode. Beware of equipment that appears to be electrically isolated from the workpiece, such as boom lifts or scaffolds, but are actually connected through hidden electrical paths. Additionally, incorrectly installed or improperly grounded equipment is a hazard.

HOW TO AVOID ELECTRIC SHOCKS

Use proper precautionary measures and recommended safe practices at all times. Train all personnel using welding and cutting equipment to reduce the risk of injuries, fatalities, and electrical accidents, by following these instructions:

- Read all instructions, labels, and installation manuals before installing, operating, or servicing the equipment.
- Train all personnel involved in welding operations to observe safe electrical work practices according to the employer, OSHA 1910.332 and ANSI Z49.1.
- Do not touch live electrical parts.
- Have all installation, operation, maintenance, and repair work performed only by qualified people.
- Properly install and ground the equipment in accordance with the instruction manual and national, state, and local codes.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
- Do not work alone where there are electrically hazardous conditions.
- Wear dry, hole-free, insulating gloves in good condition and protective clothing. Do not touch the energized electrode with a bare hand.
- Insulate yourself from the workpiece and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground or wear properly designed and approved rubber-soled boots in good condition.

American Welding Society
8669 NW 36 Street, #130
Miami, Florida 33166
E-mail: info@aws.org
http://www.aws.org

- Use fully insulated electrode holders. Never dip the holder into water to cool it or lay it on conductive surfaces or the work surface.

- Do not touch electrode holders connected to two welding machines at the same time since double open-circuit voltage can be present.

- Do not allow the electrode holder or electrode to come in contact with any other person or any grounded object.

- Do not use worn, damaged, undersized, or poorly spliced cables, welding gun cables, or torch cables. Make sure all connections are tight, clean, and dry.

- Do not wrap cables carrying electric current around any part of your body.

- Connect the work clamp to the workpiece/metal as close to the point of welding as possible.

- When required by ANSI Z49.1 or other codes, ground the workpiece to a good electrical earth ground. The work lead is not a ground lead. Do not use the work lead as a ground lead. Use a separate connection to ground the workpiece to earth.

- Do not touch an energized electrode while you are in contact with the work circuit.

When using auxiliary power from welding generators, it is recommended that you use a circuit protected by a ground fault circuit interrupter (GFCI) such as receptacles in boxes, extension cords, and the like. Use of an assured grounding system is also acceptable and is equivalent to use of a GFCI protected circuit. (see AWS Safety and Health Fact Sheet No. 29, Grounding of Portable and Vehicle Mounted Welding Generators, for information about assured grounding systems).

Additional safety precautions are required when welding is performed under any of the following electrically hazardous conditions: in damp locations or while wearing wet clothing; on metal floors, gratings, scaffolds, or other metal structures; in cramped positions such as sitting, kneeling, or lying; or when there is a high risk of unavoidable or accidental contact with the workpiece or ground. Where these conditions are present, use one of the following types of equipment presented in order of preference: (1) a semiautomatic DC constant voltage metal electrode (wire) welder, (2) a DC manual covered electrode (stick) welder, or (3) an AC welder with reduced open-circuit voltage. In most situations, use of a DC, constant voltage wire welder is recommended. And, do not work alone!

- Wear a safety harness to prevent falling if working above floor level.

- Turn off all equipment when not in use. Disconnect the power to equipment that will be left unattended or out of service.

Disconnect the input power or stop the engine before installing or servicing the equipment. Lock the input disconnect switch in the “open” (Off) position, or remove the fuses, so that power cannot be turned on accidentally. Follow lockout/tagout procedures (see AWS Safety and Health Fact Sheet No. 18, Lockout/Tagout).

American Welding Society
8669 NW 36 Street, #130
Miami, Florida 33166
E-mail: info@aws.org
http://www.aws.org

- Use only well-maintained equipment. Frequently inspect welding equipment and repair or replace all damaged parts before further use.

- Keep all covers and panels securely in place.

WEARERS OF PACEMAKERS

The technology of heart pacemakers and other electronic devices changes frequently, and this may change the way these devices are affected by other electrical devices including welding equipment. Wearers of pacemakers or other electronic devices vital to life should be instructed to check with their doctor and with the device manufacturer to determine if any hazard exists when near welding or cutting operations. See AWS Fact Sheet No. 16, Pacemakers and Welding, for additional information about pacemakers and welding.

PROCEDURES FOR ELECTRIC SHOCK

- Turn off the electric power.

- Use nonconducting material, such as dry wood, to free the victim from contact with live parts or wires.

- If the victim is not breathing, call for emergency services. Administer cardiopulmonary resuscitation (CPR) immediately after breaking contact with the electrical source. Continue CPR until breathing starts or until help arrives.

- Where an automatic electronic defibrillator (AED) is available, use according to instructions.

- Treat an electrical burn as a thermal burn by applying clean, cold (iced) compresses. Prevent contamination, and cover with a clean, dry dressing.

INFORMATION SOURCES

American National Standards Institute (ANSI). *Safety in Welding, Cutting, and Allied Processes* (ANSI Z49.1), published by the American Welding Society, 8669 NW 36 Street, #130, Miami, FL 33166; telephone 800-443-9353; Web site: www.aws.org.

Occupational Safety and Health Administration (OSHA). *Code of Federal Regulations,* Title 29 Labor, Parts 1910.1 to 1910.1450, available from the U.S. Government Printing Office, 732 North Capitol Street NW, Washington, DC 20401; telephone: 800-321-6742; Web site: www.osha.gov

National Fire Protection Association (NFPA). *National Electric Code* (NFPA 70), available from National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269-9101; telephone: 800-344-3555; Web site: www.nfpa.org.

National Fire Protection Association (NFPA). *Standard for Fire Prevention During Welding, Cutting and Other Hot Work* (NFPA 51B), available from National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269-9101; telephone: 800-344-3555; Web site: www.nfpa.org.

National Fire Protection Association (NFPA). *Standard for Electrical Safety Requirements for Employee Workplaces*

(NFPA 70E), available from National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269-9101; telephone: 800-344-3555; Web site: www.nfpa.org.

Mine Safety and Health Administration (MSHA). Code of Federal Regulations Title 30 Mineral Resources, Parts 1 to 199, available from the U.S. Government Printing Office, 732 North Capitol Street NW, Washington, DC 20401; telephone: 202-693-9400; web site: www.msha.gov.

American Welding Society (AWS). *Safety and Health Fact Sheets,* published by the American Welding Society, 8669 NW 36 Street, #130, Miami, FL 33166; telephone 800-443-9353; Web site: www.aws.org.