



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": electrode and welding circuit, input power circuit and machine internal circuits, the wire, reel of wire, drive rolls, and all other metal parts touching the energized electrode.

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 OSHA 1910.332.
- 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.
- Do not work alone where there are electrically hazardous conditions.
- Wear dry, insulating gloves in good condition and protective clothing.
- Insulate yourself from the workpiece and ground by wearing rubber soled shoes or standing on a dry insulated mat or platform.
- 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 holders connected to two welding machines at the same time.
- Do not allow the holder or electrode to come in contact with any other person.
- 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.

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- Ground workpiece as required by codes.
- When required, 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.
- In confined spaces or in locations that are electrically hazardous due to water or perspiration, do not use welding equipment with AC output unless it is also equipped with a voltage reducer and remote output control. Use equipment with DC output and do not work alone.
- 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 where there are no other protective structures such as railings, walls, guard fences, or the like.
- 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” position, or remove the fuses, so that power cannot be turned on accidentally.
- Use only well maintained equipment. Routinely inspect welding equipment and repair or replace all damaged parts before further use.
- Keep all covers and panels securely in place.

Follow lockout/tagout procedures (see AWS Safety and Health Fact Sheet No. 18, Lockout/Tagout).

WEARERS OF PACEMAKERS

- The technology of heart pacemakers 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

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equipment 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 for additional information about pacemakers and welding.

PROCEDURES FOR ELECTRIC SHOCK

- Turn off the electric power.
- Use nonconducting material, such as 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), available from Global Engineering Documents, 15 Inverness Way East, Englewood, CO 80112-5776 (telephone: 800-854-7179; web site: www.global.ih.com).

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, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 (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; website: 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; website: 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; website: 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, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 (telephone: 202-693-9400; web site: www.msha.gov).

American Welding Society (AWS). *Safety and Health Fact Sheets*, available from Global Engineering Documents, 15 Inverness Way East, Englewood, CO 80112-5776 (telephone: 800-854-7179; web site: www.global.ih.com).

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