

Prüfbericht - Nr.: M2272155.01 <i>Test Report No.</i>			Seite 1 von 20 <i>Page 1 of 20</i>		
Auftraggeber: Broco, Inc., 8690 Red Oak St., Rancho Cucamonga, CA 91730, USA <i>Client:</i>					
Gegenstand der Prüfung: Portable Welding System <i>Test item:</i>					
Bezeichnung: GOWELD <i>Identification:</i>		Serien-Nr.: BR 0029 <i>Serial No.:</i>			
Wareneingangs-Nr.: N/A <i>Receipt No.:</i>		Eingangsdatum: N/A <i>Date of receipt:</i>			
Prüfort: TUVRNA San Diego office <i>Testing location:</i>					
Prüfgrundlage: EN 60204-1:1997 <i>Test specification:</i>					
Prüfergebnis: Der vorstehend beschriebene Prüfgegenstand wurde geprüft und entspricht oben genannter Prüfgrundlage. <i>Test Result</i> The a. m. test item passed.					
geprüft/tested by: Udo Heinz 4/12/02			Kontrolliert/reviewed by Andreas Eberhard		
<u>Datum</u> <i>Date</i>	<u>Name</u> <i>Name</i>	<u>Unterschrift</u> <i>Signature</i>	<u>Datum</u> <i>Date</i>	<u>Name</u> <i>Name</i>	<u>Unterschrift</u> <i>Signature</i>
Sonstiges/Other Aspects: EN 60974-1 considered.					
Abkürzungen: OK, Pass = entspricht Prüfgrundlage Fail = entspricht nicht Prüfgrundlage N/A = nicht anwendbar			Abbreviations: OK, Pass = passed Fail = failed N/A = not applicable		
<p>Dieser Prüfbericht bezieht sich nur auf den o.g. Prüfgegenstand und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</p> <p>This test report relates to the a. m. test item. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</p>					

Clause	Requirements	Comments	OK	Fail	N/A
	Test Report	[X]	-	-	-
4	<u>General Requirements</u>		-	-	-
4.1	General considerations (EN 1050; hazards, safeguarding (EN 292-2 cl. 4), inquiry form etc.)	Covered by Machinery Directive,	X		
4.2	Selection of equipment (compliance with EN or IEC standards)	All critical components chosen in compliance with EN-/IEC-/UL-/CSA or comparable appropriate safety requirements	X		
4.3	Electrical supply (+/-10%, +/-1Hz, harmonics, unbalance, impulses, interruption, dips etc.)	OK, by maker statement	X		
4.4	Physical environment and operating conditions		-	-	-
4.4.1	General (see annex B)	Informative			X
4.4.2	Electromagnetic Compatibility (see EMC directive)	EMC Directive covered by manufactures self declaration	X		
4.4.3	Ambient Air Temperature (5-40°C) (see annex B)	Unit is for indoor or outdoor use	X		
4.4.4	Humidity (30-95%)	The humidity has no influence on safety	X		
4.4.5	Altitude (1000m)	The altitude has no influence on safety	X		
4.4.6	Contaminants (see 12.3 and annex B for details)	Enclosure is rated IP X2	X		
4.4.7	Ionizing and non-ionizing Radiation (see annex B)	None			X

Clause	Requirements	Comments	OK	Fail	N/A
4.4.8	Vibration, Shock and Bump (see annex B)	Vibration due to normal operation will not damage the equipment, 0.2 m/s ² measured at grip	X		
4.5	Transportation and storage (-25-55°C/70°C)	Transportation and storage temperature is within range	X		
4.6	Provision for handling (see 14.4.6)	Covered by Machinery Directive	X		
4.7	Installation and operation (EN's for ergonomic design)	Covered by Machinery Directive	X		
5	<u>Incoming Supply Conductor Terminations and Devices for Disconnecting and Switching off</u>		-	-	-
5.1	Incoming supply conductor terminations (EN 60445, 5.2, 5.3.1 and 5.3.2d)	42 VDC max power feed from battery	X		
5.2	Terminal for connection to the external protective earthing system (8.2.1, table 1, 8.2.2 and 60417-IEC-5019)	Through battery	X		
5.3	Supply disconnecting (isolating) device	Power cord at battery	X		
5.3.1	General (for each supply)	Single feed, 42 VDC	X		
5.3.2	Type - switch-disconnector (EN 60947-3 AC- 23B or DC-23B) - disconnector with auxiliary contact (EN 60947-3) - circuit-breaker (EN 60947-2) - plug/socket combination (16A/3kW) - plug and socket-outlet (IP2X/XXB, see 3.39 and 14.4.5)	N/a N/A N/A N/A N/A			X

