

## Safety Precautions from Tregaskiss



Some probability of death or serious injury



1. Arc welding equipment uses electric energy to create molten bonded metal. Protect yourself and others from possible electric shock/electrocution with proper training and review of safety manuals.
2. Equipment improperly used can cause fatalities.
  - 1.1 Turn off any electrically powered equipment and powered support equipment when not in use. Accidental grounding or activation of equipment can cause circuit completion, electric shock, arc flashes, fires and burns.
  - 1.2 Electrode, gun components, and work surfaces are electrical conductors. These surfaces are 'live' when system is in use.
    - 1.2.1 Typically 'stick' equipment is 'live' when equipment is on. Although modern MIG welding equipment disconnects power from the electrode when not in use, the potential for accidental triggering occurs. Treat all equipment with safety in mind.
  - 1.3 Check for proper termination.
    - 1.3.1 Check for proper grounding and attachments.
    - 1.3.2 Check for proper service termination of input to National Electrical Codes and local codes with trained and certified electricians.
    - 1.3.3 Keep welding ground as close to workpiece as possible.
    - 1.3.4 Inspect gun, holders, cords, clamps, terminators and cables for frayed wires, defects and abrasion leading to short circuit conditions or current capacity reductions.
    - 1.3.5 Use proper 'sized' guns, cables, and connections for current being carried. Use of equipment with duty cycle less than expected can lead to premature component degradation and short circuiting.
    - 1.3.6 Never touch two or more electrically 'live' parts together including guns and holders. This compounds open circuit voltage and provides feedback circuits with potential of electrical shock.
    - 1.3.7 Isolate components in automated equipment if possible. Place warning labels on electrically 'live' parts where isolation is not possible.
2. Wear proper safety equipment and clothing.
  - 2.1 Wear proper safety glasses or eye protection should arcing occur.
3. Disconnect power when making any service connections of equipment. 'Lock Out, Tag Out' all circuits and feeds.
4. Falls can be dangerous.
  - 4.1 Keep work area clear as not to trip or fall into open circuits, causing shock.
  - 4.2 When working at levels above ground, protect yourself from shock-causing falls.



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1. Never dip electrode in water for cooling.
2. Do not stand in water or on damp floors while welding, or do not weld in the rain. Avoid wearing wet or sweaty clothes as they provide an easier electric current path to you.
3. Always insulate yourself from the work and ground by wearing proper safety equipment and clothing.
  - 1.1 Isolate yourself from all moist conditions with dry hole-free clothing, gloves and rubber-soled (nonconductive) shoes. Use a nonconductive platform to isolate yourself from conductors, water and dampness.
  - 1.2 When welding in damp locations and in awkward positions, such as sitting or lying, make certain insulating material is large enough to cover your full area of physical contact with work and ground.
  - 1.3 Fix water leaks prior to welding, or immediately stop should they occur, and provide proper repair.
2. Keep everything dry including clothing, work area, cables, electrode holder and power supply.
3. Never handle 'live' electrical or welding equipment with bare hands while standing in water or while hands and/or feet are wet. Dangerous electrical shock can result.



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1. Where compressed gases are to be used at the job site, special precautions should be used to prevent hazardous situations.
2. Always secure cylinders in an upright position to a fixed support so that they cannot be knocked over. Valve protection caps should always be in place except when cylinder is in use.
3. Locate cylinders clear of areas where they may be struck and safe distance from welding or any other source of heat, sparks or flame.
4. Cylinders must be handled carefully to prevent damage to their walls, valves or safety devices. Never lift cylinders by valves or caps.
5. Keep your head and face away from cylinder valve outlet regulator when opening cylinder valves.
6. All regulators, hoses, fittings, etc. should be properly maintained and in good condition as per the manufacturer's recommendations. Faulty equipment should be replaced immediately.
7. Never strike an arc on a cylinder or allow any other electrically 'live' parts to come in contact with a cylinder. This can cause a violent rupture or lead to a rupture during handling.



