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1.0 INTRODUCTION

1.1 PURPOSE

To summarise the procedures and intervals for the “In service” safety inspection, testing and tagging of LV (Low Voltage) electrical equipment used at OneSteel Whyalla Steelworks, based on the OHS&W regulations and AS3760:2003.

1.2 SCOPE of EQUIPMENT to be INSPECTED/ TESTED

All LV electrical equipment a) to f) as follows used on OneSteel sites and owned, hired, borrowed or leased by personnel employed by OneSteel or a Contractor:

LV = above 50V ac/ 120V dc, ie generally 230 or 400 volt, single and 3 phase. See Definitions.

- a) **Portable and transportable appliances.**
Connect to power by flexible cord. Moved while operating or easily moved while connected. Example: Power tools, cleaning appliances, portable testing equipment.
- b) **Stationary appliances.**
Connect to power by flexible cord. Fixed or greater than 18 kg without a carrying handle. Example: Photocopier, microwave ovens, vending machines, fixed welding machines.
- c) **Flexible cord extension sets, appliance cords and power boards/ boxes;**
- d) **Portable ‘power packs’ and isolation transformers;**
Including transformer and switch mode type.
- e) **Portable Generators;** *and*
- f) **RCD’s (Residual Current Devices).**
Portable and fixed type.
- g) **Exclusions from inspecting, testing and tagging:**
 - i) Stationary/ fixed equipment not in hostile environment nor exposed to damage and cord not flexed in use or maintenance, eg room air conditioner. *AS3760:2003, 1.1.5, 1.2.3.a.*
 - ii) Fixed equipment directly connected to the fixed wiring (covered by AS3000).
- h) **VRD (Voltage Reduction Devices).** *Integrated into welding power source or a portable unit fitted to the secondary out put side or fitted into the primary input side of the welding power source.*

1.3 CHANGES in AS3760:2003 and in THIS REVISION (6)

Main changes in AS3760:2003 from 2001 and included in this revision are:

- a) Test intervals now based more on nature of use rather than type of equipment or site.
- b) Risk assessments to determine test interval variations are now allowed. *5.1 d).*
- c) For equipment which must be energised to operate a switch, the insulation must now be tested by current leakage with power applied rather than resistance test. *A3.2.*
- d) The ‘Responsible person’ is added and defined. *2.2 ‘Definitions’.*
- e) Qualifications for a ‘Competent person’ are clarified. *2.2 ‘Definitions’.*
- f) Responsibilities of ‘Hirer’ and ‘Hiree’ of hired equipment are clarified. *3.0 c) ‘Responsibilities’. Test intervals of hire equip increased from 1 m to 3 m. Table 5.1.*
- g) Inspect/ test not now required for some stationary equipment. *1.2 g) ‘Scope’.*

2.0 REFERENCES and DEFINITIONS

2.1 REFERENCES

Latest copy as amended of the following:

- AS 1674.2:2003 Safety in welding and allied processes - Electrical
- AS 2790:1989 Electricity generating sets - Transportable up to 25kW
- AS 3000:2000 Wiring Rules
- AS 3012:2003 Electrical Installations - Construction and Demolition Sites
- AS 3195:2002 Portable machines for electric arc welding and allied processes
- AS 3760:2003 In-service Safety Inspection and Testing of Electrical Equipment
- QM37.01 Rev 2 Electrical Equipment - Supply and Installation
- OST-OHS-ELEC-PRO-001 Electrical Safety Manual
- Occupational Health, Safety and Welfare Regulations

2.2 DEFINITIONS

Competent person: AS3760:2003 1.4.5: Person who 'Responsible person' ensures has practical and theory skills to correctly perform the tasks required.