Clause	Requirements	Comments	OK	Fail	N/A
5.3.3	Requirements (60417-IEC-5007+8, red handle for E-stop, padlock, stalled motor, etc.)	none			X
5.3.4	Operating handle (0.6-1.7/1.9m)	none			X
5.3.5	Excepted circuits (lighting, undervoltage, UPS, etc.)	None			X
5.4	Devices for switching off for prevention of unexpected start-up (disconnect of 5.3.2, 3.17 and 5.6)	Disconnect of cord	X		
5.5	Devices for disconnecting electrical equipment (see 5.3, 5.3.2 and 5.6)	Power cord	X		
5.6	Protection against unauthorized, inadvertent and/or mistaken connection (see 5.4, 5.5 and 5.3.2 d)	Described in manual	X		
6	<u>Protection against electric Shock</u>		-	-	-
6.1	General		-	-	-
6.2	Protection against direct contact		-	-	-
6.2.1	General (see 6.2, IEC 60364-4 and EN 60529 IP4X/XXB)	see below	-	-	-

Clause	Requirements	Comments	OK	Fail	N/A
6.2.2	Protection by enclosures (general > IP4X; a) opened by tool and without disconnect > IP2X inside; b) disconnect with interlock > IP2X inside; c) without tool and without disconnect > IP2X and interlock for barrier)	General >IP2X	X		
6.2.3	Protection by insulation of live parts (completely covered)	Cables, switches are sufficiently isolated	X		
6.2.4	Protection against residual voltage (60V/5sec or 60µC/1sec or IP2X)	Ok, no residual voltage 0V at 5 sec	X		
6.2.5	Protection by barriers (see 412.2 of IEC 60364-4-41)	non conductive barriers are provided , 42 VDC max	X		
6.2.6	Protection by placing out of reach or protection by obstacles (see 412.4 and 412.3 of IEC 60364-4-41)	None			X
6.3	Protection against indirect contact		-	-	-
6.3.1	General (see 3.27, 6.3.2 to 6.3.3)	see below	-	-	-
6.3.2	Measures to prevent the occurrence of a hazardous touch voltage		-	-	-
6.3.2.1	General	see below	-	-	-
6.3.2.2	Protection by use of class II equipment or by equivalent insulation	Class III equipment			X
6.3.2.3	Protection by electrical separation	42 VDC max	X		
6.3.2.4	Supply system design	Car battery, 42 VDC max	X		

Clause	Requirements	Comments	OK	Fail	N/A
6.3.3	Protection by automatic disconnection of supply	None			X
6.4	Protection by the use of PELV		-	-	-
6.4.1	General requirements (25/60V and 6/15 etc.)	42Vdc from battery	X		
6.4.2	Sources for PELV	See above	X		
7	<u>Protection of Equipment</u>		-	-	-
7.1	General		-	-	-
7.2	Overcurrent protection		-	-	-
7.2.1	General	Limited to battery	-	-	-
7.2.2	Supply conductor (data for installation protection device)	Spot check performed in provided diagram, OK	X		
7.2.3	Power circuits (7.2.10, neutral conductor, etc.)	Limited to battery	X		
7.2.4	Control circuits (connection to safety ground)	OK	X		
7.2.5	Socket outlets and their associated conductors (for each socket outlet)	None			X
7.2.6	Local lighting circuits (unearthed conductor)	None			X
7.2.7	Transformers (EN 60742 and 7.2.10)	none			X
7.2.8	Location of overcurrent protective devices (conductor, reduction for less 3m and own duct)	none			X
7.2.9	Overcurrent protective devices (must readily available in country of use)				X
7.2.10	Rating and setting of overcurrent protective devices (as low as possible)				X

