Airgas
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ARC WELDING SAFELY

Welders shall follow safe welding practices ∑ Employers shall provide safe working conditions and safety training.

As in most trades, welders are exposed to certain ha ards. a ards exist with all arc welding processes. Welding is safe when safe practices are followed.
his information is a brief outline of precautionary measures that will help avoid the ha ards of arc welding.
Read and understand the manufacturer s instructions and your employer s safe practices.
our Safety irector or Supervisor should be consulted when specific uestions arise.

WARNING:

PROTECT YOURSELF AND OTHERS. READ AND UNDERSTAND THIS INFORMATION.

F MES AN ASES can be dangerous to your health.

ARC RA S can in ures eyes and burn skin.

ELEC RIC S OC can kill.

YES

NO

fumes and gases can be dangerous to your health

- **KEEP** your head out of the fumes.
- **DON'T** get too close to the arc. se corrective lenses if necessary to stay a reasonable distance away from the arc.
- **READ** and obey the warning label that appears on all containers of welding materials.

USE ENOUGH VENTILATION or exhaust at the arc, or both, to keep the fumes and gases from your breathing one and the general area.

IN A LARGE ROOM OR OUTDOORS, natural ventilation may be ade uate if you keep your head out of the fumes See below .

USE NATURAL DRAFTS or fans to keep the fumes away from your face.
If you develop unusual symptoms, see your supervisor. Perhaps the welding atmosphere and ventilation system should be checked.

YES

NO

USE NATURAL VENTILATION

some ventilation suggestions

- **PROTECT** ade uate ventilation is available when welding in confined areas or where there are barriers to air movement.
- **SMOKE EXTRACTOR** welding gun. For semiautomatic welding processes, e uipment exists for exhausting the fumes at the arc.

USE EXHAUST AT THE ARC

wear correct eye, ear, and body protection

PROTECT your eyes and face with welding helmet properly fitted and with proper grade of filter plate See ANSI Z49.1 .

PROTECT your body from welding spatter and arc flash with protective clothing including woolen clothing, flame-proof apron and gloves, leather leggings , and high boots.

PROTECT other from spatter, flash, and glare with protective screens or banners.

IN SOME AREAS protection from noise may be appropriate.

BE SURE protective e uipment is in good condition.
Also, wear safety glasses in work area **AT ALL TIMES**.

special situations

- **DO NOT WELD OR CUT** containers or materials which previously had been in contact with ha ardous substances unless they are properly cleaned. his is extremely dangerous.
- **DO NOT WELD OR CUT** painted or plated parts unless special precautions with ventilation have been taken. hey can release highly toxic fumes or gases.

Refer to the references shown below for directions on how to deal with such special situations.

For further information refer to American National Standard Z49.1, "Safety in Welding and Cutting," available from the American Welding Society, P.O. Box 351040, Miami FL 33135

Other details are given in itle 29. Code of Federal Regulations, Section 1910 Occupational Safety and ealth Administration ocument 220 , available from .S. epartment of Labor, Washington, C 20210 and the booklet " L s, hreshold Limit alues . .," American Conference of o vernmental Industrial ygeienists. P.O. box 1937, Cincinnati, O 45201.

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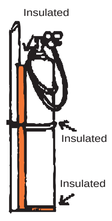
O NO O C LI E ELEC RICAL PAR S

electric shock can kill

BE SURE you are insulated from live electrical parts.
BE S RE e uipment is ade uate for the ob.
BE S RE e uipment is installed according to prevailing codes.
BE S RE damaged parts are repaired or replaced.
BE SURE welding machine is properly grounded.
BE SURE gloves have no holes.
BE SURE to stay dry do not weld when you are wet.
BE S RE e uipment is turned OFF when not in use.
O NO use cables that are too small, damaged, or poorly spliced.
O NO wrap cables around your body.

additional precautionary measures



S ES E WA

PROTECT compressed gas cylinders from excessive heat, mechanical shocks, and arcs fasten cylinders so they cannot fall.