- On OneSteel sites shall be a Licensed Electrician, or an authorised trained 4th year Electrical Apprentice.
- Competency level may need to be updated following technical advances.
- Competent person shall:
 - Be able to use test equipment safely and effectively;
 - Understand dangers of electricity and appreciates the need for inspection & testing;
 - Understand Earthed (Class I), Insulated (Class II) insulation types and earthing etc;
 - Understand AS3760:2003 application, requirements and relevant legislation.
 - Have an understanding of the relevant legislative requirements appropriate for the jurisdiction they are operating within.

Construction and Demolition Site AS3012:2003, 1.1 *Examples:* ...Building, excavation.. alterations.. demolition.. road making.. laying pipes & cables.. site offices.. land clearing.

Construction Wiring: AS3012:2003, 1.4.9: Wiring providing electricity for construction and demolition, not intended to be permanent wiring. Does not include flexible cords.

Equipment, Portable, Transportable and Stationary: See 1.2 'Scope'.

Flexible extension cord set: Ends with plug and cord extension socket. OHS&W.

Flexible supply cord or Appliance cord: one end to plug and other to equip or connector.

Generating Set, Portable: AS2790:1989, Portable/ transportable engine driven gen set with LV lighting or socket outlet/s. Intended for moving only when shut down.

Hostile environment: AS3760:2003 1.4.12. Equipment normally subject to physical abuse, exposure to moisture, heat, vibration, corrosive chemicals, dust etc.

Portable Equipment: Equipment which is moved while in operation, or an appliance which can be easily moved from one place to another while connected to the supply.

Responsible person: AS3760:2002 1.4.20. Has legal responsibility under OH&S or relevant legislation for safety of the equip. (Owner/ employee with responsibility). See 'Competent person'.

RCD (Residual Current Device) fixed or portable: All LV socket outlets must be protected by max 30mA rated RCD. Includes those on portable generators and engine driven welding sets.

Stationary Equipment: An appliance having a mass exceeding 18 kg and not provided with a carrying handle(s).

Voltages as defined AS3000:2000: **Low (LV):** >50V ac/120V ripple free dc up to 1000V ac/1500V dc. **Extra Low (ELV):** Not exceeding 50V ac/120V ripple free dc.

Welding Machine, Fixed or Stationary: AS1674.2, AS3195:2002: Electric arc fixed in position or only moved when the supply is disconnected.

Welding Machine, Portable: AS1674.2, AS3195:2002. Portable/ transportable electric arc may be moved while connected to supply.

Welding Set, Engine driven: AS1674.2, AS3195:2002. Specific inspections & tests apply to welding circuit insulation resistance. See '*Generating set, portable*'.

Voltage Reduction Device: AS1674.1 A type of hazard reducing device (either internally or externally fitted to a welding power source) that is designed to automatically reduce the open circuit voltage to a safer level.

3.0 RESPONSIBILITIES for IN SERVICE INSPECTION/ TESTING

The **Responsible person** for the safety of the electrical equipment is as follows:

- a) OneSteel **Department head** for equipment owned by the department or employees;
- b) The **Contractor** for equipment owned by them or their employees;
- c) The **Hirer** (offers equip. for hire) shall ensure that equip. complies with AS3760 at start of hire and shall inspect equip. and do push button test on portable RCD's prior to each hire. *Compliance may be indicated by a "Ready to Hire" tag.*

The **Hiree** (receives equip. from Hirer) is responsible for regular inspection, testing and tagging once in possession of the equipment.

A **Competent person** shall do the inspection, testing and tagging. 2.2 'Definitions'.

4.0 REGISTER NEW ELECTRICAL EQUIPMENT

Maintain a database/ asset register for all electrical appliances, RCD's and VRD's that require regular inspecting and testing.

For **new equipment**, print **identification number on a tag** and attach to supply cord near plug.

- *Identification tags and related supplies are listed in Appendix 10, A10.2.*
- *If no supply cord, put details at socket outlet for portable generator or at the RCD unit.*

5.0 INSPECT and TEST the EQUIPMENT

5.1 TIME/ INTERVAL for INSPECTION and TESTING

Inspect and test all **electrical equipment defined in 1.2 Scope and used on OneSteel sites**, at the times and intervals following: If in doubt then classify it with the shortest test interval.