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1. The welding area.
  - 1.1 Remove all fire hazards from the weld area. If this is not possible, move work to a hazard-free area or cover all combustibles with a fire-resistant cover. Bear in mind that hot material and sparks from the welding process easily go through small cracks and openings into adjacent areas.
  - 1.2 Do not weld in areas which have a flammable atmosphere containing explosive gases or vapors. Avoid paint booths, solvent cleaning tanks, ventilators and storage areas which contain grain or wood dust.
  - 1.3 After welding, turn off all equipment or place gun in a safe location in which no part of the electrode circuit is contacting the work piece or ground. Accidental engagement could create a fire hazard.
  - 1.4 Keep all equipment clean, free of oil and grease.
  - 1.5 Keep the appropriate fire extinguishing equipment in the weld area.
  - 1.6 A fire watcher must be present with the appropriate fire extinguishing equipment and until the area is deemed safe after welding if the following conditions exist:
    - 1.6.1 Combustibles are within the weld area.
    - 1.6.2 Combustibles which can be ignited by sparks are near the weld area.
    - 1.6.3 Openings in the floors, dividers and walls may expose combustibles to weld sparks.
    - 1.6.4 Combustibles are adjacent to floors, dividers or walls that could be ignited by radiant or conductive heat.
  - 1.7 After welding has been completed make sure the area is free of glowing embers, sparks, and any flames.
2. Equipment.
  - 2.1 Periodically check all shielding gas line connections for leaks. Also check the condition of all hoses.
  - 2.2 Keep all protective clothing free of oil and grease.
  - 2.3 Flammable hair preparations should not be used.
  - 2.4 When working with gas-powered equipment, these precautions should be followed:
    - 2.4.1 Turn off engine and allow to cool before refueling.
    - 2.4.2 Carefully refuel equipment to prevent spillage. Wipe up all spilled fuel and do not restart engine until fumes have been eliminated.
    - 2.4.3 Never add fuel near an open flame, when engine is running, or while arc welding.
    - 2.4.4 Do not overfill fuel tank, heat may expand the fuel causing it to overflow and ignite.



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FUMES & GASES

1. Illness or death can result from breathing fumes, gases or oxygen enrichment or depletion that welding may produce.
2. Provide proper ventilation to avoid breathing fumes and gases produced by welding. It may be necessary to supply fresh air to the welder with an air-supplied respirator or other means when working in a confined space.
3. The three major toxic gases associated with GMAW are ozone, nitrogen dioxide and carbon monoxide.
4. Do not weld near degreasing or other cleaning operations involving chlorinated hydrocarbons. Heat and arc rays can react with solvent vapors and form phosgene, a highly toxic gas, along with other irritating products.
5. Shielding gases can displace air. Use special care to insure that breathing air is safe when welding in confined area. Upon entering a confined space, check the breathing air to make sure it is safe. Check gas connections for leaks after installation and regularly thereafter.
6. If welding causes dizziness, nausea, or respiratory irritation, ventilation is inadequate.
7. Operate engine-powered equipment in open, well-ventilated areas or exhaust the engine's fumes outdoors. Never ventilate with oxygen.
8. Read and understand the manufacturer's instructions for this equipment and other welding equipment. This includes the Material Safety Data Sheets (MSDS) and your employer's safety practices.

1. Wear suitable clothing to reduce risk of burns to exposed skin.
  - 1.1 Wear durable, flame-resistant clothing with closed, opaque weaves. This reduces chance of 'sun' burn, contact burns, and accidental ignition of clothing that could occur.
    - 1.1.1 Do not wear wet or damp clothing.
  - 1.2 Wear appropriate gloves, shoes, and outer protection as described to prevent electrical shock.
2. Protect others from arc rays that can burn unintentionally.
  - 2.1 Provide suitable screening to reduce exposure of others to existing welding areas.
  - 2.2 Provide proper eye protection.
  - 2.3 Provide suitable clothing.



Minor personal injury or damage to equipment



1. Improperly balanced equipment can result in personal injury and/or damage to equipment.
2. Check and maintain equipment daily for safe operation.
3. Read and understand the manufacturer's instructions for this equipment and other welding equipment. This includes your employer's safety practices.



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PINCH POINTS

1. Keep clothing, tools, hands, fingers, or any other part of your body away from moving parts of the machine such as v-belts, gears, and fans.
2. Never operate any equipment without safety guards.



For most efficient operation

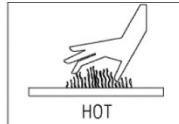


CHECK MSDS

1. Material Safety Data Sheets are designed to help you understand how to safely work with chemicals and materials in your work area.
  - 1.1 Follow data sheet instructions for proper ventilation or respiration.
  - 1.2 Follow proper first aid treatment should accidents occur.
  - 1.3 Keep proper fire extinguishing equipment as denoted on data sheet.
  - 1.4 Do not exceed exposure limits.
  - 1.5 Dispose of material properly.
2. Read and understand data sheets regarding the hazards associated with the use of chemicals and materials.



