

Safe Use of Hand-Held or Mechanised Plasma Cutting Equipment

Standard Operating Procedure (SOP)

1. Purpose

To prevent electric shock, burns, eye damage (arc eye), inhalation of toxic metal fumes, and fire when plasma cutting mild steel, stainless steel, or aluminium.

2. Scope

Applies to all portable plasma cutters in the workplace.

3. Responsibilities

Operator: Must be trained and authorised; never bypass safety devices.

Supervisor/PCBU: Ensure machine is serviced, leads undamaged, and fume extraction is adequate.

4. Major Hazards

- Electric shock (live torch up to 400 V DC open-circuit)
- UV/IR burns and arc eye
- Toxic fumes (chromium VI from stainless, zinc from galvanised)
- Fire from sparks/hot slag
- Noise (>95 dB(A))

5. Mandatory Personal Protective Equipment (PPE)

- Shade 8–12 auto-darkening welding helmet or shade 8 goggles (AS/NZS 1338.1)
- Flame-resistant jacket or leather sleeves
- Dry leather welding gloves (no holes)
- Hearing protection (Class 5 ear muffs)
- P2 or powered air-purifying respirator (PAPR) when cutting stainless, galvanised, or painted metal
- Steel-cap boots
- Close-fitting clothing – no synthetic fibres that melt

6. Training & Authorisation

Only persons who have completed documented plasma-cutting training and been signed off on this exact machine may operate unsupervised.

7. Pre-Operation Checks

- Power lead, work lead, and torch lead undamaged – no exposed copper
- Earth clamp clean and tight on workpiece or metal bench
- Consumables (electrode, nozzle, shield) correct and not worn
- Air supply clean, dry, and set to manufacturer pressure (typically 550–650 kPa)
- Fume extraction or local exhaust ventilation (LEV) working
- Fire extinguisher (9 kg ABE dry chemical) within 5 m and in test
- Area clear of flammables for 8 m radius

8. Safe Operating Procedure

Set-Up

- Connect earth clamp as close as possible to the cut line (within 1 m).
- Set correct amperage and air pressure for material thickness (refer machine chart).
- Drag cutting: hold shield in contact with work; piercing: hold 3–5 mm off and tilt 45°.

Cutting

- Put on all PPE – helmet down before pressing trigger.
- Start cut at edge whenever possible – pierce only when necessary.
- Maintain 1.5–3 mm stick-out (torch-to-work distance).
- Keep torch perpendicular to work unless bevel cutting.
- Never cut galvanised or painted metal without P2/PAPR respirator and LEV.
- Never lay torch down while still energised.

Shut-Down

- Release trigger, wait for air post-flow to finish (10–30 s).
- Hang torch on insulated hook – never on bench or floor.
- Turn off machine and air supply.
- Disconnect earth clamp.

9. Absolutely Prohibited Actions (Zero Tolerance)

- Touching the torch nozzle while trigger is pressed
- Cutting in wet conditions or with wet gloves
- Cutting containers that held flammables without hot-work permit
- Using damaged torch or leads
- Bypassing the torch safety trigger lock
- Plasma cutting magnesium or zinc-rich coatings without specific risk assessment

10. Emergency Procedures

- Electric shock: do not touch person – isolate power first
- Arc eye: rinse eyes with sterile saline, seek medical help
- Fire: use extinguisher on small fires; evacuate and call 111 for large fires
- Fume inhalation: move to fresh air, give oxygen if trained

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