See 1.2 g) for exclusions.

- a) At no more than the intervals in columns 2 to 4 of Table 5.1 below, **during the first month** of that interval; *and Intervals may be increased if a risk assessment is approved by the Lead Elect Engineer.*
- b) Before the first introduction into service; *and*
- c) After equipment is repaired, before return to service.

Table 5.1: Intervals for inspection and testing

Location/ Conditions of use or Equipment type <i>References. See also 1.2 'Scope'.</i>	Inspect, Test, Tag Interval	
	Construction	Other sites
Equipment subject to cord flexing in normal use or damage from location conditions. AS3012 3.6; AS3760 tbl 4.	3 months.	12 months. Incl. work shops.
Equipment not subject to cord flexing in normal use or damage from location conditions. AS3760 tbl 4; AS3012 3.4, 3.6.	6 months. Inspect wiring	5 years. Exclude 1.2 g)
Portable welding m/c & generators. AS1674.2 5.1; AS3012 3.5.	3 months.	Risk assess
Fixed welding machines. AS1674.2 5.1.	12 months.	Risk assess
Portable RCD p.b. test / op. test. AS3760 tbl 4; OHSW 2.5.6.	Daily / 3 months	Daily / 2 years.
Fixed RCD p.b. test / op. test. AS3012 3.5, 3.7; AS3760 tbl 4.	1 month / 12 months.	6 months / 2 years.
Hired equipment. 3.0 c) and AS3760 table 4.	3 months.	3 months.
VRD Portable and Fixed: Test as per attachment 11	Daily / 3 months	Daily / 6 months

5.2 PROCEDURE FOR INSPECTION, TESTING and TAGGING

Comply with the principles of AS3760 and the particular requirements of OneSteel Whyalla Steelworks as set out in this Work Instruction, including Appendices 1 to 11.

6.0 RECORD the INSPECTION and TEST RESULTS

Record the results of test measurements and the pass/fail status together with confirmation of compliance with inspection requirements.

Give the plant owner a copy of the records.

Owner to keep records on site, available for audit for seven years unless other specified.

- *A record of pushbutton test for fixed RCD's need only be kept for one year. A test sticker at the unit to indicate a successful test may be used.*
- *A record of portable RCD user pushbutton tests is not required.*

7.0 TAG the EQUIPMENT that COMPLIES

Attach the appropriate test tag (appendix 10) to the supply cord near the plug of all equipment that **fully complies** with the inspections and tests of AS3760 and this Work Instruction. The tag shall include the name of the company or person who performed the test and the test date. It may also include a re-test date.

- *Where there is no supply cord, e.g. fixed RCD's, plug packs etc a test sticker at the unit may be used or the test tag attached to the ELV lead near the unit. Voltage Reduction Devices fitted to the secondary side of the output terminals of a welding power source shall have their test tag attached to either of the input cables.*
- *The correct colour tag is shown in appendix 10 (may be colour-printed for a display chart). A definite check for validity of a test must include reading the date/year on the tag.*

Remove all out of date test tags.

8.0 REMOVE NON-COMPLIANT EQUIPMENT from SERVICE

Remove from service all equipment that fails to comply with the inspection or test criteria and attach a warning tag.

Arrange for repair and return to service.

- *Note that it must be inspected, tested and tagged before return to service.*
- *If the equipment is not fit for repair, destroy and dispose of it.*
- *Remove from OneSteel site any personal equipment that fails to comply.*

For guide to a visual check of the tag for test status of equipment see Appendix 10, A10.1.