BE SURE cylinders are never grounded or part of an electrical circuit.

REMOVE all potential fire ha ards from welding area.

ALWAYS HAVE FIRE FIGHTING EQUIPMENT READY FOR IMMEDIATE USE AND KNOW HOW TO USE IT

cooperating for safety

Cooperation between management and employees is vital to the success of every company. By working together toward the common goal **SAFETY IN WELDING** everyone wins
Welders and their supervisors should have ade uate safely training.

Special thanks to the American Welding Society and Lincoln Electric for the information contained in this poster.

WARNING

CALIFORNIA PROPOSITION 65 WARNINGS

iesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

he Above For iesel Engines

he engine e xhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

he Above For asoline Engines

ARC WELDING CAN BE HAZARDOUS. PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS SHOULD CONSULT WITH THEIR DOCTOR BEFORE OPERATING.

Read and understand the following safety highlights. For additional safety information, it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting - ANSI Standard Z49.1" from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 or CSA Standard W117.2-1974. A Free copy of "Arc Welding Safety" booklet E205 is available from the Lincoln Electric Company, 22801 St. Clair Avenue, Cleveland, Ohio 44117-1199.

BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR PROCEDURES ARE PERFORMED ONLY BY QUALIFIED INDIVIDUALS.

FOR ENGINE powered equipment.

1.a. urn the engine off before troubleshooting and maintenance work unless the maintenance work re uires it to be running.

1.b. Operate engines in open, well-ventilated areas or vent the engine exhaust fumes outdoors.

1.c. o not add the fuel near an open flame weld - ing arc or when the engine is running. Stop the engine and allow it to cool before refueling to prevent spilled fuel from vapori ing on contact with hot engine parts and igniting. o not spill fuel when filling tank. If fuel is spilled, wipe it up and do not start engine until fumes have been eliminated.

1.d. eep all e uipment safety guards, covers and devices in position and in good repair. eep hands, hair, clothing and tools away from -belts, gears, fans and all other moving parts when starting, operating or repairing e uipment.

1.e. In some cases it may be necessary to remove safety guards to perform re uired maintenance. Remove guards only when necessary and replace them when the maintenance re uiring their removal is complete. Always use the greatest care when working near moving parts.

1.f. o not put your hands near the engine fan. o not attempt to override the governor or idler by pushing on the throttle control rods while the engine is running.

1.g. o prevent accidentally starting gasoline engines while turning the engine or welding generator during maintenance work, disconnect the spark plug wires, distributor cap or magneto wire as appropriate.

1.h. o avoid scalding, do not remove the radiator pressure cap when the engine is hot.

ELECTRIC AND MAGNETIC FIELDS may be dangerous

2.a. Electric current flowing through any conductor causes locali ed Electric and Magnetic Fields EMF . Welding current creates EMF fields around welding cables and welding machines

2.b. EMF fields may interfere with some pacemakers, and welders having a pacemaker should consult their physician before welding.

2.c. Exposure to EMF fields in welding may have other health effects which are now not known.

2.d. All welders should use the following procedures in order to minimi e exposure to EMF fields from the welding circuit:

2.d.1. Route the electrode and work cables together - Secure them with tape when possible.

2.d.2. Never coil the electrode lead around your body.

2.d.3. o not place your body between the electrode and work cables. If the electrode cable is on your right side, the work cable should also be on your right side.

2.d.4. Connect the work cable to the workpiece as close as possible to the area being welded.

2.d.5. o not work next to welding power source.

ELECTRIC SHOCK can kill.

3.a. he electrode and work or ground circuits are electrically "hot" when the welder is on. o not touch these "hot" parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.

3.b. Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground.