Minor personal injury or damage to equipment

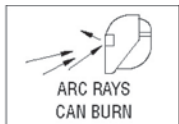


HOT

1. Hot metal such as electrode stubs and work pieces should never be handled.
  - 1.1 Serious burns and injury can occur from accidental contact with hot materials.
  - 1.2 Wear protective clothing to prevent burns to exposed skin.
    - 1.2.1 Wear insulated gloves.
    - 1.2.2 Wear clothing that resists heat penetration and ignition.
  - 1.3 Assume that all metal pieces in the weld area are hot.
2. If touching, always test any metal and discarded electrodes for heat. Do not assume any material in the welding area is cool to touch.
3. Mark welded work HOT or place small pieces in marked container.



Minor personal injury or damage to equipment



ARC RAYS CAN BURN

1. The welding arc produces a bright light emitting concentrated volumes of ultraviolet and infrared rays. These rays are harmful to unprotected eyes or skin. Protection shall be taken to inhibit exposure.
2. Protect eyes from arc rays.
  - 2.1 Do not observe the arc or its reflection without eye protection including filtered lenses.
    - 2.1.1 Filters with cover plates shall be worn to reduce exposure to rays.
    - 2.1.2 Cracked or broken lenses should be replaced immediately, reducing risk of unfiltered light entry into eyes.
  - 2.2 Protect face area from arc rays by using proper hooding and shields.
    - 2.2.1 Hood shall be opaque.
    - 2.2.2 Hood shall be replaced immediately, reducing risk of unfiltered light entry, should cracks or holes occur.

#### SAFETY REFERENCES

- AWS Z49.1 (ANSI) "Safety in Welding and Cutting"
- AWS C5.6 "Recommended Safe Practices for Gas-Metal Arc Welding"
- AWS F4.1 "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping"
- AWS C5.1 "Recommended Practices for Plasma Arc Welding"
- AWS C5.3 "Recommended Practices for Air Carbon Arc Gouging and Cutting"  
Available from the American Welding Society, P.O. Box 351040, Miami, Florida 33135
- ANSI Z41 "Standard for Personal Protection - Protective Footwear"
- ANSI Z49.1 "Safety in Welding and Cutting"
- ANSI Z87.1 "Practice for Occupational and Educational Eye and Face Protection"
- ANSI Z88.2 "Standard Practice for Respiratory Protection"  
Available from the American National Standards Institute, 11 W. 42nd St., New York, NY 10036
- Code of Federal Regulations (OSHA)  
Section 29, Parts 1900-1910.000 and 1910.1000-  
Available from the U.S. Government Printing Office, Washington, DC 20402
- CSA W117.2 "Safety in Welding, Cutting, and Allied Processes"  
Available from the Canadian Standards Association, 178 Rexdale Blvd., Rexdale, Ontario, Canada M9W 1R3
- CGA Pub.P-1 "Safe Handling of Compressed Gas in Containers"  
Available from the Compressed Gas Association, 1725 Jefferson Davis Highway, Arlington, VA 22202-4100
- NFPA51B "Fire Prevention in Cutting and Welding Processes"
- NPFA70 "National Electrical Code"  
Available from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269

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## EMF Information

### Considerations About Welding And The Effect Of Low Frequency Electric And Magnetic Fields

Welding Current, as it flows through welding cables, will cause electronic magnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: "The body of evidence, in the committee's judgment, has not demonstrated that exposure to power frequency electric and magnetic fields is a human-health hazard." However, studies are still going forth and evidence continues to be examined. Until the final conclusions of the research are reached, you may wish to minimize your exposure to electromagnetic fields when welding or cutting.

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to on side away from the operator.

3. Do not coil or drape cables around your body.
4. Keep welding power source and cables as far away from operator as practical.
5. Connect work clamp to work piece as close to the welds as possible.

About Pacemakers:

Pacemaker wearers consult your doctor first. If cleared by your doctor, then following the above procedures is recommended.

## California Proposition 65 Warning

This product contains chemicals, including lead, known to the state of California to cause cancer, and birth defects or other reproductive harm. *Wash hands after use.*