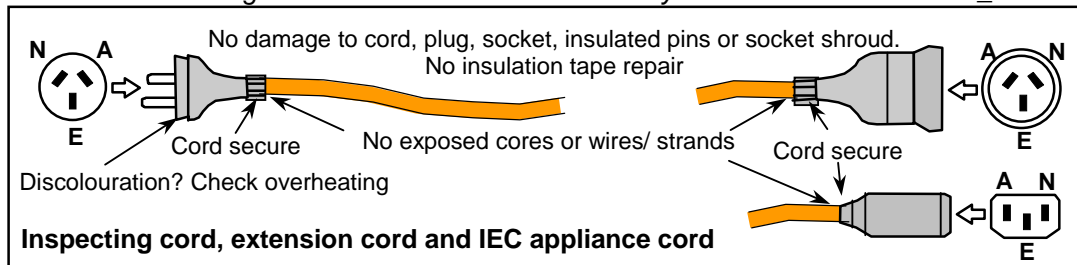
Appendix 1: VISUALLY INSPECTING the EQUIPMENT

Visually inspect for design faults or damage at the time or interval shown in 5.1 above and record the results. Check the following as applicable:

Records should be retained for seven (7) years. See 6.0.

- a) Equipment free from obvious external damage.
- b) Flexible supply cord or extension lead and plug or outlet socket not damaged.
 - Outer sheath not damaged or deformed by twisting; inner cores or wires/ strands not exposed; cords effectively anchored and insulated pins or socket shroud not damaged.
 - Connect plug/socket together to help confirm that pins have not spread.

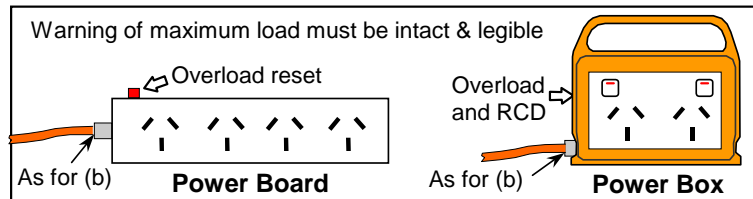
Figure 8 type light duty cords with 240 volt supply for radios and similar shall not be used where liable to damage or moisture. See Electrical Safety Manual OST-OHS-ELEC_PRO-



001 section 2.18.1.

- c) Equipment has appropriate safety/weather protection (IP rating).
See QM37.01 rev 2, 1.8.5.a.

- d) Warning and rating labels intact and legible and protection devices fitted.
For portable power boards/ boxes a maximum load warning and overload fitted.



- e) Operating controls in good working order.
Secure, aligned and appropriately identified.
- f) Ventilation inlets and exhausts unobstructed and covers/ guards secured.

Additional inspections of:

- Portable generators see A7.1.
- Electric arc welding accessories, see A8.2.

Appendix 2: TESTING the EARTHING CONTINUITY of EQUIPMENT which is EARTHED or PROVIDES EARTHING to other appliances

Test the earthing continuity from the plug earth pin to accessible earthed parts (appliance) or to the earth contact (socket/ ext. socket) of the following equipment for **1.0 ohm maximum** at the time/ interval shown in 5.1 above:

Proves resistance is low enough for circuit protection to operate, AS3760:2003 appx A.

- a) All earthed (Class I) equipment/ appliances; *and*
- b) Cord extensions, IEC appliance cord sets, power boards/ boxes & portable RCD's.

Additional earthing continuity test of LV outlets on portable generators: See A7.2.

Appendix 3: TESTING the INSULATION EFFECTIVENESS of EQUIPMENT

A3.1 Insulation RESISTANCE test:

Test at the times and intervals in 5.1 above using the insulation resistance test:

Measure the insulation resistance with the switch in 'ON' position, at 500V dc¹, between the live supply conductors joined together and accessible metal parts, or the earthing conductor.
As per AS3760:2003 appendix B, B2.2.

1. 250V dc may be used for equipment containing MOV's/ EMI filtering equipment.

Insulation resistance shall be **1 Megohm minimum** or:

- 0.01 Megohms for appliances with mineral insulated metal sheathed heat elements.
- 0.1 Megohm for RCD's with a 'Functional Earth' connection.