Clause	Requirements	Comments	OK	Fail	N/A
7.3	Overload protection of motors (more than 0.5kW, each live conductor, more than 2kW for heavy duty, restart not possible)	Motor used for feeding the wire	X		
7.4	Abnormal temperature protection (heater protection)	No abnormal temp. expected			X
7.5	Protection against supply interruption or voltage reduction and subsequent restoration (undervoltage device, restart not possible)	Restart not possible	X		
7.6	Motor overspeed protection (see 9.4.2)	see 7.3, motor speed is controlled, failure mode simulated, no hazard recorded	X		
7.7	Earth fault/residual current protection (see 6.3)	not needed			X
7.8	Phase sequence protection	DC only			X
7.9	Protection against overvoltage due to lightning and to switching surge	none			X
8	<u>Equipotential Bonding</u>		-	-	-
8.1	General		-	-	-
8.2	Protective bonding circuit		-	-	-
8.2.1	General (figure 3, all stress, etc.)	Ok	X		
8.2.2	Protective conductors (15.2.2, same size than live conductor)	same size as live conductor	X		
8.2.3	Continuity of the protective bonding circuit (doors, hinges etc. need conductor, except for PELV etc.).	considered	X		
8.2.4	Exclusion of switching devices from the protective bonding circuit	None			X

Clause	Requirements	Comments	OK	Fail	N/A
8.2.5	Parts that need not be connected to the protective bonding circuit (insulation failure unlikely, 50x50mm ²)	None			X
8.2.6	Interruption of the protective bonding circuit (metallic connector housing)	None			X
8.2.7	Protective conductor connecting points (60417-IEC-5019 or green-and-yellow, PE only for supply terminal)	identified with conductors connected to battery	X		
8.3	Bonding to the protective bonding circuit for operational purposes (insulation failure and EMI)		-	-	-
8.3.1	General (see 8.3.2 and 8.3.3)	see below	-	-	-
8.3.2	Bonding to the protective circuit	Ok	X		
8.3.3	Bonding to a common reference potential	not relevant for safety			X
9	<u>Control Circuits and Control Functions</u>		-	-	-
9.1	Control circuits		-	-	-
9.1.1	Control circuit supply (transformer, except for <3kW, less than two controls etc.)	SELV	X		
9.1.2	Control circuit voltages (< = 250V)	24 / 42vdc	X		
9.1.3	Protection (7.2.4 and 7.2.10)	See 7.2.4 and 7.2.10	X		
9.1.4	Connection of control devices (7.2.4 etc.)	See 7.2.4	X		
9.2	Control functions		-	-	-
9.2.1	Start functions (9.2.5.2)	Start by energizing	X		

Clause	Requirements	Comments	OK	Fail	N/A
9.2.2	Stop functions (category 0, 1, and 2 etc.)	The provided OFF is Category 0.	X		
9.2.3	Operating modes (separate action for mode selector functions etc.)	one mode only.	X		
9.2.4	Suspension of safeguards (hold-to-run, speed limiting, range of motion)	no suspension of safeguards possible			X
9.2.5	Operation		-	-	-
9.2.5.1	General (interlock see 9.3)	Ok	X		
9.2.5.2	Start (safeguard in place, interlocks with sequential starting ...)	Ok	X		
9.2.5.3	Stop (category depends on risk assessment based on EN 1050 ...)	Cat. 0 stop provided, see 9.2.2.	X		
9.2.5.4	Emergency operations (emergency stop, emergency switching off)		-	-	-
9.2.5.4.1	General (see 11.3.4)	No EMO provided			X
9.2.5.4.2	Emergency stop (category 0/1 stop, see 9.2.5.3, 9.2.2)	Cat. 0 stop	X		
9.2.5.4.3	Emergency switching off (see IEC 60364-4-46, 6.2.6)	None			X
9.2.5.5	Monitoring of command actions (for hazardous movement)	None			X
9.2.5.6	Hold-to-run controls (continuous actuation)	Trigger at grip	X		
9.2.5.7	Two-hand control (type I, II, and III...)	None			X
9.2.5.8	Enabling device (position 1/2/3)	None			X
9.2.6	Combined start and stop controls (for secondary function only)	None			X

