

SAFE WORK PRACTICE – ELECTRICAL SAFETY

PURPOSE

To provide a sense of the hazards involved in the use of electricity when welding in the workplace and to facilitate its use in a manner that minimizes risk of worker injury or damage to equipment and the environment.

PREREQUISITES

- Follow electrical safety procedures to prevent electrical hazards.
- Electricity used in welding is available as:
 - single phase, 120 Volts (V) or 240 V; and
 - triple phase 575 V in Canada and 480 V in the USA. (Never connect an American triple phase power supply directly to a Canadian triple phase voltage input. You will destroy the transformer and possibly injure yourself.)
- Make sure that the maximum rating of the welding current matches with the welding electrode in use.
- **Power Supplies:** All power supplies must meet the guidelines set by CSA standard C22.1-15 Canadian Electrical Code, 23rd edition, 2015 (in Canada) or ANSI/NFPA 70 (2014) National Electrical Code (in the USA), or by your local electrical utility or other appropriate body.

HAZARDS

- **Electric Shock:**
 The human body conducts electricity. Even low currents may cause severe health effects. Spasms, burns, muscle paralysis, or death can result depending on the amount of the current flowing through the body, the route it takes, and the duration of exposure.
- | Effects of Electrical Shock | |
|-----------------------------|-----------------|
| Effect | DC Current (mA) |
| Death | 120+ |
| Ventricular Fibrillation | 50-120 |
| Paralysis of Diaphragm | 20-50 |
| Makes hands "clamp-on" | 16-20 |
| Involuntary Reflexes | 4-9 |
| Perception | 1-4 |
- **Completion of Circuit through the Body:**
 - If a person touches a live conductor, current may flow through the body to the ground and cause a shock.
 - A person may get an electric shock hazard if incidentally the hands or other part of the body create a bridge between the welding supply (i.e. the live welding electrode) and the welding return (i.e. workpiece) of the welding circuit/equipment.
 - Increased electrical contact with the ground increases the risk of shock.
 - Small shocks could surprise you and cause you to slip and fall, possibly from a high place.

DIRECTIVES:

- Make sure all cables are in good condition with no bare insulation or frayed wires to minimize the extent of live parts.

- Protect cables from vehicular traffic or other hazards so the cables are not damaged, cut, or pinched.
- Make sure that the rod holder is insulated.
- Do not replace the welding electrode with a bare hand, or with a wet welding glove.
- Always keep the hands and the body dry during a welding operation.
- Avoid standing in water, on wet surfaces, or working with wet hands or wearing sweaty garments.
- Do not dip energized (hot) electrode holders in water.
- Avoid direct contact with the live parts of welding equipment and the workpiece.
- Ground the work or metal to be welded to a good electrical ground. Always insulate yourself from the work and ground.
- Wear proper protective equipment, such as rubber boots and rubber pads, if performing arc welding in wet or high humidity conditions. Wear rubber gloves under the welding gloves.
- If the welding operation must be done on steel or other conductive material, use an insulating mat under the operator.
- Place the welding transformer in the close vicinity. In case of need or accident, the transformer can be switched off quickly to cut off the power source.
- Turn off the welding transformer during breaks or not in use. Detach the remaining welding electrode on the electrode holder before leaving the welding area.
- Do not hold or move the welding electrode holder and the welding return cable simultaneously when moving from one working position to another if the power source to the welding equipment has not been cut.