Additional insulation resistance tests of:

- Portable power supplies, plug packs and isolating transformers see Appendix 6;
- LV outlets on portable generators see A7.3; *and*
- Electric arc welding machines see A8.1.

A3.2 Insulation LEAKAGE CURRENT test:

For **equipment which must be energised to operate a switching device**, it is now mandatory to test its insulation by a leakage current test with the power applied at rated voltage. The current shall not exceed the following:

As per AS3760:2003 appendix B, B2.1.

Equipment	Leakage test current	Max mA
With accessible earthed parts (earthed class I)	Protective earth conductor	5
With no accessible earthed parts (insulated class II)	Between accessible un-earthed metal and earth	1
Portable RCD's with functional earth	Functional earth conductor	2.5
Cord extensions, portable outlets and portable RCD's	Protective earth conductor	1

Appendix 4: PERFORMANCE of FIXED & PORTABLE RCD'S, 10/30mA

With rated tripping current flowing between active and earth the tripping time shall be 40msec maximum. Up to 100msec is permitted for 30mA electromechanical type only.

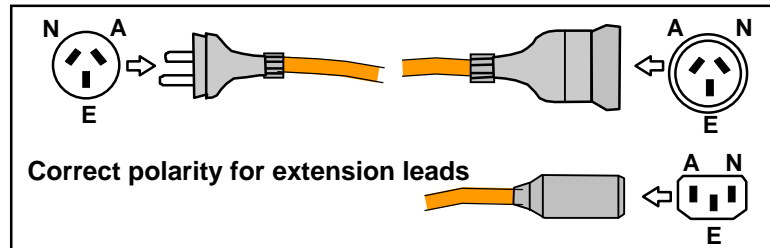
- *Refer AS3760:2003 appx D. Note: OneSteel Whyalla max tripping time is less than AS3760.*
- *If measured time is greater, then circuit load should be disconnected for a re-test. This will eliminate misleading effect than inductive circuit may have on some test instruments.*
- *The intervals for user pushbutton tests are given in table 5.1.*
- *Where no neutral is present at 3 phase outlets, a suitable transformer may be used to enable the use of a standard 240 volt tester.*

Appendix 5: ADDITIONAL TESTS of RE-WIRABLE EXTENSION LEADS and POWER BOARDS

A5.1 Additional polarity test on rewireable extension leads and power boards/ boxes:

Test that phases are not transposed on re-wireable extension leads and power boards/ boxes.

For non rewireable type the transposed phase test shall be done at least on its introduction to service.



A5.2 Additional phase test for multi-phase rewireable power boxes:

For multi-phase rewireable power boxes make a final voltage test on all outlets to ensure a nominal voltage of 230 V for phase to neutral and 400 V for phase to phase outlets.

Appendix 6: ADDITIONAL TEST of POWER SUPPLY UNITS, PLUG PACKS and PORTABLE ISOLATING TRANSFORMERS

Measure the **insulation resistance** for **1 Megohm minimum** between the following as appropriate:

Refer to AS3760:2003 appendix C and E.

- Live supply conductors connected together and transformer output (sec.) winding;
 - Transformer output (secondary) winding and accessible earthed parts.
- Not applicable to equip with ELV output connected to earth directly or by resistance.*

Appendix 7: ADDITIONAL INSP/ TESTS of PORTABLE GENERATORS

Including engine driven welding sets with LV outlets.

A7.1 Additional inspection of portable generators:

Including engine driven welding sets with LV outlets.