Clause	Requirements	Comments	OK	Fail	N/A
9.2.7	Cableless control		-	-	-
9.2.7.1	General	None			X
9.2.7.2	Control limitation	None			X
9.2.7.3	Stop (see annex B)				X
9.2.7.4	Serial data communication	None			X
9.2.7.5	Use of more than one operator control station	one control station			X
9.2.7.6	Battery-powered operator control stations	None			X
9.3	Protective interlocks		-	-	-
9.3.1	Restoration of interlocked safeguards (no automatic start...)	None			X
9.3.2	Overtravel limits (interruption of power circuit...)	None			X
9.3.3	Operation of auxiliary functions (sensors...)	None			X
9.3.4	Interlocks between different operations and for contrary motions (interlock against contrary motion)	None			X
9.3.5	Reverse current braking (time function is not possible...)	None			X
9.4	Control functions in case of failure		-	-	-
9.4.1	General requirements (protective device, proven techniques, redundancy, functional tests...)	see below	-	-	-

Clause	Requirements	Comments	OK	Fail	N/A
9.4.2	Measures to minimize risk in the event of failure		-	-	-
9.4.2.1	Use of proven circuit techniques and components (one terminal, de-energizing for stop, positive open operation, design...)	See 9.3.1	X		
9.4.2.2	Provisions for redundancy (on-line, off-line...)	See 9.3.1	X		
9.4.2.3	Use of diversity (combination of open and closed contacts, different components, electrical and non-electrical systems...)	None			X
9.4.2.4	Functional tests (automatic or manually (19.2 and 20.7)...))	functional tests performed with test setup, OK	X		
9.4.3	Protection against maloperation due to earth faults, voltage interruptions and loss of circuit continuity		-	-	-
9.4.3.1	Earth faults (8.2, 9.1.4, ...)	See 8.1 and 9.1.4	X		
9.4.3.2	Voltage interruptions (7.5...)	See 7.5	X		
9.4.3.3	Loss of circuit continuity	None			X
10	<u>Operator Interface and Machine mounted Control Devices</u>		-	-	-
10.1	General		-	-	-
10.1.1	General device requirements (IEC 60073 and IEC 60447)	Ok	X		

Clause	Requirements	Comments	OK	Fail	N/A
10.1.2	Location and mounting (>= 0.6m...)	Ok, by manufacturer statement,	X		
10.1.3	Protection (IP54 or IP55, EN 60529...)	Ok, for industrial environment, IP X2	X		
10.1.4	Position sensors (no damage...)	none			X
10.1.5	Portable and pendant control stations	None			X
10.2	Push-buttons		-	-	-
10.2.1	Colors (table 2, red and yellow!...)	Push button colors are compliant.	X		
10.2.2	Markings (IEC 60417, EN 50099...)	markings comply with the standard	X		
10.3	Indicator lights and displays		-	-	-
10.3.1	Modes of use (red, yellow, green!...)	compliant	X		
10.3.2	Colors (EN 50099...)	See above	X		
10.3.3	Flashing lights (immediate action...)	None			X
10.4	Illuminated push-buttons (table 2 and 3...)	None			X
10.5	Rotary control devices (rotation...)	None			X
10.6	Start devices (inadvertent operation...)	compliant	X		
10.7	Devices for emergency stop		-	-	-
10.7.1	Location (see 9.2.7.3)	None			X

Clause	Requirements	Comments	OK	Fail	N/A
10.7.2	Types (push-button, pull-cord, and pedal-operated)	None			X
10.7.3	Restoration of normal function after emergency stop	None			X
10.7.4	Actuators (red and yellow)	none			X
10.7.5	Local operation of the supply disconnecting device to effect emergency stop (disconnecting device based on 5.3.2 a), b) or c); color see 10.7.4)	None			X
10.8	Devices for emergency switching off	None	-	-	-
10.9	Displays	None			X
11	<u>Electronic Equipment</u>	Not safety relevant.			X
12	<u>Controlgear: location, mounting and enclosures</u>		-	-	-
12.1	General requirements		-	-	-
12.2	Location and mounting		-	-	-
12.2.1	Accessibility and maintenance (0.4-2.0m, see 14.4.5)	Ok by manufacturer declaration, addressed at final installation.	X		
12.2.2	Physical separation or grouping (power circuits, associated control circuits, others)	Ok	X		
12.2.3	Heating effects (limits...)	Ok	X		
12.3	Degrees of protection (at least IP22 for enclosures of controlgear, see EN 60529...)	Ok for intended use, IP 22 of enclosure and connectors	X		

