fumes and gases can be dangerous to your health

> **KEEP** your head out of the fumes.
> **USE ENOUGH VENTILATION** or exhaust at the arc, or both, to keep the fumes and gases from your breathing zone and the general area.
> **AN APPROVED RESPIRATOR SHOULD BE USED** unless exposure assessments are below applicable exposure limits.
> **USE NATURAL DRAFTS** or fans to keep the fumes away from your face.
> **DON’T GET TOO CLOSE** to the arc. Use corrective lenses if necessary to stay a reasonable distance away from the arc.
> **READ AND OBEY** the Safety Data Sheet (SDS) and the warning label that appears on all containers of welding materials.
> If you develop unusual symptoms, see your supervisor. Perhaps the welding atmosphere and ventilation system should be checked.

**some ventilation suggestions**

> **BE SURE** adequate ventilation is available when welding in confined areas or where there are barriers to air movement. Always position exhaust near the arc and change the filter regularly.
> **SMOKE EXTRACTOR** welding gun. For semiautomatic welding processes, equipment exists for exhausting the fumes at the arc.

**wear correct eye, ear, and body protection**

> **PROTECT** your eyes and face with a 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** others from splatter, flash, and glare with protective screens or barriers.
> **IN SOME AREAS**, protection from noise may be appropriate.
> **BE SURE** protective equipment is in good condition.
> Also, wear safety glasses in work area AT ALL TIMES.

**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 adequate safety training.

**ARC WELDING SAFELY**

As in most trades, welders are exposed to certain hazards. Hazards exist with all arc welding processes. Welding is safe when safe practices are followed.

This information is a brief outline of precautionary measures that will help avoid the hazards of arc welding. Read and understand the manufacturer’s instructions and your employer’s safe practices. Your Safety Director or Supervisor should be consulted when specific questions arise.

**WARNING:**

**PROTECT YOURSELF AND OTHERS. READ AND UNDERSTAND THIS BOOKLET.**

**FUMES AND GASES**

- can be dangerous to your health.

**ARC RAYS**

- can injure eyes and burn skin.

**ELECTRIC SHOCK**

- can kill.

**DO NOT TOUCH LIVE ELECTRICAL PARTS**

- electric shock can kill

> **BE SURE** you are insulated from live electrical parts.
> **BE SURE** equipment is adequate for the job.
> **BE SURE** equipment is installed according to prevailing codes.
> **BE SURE** 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 SURE** equipment is turned OFF when not in use.
> **DO NOT** use cables that are too small, damaged, or poorly spliced.
> **DO NOT** wrap cables around your body.

**additional precautionary measures**

> **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 hazards from welding area.
> **ALWAYS HAVE FIRE FIGHTING EQUIPMENT READY FOR IMMEDIATE USE AND KNOW HOW TO USE IT**.

**special situations**

> **DO NOT WELD OR CUT** containers or materials which previously had been in contact with hazardous substances unless they are properly cleaned. This is extremely dangerous.
> **DO NOT WELD OR CUT** painted or plated parts unless special precautions with ventilation have been taken. They 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 free of charge on the AWS website at www.aws.org or contact the AWS at P.O. Box 351040, Miami, FL 33125.

Other details are given in Title 29, Code of Federal Regulations, Section 1910 (Occupational Safety and Health Administration Document 2006), available from U.S. Department of Labor, Washington, DC 20210 and the booklet “TLV’s, Threshold Limit Values…” American Conference of Governmental Industrial Hygienists, P.O. Box 1673, Cincinnati, OH 45201.
1. A welder should use the following procedures in order to minimize their exposure to EMF from the welding circuit:
   1. Do not use electrically "hot" parts with your bare skin or wet clothing. Wear dry, non-conductive gloves to insulate hands.
   2. Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your entire area of physical contact with work and ground.
   3. In addition to the normal safety precautions, if welding must be performed under electrically "hot" conditions, in confined areas or locations where the arc may contact wet clothing, warning your employers or co-workers is important to avoid injury or death. Always use enough ventilation, especially in confined areas, to ensure breathing air is safe.
   4. Read and understand the manufacturer's instructions for using this equipment and the consumables to be used, including the safety data sheet (SDS) and follow your employer's safety practices. SDS forms are available from your welding distributor or from the manufacturer.