Check that portable generators or engine driven welding sets with LV (240v or 415V) socket outlets comply with AS2790 and OneSteel policy as follows:

- a) All LV socket outlet/s are protected by an RCD.
RCD connection specified in AS2790:1989 amdt 1. See QM37.01 rev 2, 2.8.2 and 2.8.5. Requires neutral-frame link which will be tested for effectiveness in A7.2 below.
- b) Overload circuit protection is fitted.
- c) Electrical equipment is weather proof. Minimum IP23 for outside use.
- d) Has a warning notice on the set:
'The output of this generating set is potentially lethal. The set should not be connected to a fixed electrical installation except by an appropriately licensed person'.
- e) Has a warning notice or notices:
'Do not operate in a hazardous location'.
'Do not operate in a confined area'.
'Do not refuel while engine is running'.

A7.2 Additional earthing continuity test of LV socket outlets on portable generators:

Including engine driven welding sets with LV outlets.

For portable generators and engine driven welding sets with LV outlets test for a resistance of **1.0 ohm maximum** between the RCD neutral; earthing socket of the outlet; frame; generator body and any metal wiring enclosures.

See A7.1 (a) above and AS3012:2003, 3.7.

A7.3 Additional insulation resistance test of LV socket outlets on portable generators:

Including engine driven welding sets with LV outlets.

Disconnect the RCD neutral-frame link then test for an insulation resistance of **1 Megohm minimum** between the supply conductors and accessible metal parts including frame connection, generator body and wiring enclosures.

RECONNECT the neutral-frame link after the test.

A7.4 Additional insulation resistance test of welding circuit windings on engine driven welding sets: As for arc welding machines in A8.1 below.

Appendix 8: ADDITIONAL INSPECTION and TESTS of ELECTRIC ARC WELDING MACHINES (including engine driven welding sets)

AS1674.2-2003 'Safety in welding and allied processes – Electrical' sets out the routine inspection and tests from AS3195:2002 'Approval and test spec – Portable machines for electric arc welding' as follows:

A8.1 Additional insulation resistance test of electric arc welding machines:

Measure the insulation resistance between the parts shown using the following test sequence:
Based on AS1674.2-2003, 5.1.2 and AS3195:2002, 18.2 and 18.3.

- a) Measure the resistance with 500 V dc test voltage applied.
- b) Immediately apply the test voltage shown in the last column of the table below.
- c) Immediately following (b) above, repeat the test and measurement in (a).

The insulation should comply with the values shown in the following table.

Measure between:	Megohms	Test volts kV ²
Between live parts and any exposed metal	1	1.25
Between output terminals and any exposed metal	1	1.25
Between input windings ¹ and output windings ¹	5	3.75
Between input windings and core connected to any screen and any exposed metal	2	1.25
Between output windings and core connected to any screen and any exposed metal	2	1.25

1. For welding machines with accessible connections: For this test the core is bonded to the secondary winding, any screen is disconnected from earth, and any ancillary equipment (eg switches, fuses) connected to the windings is disconnected for the test.
2. For when to apply the test voltage see A8.1 (b) above.

A8.2 Inspection of electric arc welding accessories when welding machine is tested:

It is recommended that welding accessories be inspected (testing not required) when the welding machine is tested and a guide is provided following:

Additional to regular checks that the operator is required to make, specified in AS1674.2-2003.

Inspection guide: Inspect all welding accessory equipment associated with the machine (connections, leads, electrode holders, wire feeders, Voltage Reduction Device etc.) to ensure they are in a safe and serviceable condition and make a record of the inspection.

For further details see the Electrical Safety Manual OST-OHS-ELEC-PRO-001 section 1.14 'Welding safety'.

A8.3 Special tests for arc welding machines and power supplies:

- a) **Test of welding supply socket outlets/ plugs when first put into service or after repair:**
When first put into service or after repair, three phase welding socket outlets and the plugs of welding machines capable of being plugged into them shall be tested for correct wiring connection and phase sequence. See A9.1 of Appendix 9.
- b) **Test of open circuit volts of the welding circuit of electric arc welding machines, including engine driven welding sets, when required:**
When required the open circuit volts shall be measured as set out in A9.3 of Appendix 9.
From AS3195:2002.