Clause	Requirements	Comments	OK	Fail	N/A
12.4	Enclosures, doors and openings (doors <= 0.9m, no openings between liquids and electrical devices...)	OK	X		
12.5	Access to controlgear (see 481.2.4 of IEC 60364-4-81, 0.7m x 2.0m...)	OK	X		
13	<u>Conductors and Cables</u>		-	-	-
13.1	General requirements (EN 60439-1...)	see below	-	-	-
13.2	Conductors (table 4, not less than 0.5mm ² ,...)	Table 4 is considered	X		
13.3	Insulation (PVC, 2000V test voltage, 500V for PELV, see IEC 60364-4-41, class III equipment...)	All cables/wire are UL listed, additional insulation (sleeving) is provided	X		
13.4	Current-carrying capacity in normal service (table 4, table 5, and C2...)	Table 4 and 5 are considered	X		
13.5	Conductor and cable voltage drop (<= 5%...)	not safety relevant			X
13.6	Minimum cross-sectional area (table 6...)	Table 6 is considered	X		
13.7	Flexible cables		-	-	-
13.7.1	General (table C.4...)	Ok,	X		
13.7.2	Mechanical rating (15 N/mm ² ...)	Not used for moving part			X

Clause	Requirements	Comments	OK	Fail	N/A
13.7.3	Flexible cables (table 7, see clause 44 of IEC 60621-3)	Ok	X		
13.8	Collector wires, collector bars and slip-ring assemblies		-	-	-
13.8.1	Protection against direct contact (see 412.2.2 of IEC 60364-4-41)	finger safe	X		
13.8.2	Protective conductor circuit	None			X
13.8.3	Protective conductor current collectors	None			X
13.8.4	Removable current collectors with a disconnecter function (see 8.2.6)	None			X
13.8.5	Clearances in air (see 2.5 of IEC 60664-1)	Ok, by visual check	X		
13.8.6	Creepage distances (see 2.5 of IEC 60664-1)	Ok, by visual check	X		
13.8.7	Conductor system sectioning	None			X
13.8.8	Construction and installation of collector wire , collector bar systems and slip-ring assemblies	Ok, by visual check	X		
14	<u>Wiring Practices</u>		-	-	-
14.1	Connections and routing		-	-	-
14.1.1	General requirements (loosening, 13.2, one terminal, correspond with schematics, no solder, EN 60947-7-1, no cross overs...)	OK	X		

Clause	Requirements	Comments	OK	Fail	N/A
14.1.2	Conductor and cable runs (from terminal to terminal, no strain to termination, ...)	Ok, by visual check	X		
14.1.3	Conductors of different circuits (insulation for highest voltage, separation of live conductors before disconnect or marked with different color...)	Separated as long as possible highest voltage cables used, additional sleeving provided	X		
14.2	Identification of conductors		-	-	-
14.2.1	General requirements (IEC 60757 for color code, green-and-yellow for safety ground only (14.2.2)...))	Color code followed	X		
14.2.2	Identification of the protective conductor (60417-IEC-5019 symbol or green-and-yellow...)	Symbol and color used	X		
14.2.3	Identification of the neutral conductor (light blue (3.1.2 of IEC 60446)...))	No neutral conductor			X
14.2.4	Identification of other conductors (black > power, red > control, orange > interlock...)	Black: power circuit	X		
14.3	Wiring inside enclosures (IEC 60332-1, 12.2.1, 8.2.3...)	OK	X		
14.4	Wiring outside enclosures	depends on installation site	-	-	-
14.4.1	General requirements (individual glands, bushings, ...)	Not part of this evaluation			X
14.4.2	External ducts (14.5, ...)	none			X