In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions (in damp locations or while wearing wet clothing; on metal structures such as floors, gratings or scaffolds; when in cramped positions such as sitting, kneeling or lying, if there is a high risk of unavoidable or accidental contact with the workpiece or ground) use the following equipment:
- **Semiautomatic DC Constant Voltage (Wire) Welder.**
- **DC Manual (Stick) Welder.**
- **AC Welder with Reduced Voltage Control.**

3.c. In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, no le or semiautomatic welding gun are also electrically "hot".

3.d. Always be sure the work cable makes a good electrical connection with the metal being welded. he connection should be as close as possible to the area being welded.

3.e. round the work or metal to be welded to a good electrical earth ground.

3.f. Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.

3.g. Never dip the electrode in water for cooling.

3.h. Never simultaneously touch electrically "hot" parts of electrode holders connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.

3.i. When working above floor level, use a safety belt to protect yourself from a fall should you get a shock.

3. . Also see Items .c. and 8.

ARC RAYS can burn.

4.a. se a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. eadshield and filter lens should conform to ANSI Z87. I standards.

4.b. se suitable clothing made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.

4.c. Protect other nearby personnel with suitable, non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.

FUMES AND GASES can be dangerous.

5.a. Welding may produce fumes and gases ha ardous to health. Avoid breathing these fumes and gases.When welding, keep your head out of the fume. se enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing one. **When welding with electrodes which require special ventilation such as stainless or hard facing (see instructions on container or MSDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and below Threshold Limit Values (TLV) using local exhaust or mechanical ventilation. In confined spaces or in some circumstances, outdoors, a respirator may be required. Additional precautions are also required when welding on galvanized steel.**

5.b. o not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. he heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

5.c. Shielding gases used for arc welding can displace air and cause in ury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.

5.d. Read and understand the manufacturer s instructions for this e uipment and the consumables to be used, including the material safety data sheet MS S and follow your employer s safety practices. MS S forms are available from your welding distributor or from the manufacturer.

5.e. Also see item 1.b.

WELDING SPARKS can cause fire or explosion.

.a. Remove fire ha ards from the welding area. If this is not possible, cover them to prevent the welding sparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to ad acent areas. Avoid welding near hydraulic lines. ave a fire extinguisher readily available.

. b. Where compressed gases are to be used at the ob site, special precautions should be used to prevent ha ardous situations. Refer to "Safety in Welding and Cutting" ANSI Standard Z49.1 and the operating information for the e uipment being used.

.c. When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire ha ard.

.d. o not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. hey can cause an explosion even though they have been "cleaned". For information, purchase "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping hat ave eld a ardous Substances", AWS F4.1 from the American Welding Society see address above .

.e. ent hollow castings or containers before heating, cutting or welding. hey may explode.

.f. Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.

.g. Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away from the welding area increase the possibility of the welding current passing through lifting chains, crane cables or other alternate circuits. his can create fire ha ards or overheat lifting chains or cables until they fail.

.h. Also see item 1.c.

CYLINDER may explode if damaged.

7.a. se only c ompressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.

7.b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.

7.c. Cylinders should be located:
∑ Away from areas where they may be struck or sub ected to physical damage.

∑ A safe distance from arcwelding or cutting operations and any other source of heat, sparks, or flame.

7.d. Never allow the electrode, electrode holder or any other electrically "hot" parts to touch a cylinder.

7.e. eep your head and face away from the cylinder valve outlet when opening the cylinder valve.

7.f. alve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.

7.g. Read and follow the instructions on compressed gas cylinders, associated e uipment, and C A publication P-l, "Precautions for Safe andling of Compressed ases in Cylinders," available from the Compressed as Association 1235 Jefferson avis ighway, Arlington, A 22202.

FOR ELECTRICALLY powered equipment.

8.a. urn off input power using the disconnect switch at the fuse box before working on the e uipment.

8.b. Install e uipment in accordance with the .S. National Electrical Code, all local codes and the manufacturer s recommendations.

8.c. round the e uipment in accordance with the .S. National Electrical Code and the manufacturer s recommendations.

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