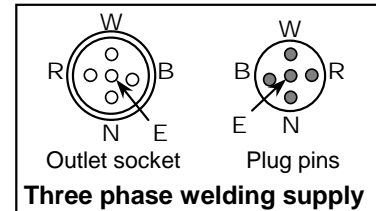
Appendix 9: SPECIAL INSPECTION/ TESTS of WELDING EQUIPMENT

A9.1 Tests of 3 phase welding supply socket outlets/ plugs for correct polarity when first put into service and after repair:

When first put into service and after repair test that all **3 phase** welding socket outlets and the plugs of welding machines capable of being plugged into them have the following wiring connection and phase sequence: A polarity tester should be available.

Connection when viewed from the front of the outlet or rear of the plug in a clockwise direction: Neutral at the bottom, phase 1 (red), phase 2 (white), phase 3 (blue), centre earth.

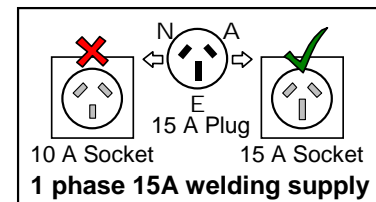
- Note that location of the earth/ neutral is different from general use 3 phase outlets but the two types cannot be inter-changed.
- The above checks are made in order to comply with maximum allowable welding voltages between electrode connections of adjacent welding machines. Right and wrong connections are illustrated in OST-OHS-ELEC-PRO-001 section 1.14.7 and further details in AS1674.2.
- Maximum allowable secondary welding voltage between electrodes of adjacent machines:
 - Same phase connected welding machines: Zero volts.
 - Different phase connected welding machines: Open circuit volts. See A9.3 below.



A9.2 Inspection of 1 phase welding supply socket outlets/ plugs when required:

When required check that **single phase** welding machines and the socket outlets and extension leads intended for their supply, are 3 flat pin 15 amp with a wide earth pin on the plug preventing the machines use from 10 amp socket outlets.

For further details see *Electrical Safety Manual OST-OHS-ELEC-PRO-001 section 1.14.1.*



A9.3 Test of open circuit volts of welding circuit for electric arc welding machines when required: See A8.3 above.

Including the welding circuit of engine driven welding sets.

Open circuit volts of the welding circuit shall be a **maximum** as shown following:

Working conditions	Rated no-load volts	AS3195 ¹
Environment with increased hazard of electric shock <i>Voltage reducing required</i>	d.c. 113 V peak a.c. 68 V peak and 48 V rms	12.2
Environment without increased hazard of electric shock	d.c. 113 V peak a.c. 113 V peak and 80 V rms	12.3
Mechanically held torches with increased protection for the operator	d.c. 141 V peak a.c. 141 V peak and 100 V rms	12.4
Allied processes	d.c. 710 V peak a.c. 710 V peak and 500 V rms	12.5

1. AS3195:2002 clause 12.1 details the test method. Clauses 12.2 to 12.5 detail conditions for the above test.

Appendix 10: TEST TAGS and OTHER SUPPLIES

A10.1 CORRECT COLOUR of TAG RELATED to TESTING INTERVALS and MONTH

See 7.0 'Tag equipment that complies'. This table may be printed in colour for display purpose.

	5 years	12 months	6 months alternating	3 months alternating	
January >	Blk txt on white	Orange	Blue Red	Yellow Red	< January
February >	"	"	Red	Red	< February
March >	"	"	Red	Red	< March
April >	"	"	Red	Red Green	< April
May >	"	"	Red	Green	< May
June >	"	"	Red	Green	< June
July >	"	"	Red Blue	Green Blue	< July
August >	"	"	Blue	Blue	< August
September >	"	"	Blue	Blue	< September
October >	"	"	Blue	Blue Yellow	< October
November >	"	"	Blue	Yellow	< November
December >	"	"	Blue	Yellow	< December

- For a definite check, the date on the tag should be read to ensure that the test was done in the current year. For equipment tested at 12 month and 5 year intervals the tag must be read for a date check, since the tag colour does not change.

