

SAFETY BULLETIN

240V Portable welding machines

BACKGROUND

Recent inspections of 240V powered portable inverter welding machines in use at different coal operations have identified numerous failures of voltage reduction devices (VRDs) incorporated within the welding machines. VRD's are a type of hazard reduction device (HRD) that reduces the output voltage of a welding machine to safer levels.

The VRD failures have ranged from partial failure, where output voltages have been measured in excess of the name plate rating, to total failure of the VRD that allows full output voltage to be present at the welding handpiece. These defects have been identified across a range of different brands of welding machines.

Indicators associated with the VRD's fitted to some of these welding machines have also been shown to be unreliable. In some instances the indicators showed that the VRD was functioning correctly even though the output voltage was in excess of specifications.




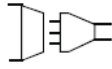

Welding machines have also been identified with 10 amp plugs fitted to the 240V supply cable when the effective load current ($I_{1\text{eff}}$) on the name plates exceeded 10 amps (refer to clause 10.9 of AS 60974.6 – *Limited duty portable arc welding and allied process power sources*).

Some of these welding machines were supplied with 10 amp plugs fitted or have had the 10 amp plugs fitted after initial purchase. Others were found where the earth pins of correctly rated plugs (15 or 20 amp) have been filed down to enable use in a 10 amp socket outlet.



Example of a 3 pin plug with the earth pin filed down to enable use in a 10A socket outlet.

Figure 1 – Rating Plate

a) Identification					
1) Manufacturer Address		Trademark			
2) Type		3) Serial number			
4) 		5) ISO / IEC 60974-1			
b) Welding output					
6) 	8) ~50 Hz	10) 15 A / 20,6 V to 160 A / 27 V			
		11) X	11a) 35 %	11b) 60 %	11c) 100 %
7) 	9) $U_0 = 48 \text{ V}$	12) I_2	12a) 160 A	12b) 130 A	12c) 100 A
		13) U_2	13a) 26 V	13b) 25 V	13c) 24 V
c) Energy input					
14)  1 ~ 50 Hz	15) $U_1 = 230 \text{ V}$	16) $I_{1\text{max}} = 37 \text{ A}$	17) $I_{1\text{eff}} = 22 \text{ A}$		
	22) IP23	23) 			

Example of a rating plate complying to AS 60974.1 - *Arc welding equipment Part 1: Welding power sources* showing $I_{1\text{eff}}$ for a single phase welding machine (or welding power source)

RECOMMENDATIONS

- Welding machines should be constructed to achieve safety outcomes identified in Australian Standards AS 60974 parts 1 and 6 as applicable and with AS 1674.2–2007 - *Safety in welding and allied processes – Electrical*.
- Welding machines should be subject to inspections and testing prior to acceptance at a mining operation to ensure that the machine is fit-for-purpose and functioning correctly prior to use at the operation.
- Requirements for fit-for-purpose welding equipment need to be determined in relation to, but not limited to:
 - Intended environment of operation
 - Required welding currents
 - Duty cycle of the welding machine for the required welding currents
- Mines should undertake assessment of the intended uses and applications of welding machines at the operation. Guidance in the classification of areas of use and suitability of welding machines is contained in AS 1674.2–2007.

- Information should be maintained in the safety file for the welding machine that shows assessments have been undertaken that demonstrate the probability of failure of any safety devices, including the HRD, is appropriate to the degree of risk posed by the hazards created by the use of the welding machine.
- In considering the suitability of a particular welding machine, consideration should be given to the availability of appropriately rated supply equipment, circuits and socket outlets within the electrical installation where the welding machine is to be used
- Where safety systems such as hazard reduction devices suffer repeated failures, or where failures are identified during testing that are undetectable by machine operators in normal operation, information relating to the failure of the safety system should be provided to the designer, manufacturer and/or supplier, as appropriate, in accordance with relevant health and safety legislation.
- Reference should be made to previously issued safety alerts and bulletins:
 - SB07-04 – *Safe use of electric welders*
 - SA00-20 – *Electric shock from welding equipment*
 - QLD Mines Inspectorate Safety Alert No. 253 – *Electric shocks from welding equipment*
 - QLD Mines Inspectorate Safety Alert No. 6 – *Welding electric shock : equipment and practice*

NOTE: Please ensure all relevant people in your organisation receive a copy of this Safety Bulletin, and are informed of its content and recommendations. This Safety Bulletin should be processed in a systematic manner through the mine's information and communication process. It should also be placed on the mine's notice board.

Signed



**William Barraclough
ACTING DIRECTOR
MINE SAFETY OPERATIONS BRANCH
TRADE & INVESTMENT**

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