2. Always wear safety glasses with side shields when working around the welding area. Do not attempt to stand closer than 3 feet to any arc while working near moving parts.

3. Do not put your hands near the engine fan. Do not attempt to reach the governor or idler by reaching over the throttle control rods while the engine is running.

4. To prevent accidental starting of gasoline engines while turning the engine or welding generator during maintenance work, disconnect the spark plug wires, distributor cap or ignition system when working on the engine.

5. Keep all equipment safety guards, covers and devices in place when operating or repairing equipment.

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

7. When not welding, make certain no part of the electrode cable is resting on any part of the equipment being used.

8. Do 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. They 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 That Have Held Hazardous Substances", AWS F4.1 from the American Welding Society.

WELDING SPARKS Can Cause Fire or Explosion

6.a. Remove fire hazards from the welding area. If it 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 adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.

6.b. Where compressed gases are used to be at the job site, special precautions should be used to prevent hazardous situations. Refer to "Safety in Welding and Cutting" (ANSI Standard Z49.1) and the operating information for the equipment being used.

6.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 hazard.

6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to ensure that such procedures will not cause flammable or toxic vapors from substances inside. They 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 That Have Held Hazardous Substances", AWS F4.1 from the American Welding Society (see address above).

6.e. Vent high-oxygen cylinders or containers before heating, cutting or welding. They may explode.

6.f. Sparks and spatter are thrown from the welding arc. Wear body protective garments such as leather gloves, heavy shirt, cuffs turned up, high shoes and a cap over your hair.

WELDING GASES Can Be Dangerous

5.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of the fume. Use enough ventilation and/or exhaust to the arc to keep fumes and gases away from the breathing zone. When welding, always wear a properly fitted face mask designed to allow the welder to see clearly.

5.b. When welding, fumes and gases may be produced. These fumes and gases may be highly toxic, thus it is important to use proper ventilation and to be aware of the potential hazards of welding fumes and gases. There may be exposure to inhalation of gases and fumes, absorption of gases and fumes through the skin, or ingestion of gases and fumes. The gases and fumes produced may contain a variety of substances that are toxic or hazardous to health.

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

5.d. Read and understand the manufacturer's instructions for this equipment and the consumables to be used, including the safety data sheet (SDS) and follow your employer's safety practices. SDS forms are available from your welding distributor or from the manufacturer.

5.e. Also see item 1b.

FUMES AND GASES Can Be Dangerous

2.a. All welders should use the following procedures in order to minimize their exposure to EMF from the welding circuit:

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

2.d. 2. Never touch the electrode or work cables when the cable is not being used.

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

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

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

ELECTRIC SHOCK Can Kill

3.a. The electrode and work or ground circuits are electrically "hot" when the welder is in use. Do not touch these "hot" parts with your bare skin or wet clothing. Wear dry, non-conductive 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 entire area of physical contact with work and ground.

3.c. In addition to the normal safety precautions, if welding must be performed under electrically "hot" conditions, in confined areas or locations where the arc may contact wet clothing, warning your employers or co-workers is important to avoid injury or death. Always use enough ventilation, especially in confined areas, to ensure breathing air is safe.

3.d. Read and understand the manufacturer’s instructions for this equipment and the consumables to be used, including the safety data sheet (SDS) and follow your employer’s safety practices. SDS forms are available from your welding distributor or from the manufacturer.

3.e. Also see item 1b.

ELECTRO-MAGNETIC FIELDS May Be Dangerous

2.a. Electric current flowing through any conductor causes localized electro-magnetic fields (EMF).

2.b. Exposure to EMF may have other health effects which are not yet known.

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


2.e. Electric current may interfere with some pacemakers, and welders having a pacemaker should consult their physician before welding.

2.f. Exposure to EMF in welding may have other health effects which are not yet known.