A10.2 TEST and IDENTIFICATION TAGS and RELATED SUPPLIES:

Item	Catalogue Number	Unit
5 year test tag, Black text on white	55041201	Pack 100
5 year test tag, White text on black alternate		
12 month test tag, Orange	55053116	Pack 100
6 month test tag, Red ¹ <i>January-June</i>	55026403	Pack 100
6 month test tag, Blue ¹ <i>June-December</i>	55026497	Pack 100
3 month test tag, Red ² <i>January-March</i>	55041202	Pack 100
3 month test tag, Green ² <i>April-June</i>	55041205	Pack 100
3 month test tag, Blue ² <i>July-September</i>	55041204	Pack 100
3 month test tag, Yellow ² <i>October-December</i>	55041207	Pack 100
Test sticker, Green/White	55026569	Card 14
Identification (registration) tags	55041200	Pack 100
Marking pens	55041208	Each

- Colour for 6-month test tags as recommended in AS4249: 1994 clause 15.1.8.
- Colour for 3 month test tags as recommended in AS3012:2003 appx F.

Appendix 11 VOLTAGE REDUCTION DEVICES

11.1 VRD Switching Resistance

Voltage reduction devices shall automatically reduce the rated no-load voltages to which they are connected to less than 35V DC peak or 25V AC RMS, at a maximum resistance of the external welding circuit being 200 Ohms.

11.2 Daily or Pre-Start Inspections

As the final part of the pre-start inspection of a welding power source, it is recommended that the operator carry out a visual inspection to confirm that the indicating lights on the VRD are functioning in accordance with the manufactures specifications and the requirements of AS1674.2. This inspection requires power to the welding machine so the operator should take precautions to ensure the inspection is carried out in a safe environment. The operator observes that the VRD indicators are functioning, either by using a test unit or by performing a trial weld. In the event that the VRD indicators do not function correctly the welding power source shall be placed out of service until the fault can be rectified.

Test Sequence

Ensure power is isolated from the welding power source. For welding power sources with build in VRD disconnect work and electrode lead from the welding power source. Welding power sources with external VRD on the secondary side of the welding power source disconnect return and electrode cable from the output side of the VRD.

Attach the test electrodes of the meter to the output terminals of the welding power source.

Activate the secondary circuit of the welding power source, i.e. turn on the power to the welding power source on or in the case of a generator types, start the generator.

Record the maximum voltage on the output terminals of the welding power source.

The voltage should be less than or equal to 20 volts.

11.4 VRD Switching Times

The switching time for the output of DC welding machine hazard reducing devices (VRD's) shall operate within 0.5 seconds.

The switching time for the output of AC welding machines hazard reducing devices (VRD's) shall operate within 0.3 seconds.

These times need to be checked during maintenance inspections.


11.5 Record of Results

Records of test results carried out should be kept in a suitable register.

The test results should contain the following information:

- Date of test
- Identification of the VRD tested. This would include details of the welding power source with integral VRD fitted or welding power source and after market VRD.
- Identification of the competent person carrying out the test.
- Reference to the test procedure used.
- Identification of testing equipment used.
- Results of tests carried out.
- A statement of compliance or non-compliance to AS1674.2 requirements.

Attachment 1: Sheet for Recording VRD test results.

		VRD TEST RESULTS SHEET		
Department Area				
Description of VRD (internally fitted or external)				
Name of manufacturer:				
Model No:			Date of test:	
Serial No:				
Test Parameters		Measured Value	Required valve Seconds Maximum	Compliance Yes / No
Maximum Permitted Open Circuit Voltage			35 Volts Peak 25 Volts RMS.	
Maximum circuit resistance			200 Ohms Max.	
Time to Operate			0.3 secs for AC. 0.5 secs for DC.	
Test Equipment used:				
Name of testing officer:				
Signature:				