

Safe Use of MIG (GMAW) Welding Equipment

Standard Operating Procedure (SOP)

1. Purpose

To prevent electric shock, burns, arc eye, inhalation of welding fumes, and fire when MIG welding mild steel, stainless steel, or aluminium.

2. Scope

Applies to all MIG welders in the workplace using solid or flux-cored wire.

3. Responsibilities

Operator: Must be trained and follow this SOP.

Supervisor/PCBU: Ensure annual electrical test & tag, fume extraction, and only authorised welders use the equipment.

4. Major Hazards

- Electric shock (up to 80 V DC open-circuit)
- UV/IR radiation (arc eye, sunburn)
- Welding fumes (manganese, Cr(VI) from stainless, zinc from galvanised)
- Fire from sparks/hot spatter
- Noise (>90 dB(A))

5. Mandatory Personal Protective Equipment (PPE)

- Auto-darkening welding helmet shade 9–13 (AS/NZS 1338.1)
- Flame-resistant clothing cotton or leather
- Dry leather welding gloves (no holes)
- Class 5 hearing protection
- P2 or PAPR respirator when welding stainless, galvanised, or in confined spaces
- Steel-cap boots
- No synthetic clothing that can melt

6. Pre-Operation Checks

- Power lead, earth clamp, and torch lead undamaged – no exposed copper
- Earth clamp clean and tight on workpiece or bench (within 2 m of weld)
- Wire drive rolls correct for wire diameter and type
- Contact tip correct size and not blocked

- Gas cylinder secured upright, regulator correct (Argon/CO₂ or CO₂), hose undamaged
- Gas flow set to manufacturer recommendation (10–20 L/min)
- Local exhaust ventilation (LEV) or fume extractor operating
- Fire extinguisher (9 kg ABE dry chemical) within 5 m and in test
- Area clear of flammables for 8 m radius

7. Safe Operating Procedure

Set-Up

- Set correct voltage, wire speed, and gas flow (refer machine chart or WPS).
- For stainless or aluminium: use correct shielding gas (e.g., Argoshield Light, BOC 23, etc.).
- Clean base metal – remove rust, paint, oil, galvanising within 50 mm of weld area.

Welding

- Put on full PPE – helmet down before pulling trigger.
- Maintain 10–15 mm stick-out (solid wire) or 15–25 mm (flux-cored).
- Keep torch angle 10–15° push or drag depending on gas/wire.
- Never weld galvanised or painted metal without LEV and P2/PAPR respirator.
- Never leave torch on bench while energised.

Shut-Down

- Release trigger, hang torch on insulated hook.
- Turn off welder, then gas bottle valve.
- Bleed gas from regulator (open torch trigger briefly).
- Back off regulator pressure screw.

8. Absolutely Prohibited Actions (Zero Tolerance)

- Welding without helmet down
- Touching live torch tip or work without gloves
- Welding in wet clothing or wet area
- Welding on drums/tanks that contained flammables without hot-work permit
- Using damaged leads or earth clamp
- Leaving welder running unattended
- Dry sweeping welding fumes

9. Emergency Procedures

- Electric shock: isolate power first – do not touch victim until safe
- Arc eye: rinse with sterile saline, seek medical attention

- Fire: use extinguisher on small fires; evacuate and call 111 for large fires
- Fume inhalation: fresh air, oxygen if trained, medical review

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