Clause	Requirements	Comments	OK	Fail	N/A
14.4.3	Connection to moving elements of the machine (13.2, flexible conduit, 25mm, no metallic conduits, ...)	No wiring which to be connected to moving part is in the scope of this evaluation			X
14.4.4	Interconnection of devices on the machine (no in series connection of devices...)	None			X
14.4.5	Plug/socket combinations (safety ground first, > 16A must be locked, identification, see 6.2.4 and IEC 60309-1...)	None			X
14.4.6	Dismantling for shipment (protected, ...)	Ok	X		
14.4.7	Additional conductors (spare conductors)	None			X
14.5	Ducts, connection boxes and other boxes		-	-	-
14.5.1	General requirements (no edges, IP33, separation from liquids...)	Ok	X		
14.5.2	Percentage fill of ducts	Ok, by visual check	X		
14.5.3	Rigid metal conduit and fittings (corrosion...)	Subject to the installation			X
14.5.4	Flexible metal conduit and fittings	Subject to the installation			X
14.5.5	Flexible non-metallic conduit and fittings	Subject to the installation			X
14.5.6	Cable trunking systems	None			X
14.5.7	Machine compartments and cable trunking systems	None			X

Clause	Requirements	Comments	OK	Fail	N/A
14.5.8	Connection boxes and other boxes (see 12.3)	None			X
14.5.9	Motor connection boxes	Motors are not part of this evaluation	X		
15	<u>Electric Motors and associated Equipment</u>		-	-	-
15.1	General requirements (EN 60034-1, 7.3, 7.6, 7.2, 5.3, 5.4, 5.5, 7.5, 7.6, 9.4, 12...)	SELV motor used.	X		
15.2	Motor enclosure (EN 60034-5, IP23...)	OK	X		
15.3	Motor dimensions (IEC 60072-1, IEC 60072-2...)	OK	X		
15.4	Motor mounting and compartments (EN 60034-1, guarding...)	OK	X		
15.5	Criteria for motor selection (EN 60034-1, IEC 60146, ...)	OK			
15.6	Protective devices for mechanical brakes	no brake			X
16	<u>Accessories and Lightning</u>		-	-	-
16.1	Accessories (socket-outlets based on EN 60309-1, see 6.4, 7.2, 7.3, 5.3.5...)	no lighting, no accessories			X
16.2	Local lightning of the machine and equipment		-	-	-
16.2.1	General (see 8.2.2, 4.4.2...)	None			X

Clause	Requirements	Comments	OK	Fail	N/A
16.2.2	Supply ($\leq 50V$, 250V, one source like transformer, separate overcurrent protection, factory lighting, 7.2.6...)	See above			X
16.2.3	Protection (7.2.6...)	See above			X
16.2.4	Fittings (lampholders based on IEC, ...)	See above			X
17	<u>Marking, warning signs and reference designations</u>		-	-	-
17.1	General	Ok	X		
17.2	Warning signs (60417-2-IEC-5036, no disconnect, ...)	None	X		
17.3	Functional identification (IEC 60417, ISO 7000...)	Clearly identified	X		
17.4	Marking of control equipment (name, mark, ratings, IEC 61082...)	Will be provided, copy of nameplate is checked	X		
17.5	Reference designation (IEC 61346-1...)	Ok	X		
18	<u>Technical Documentation</u>	Cover by Machinery Directive			X
19	<u>Testing and verification</u>	<ul style="list-style-type: none"> Hipot 2120 VDC for 1min each phase to ground, OK. Ground Continuity @ 25A at various dead metal parts, $<0.1 \text{ Ohm}$, OK. Noise, 74dB(A) 	X		

Clause	Requirements	Comments	OK	Fail	N/A
Annex B	Inquiry Form (Annex B of EN 60204-1) (for information between supplier and user only) <ul style="list-style-type: none">· Name of manufacturer:· Name of end user, if applicable:· Order number, if applicable:· Type/Model of machine:· Serial number:	not applied (informative)			X

END OF TEST REPORT