IA – CERTIFICATE

(Annual review required by MASC covered by an additional letter)
(Revision 2- Update & Review)

IN TERMS OF REGULATION 21.17.2 OF THE MINERALS ACT (INCORPORATION THE MINE HEALTH AND SAFETY ACT) AND REGULATION 9 (1) OF THE ELECTRICAL MACHINERY REGULATIONS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT

Ex – Type Examination	
Certificate number:	**MASC M/11-014X**
Equipment:	Intrinsically Safe Battery for Use in Flameproof Enclosures
Serial No:	(See "Conditions of Certification")
Applicant:	NAUTITECH MINING SYSTEMS PTY LTD
Address:	Unit 3/9 Packard Avenue Castle Hill 2154 NSW Australia
Manufacturer:	NAUTITECH MINING SYSTEMS PTY LTD
Address:	Unit 3/9 Packard Avenue Castle Hill 2154 NSW Australia

DESCRIPTION:

The Intrinsically safe Battery apparatus is intended for installation where the outputs are only intrinsically safe when the external connected system power sources are de-energised, and either the isolation switch assembly contacts are open or the isolation switch assembly is disconnected or the shutdown inputs are not driven.

The apparatus consists of a nickel cadmium battery using six (6) or ten (10) cells and protective components limiting the maximum current and energy available at the connections to prevent spark ignition. The complete assembly is housed in a rectangular mild steel cup and fully encapsulated. Connections to external circuits are made with flying cables and wires from the enclosure, each connection is distinguished by colour coding of the emerging cables and wires.

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The type of the battery is indicated by CT11164[XX].

XX	Designation	General rating and Interconnection Description
01	Standard	8.2V unit with flying leads.
02	Standard with interconnection PCB	8.2V unit with interface PCB incorporating terminals / plugs and sockets. Flying leads used with no internal connections to PCB.
03	12V for C7 application	12V unit with Interface PCB. All internal circuits connected via internal connections. No flying leads used.
04	12V with internal charger	12V unit with Interface PCB. All internal circuits connected via internal connections. No flying leads used.
05	Mini Loader interconnection	8.2V unit with Interface PCB. All internal circuits connected via internal connections. No flying leads used.

MARKING

ITACS Marking remains applicable.

Additional MASC marking:

I.A. No: MASC M/11-014X

COMPLIANCE:

The unit / system as described above and in MASC letter 11-014 R2 is hereby certified "Explosion Protected" Ex ia I or [Ex ia] I (-20°C<Tamb<60°C) and is suitable for use in hazardous locations as stated below and as tested, assessed and inspected in accordance with the relevant requirements of SANS/IEC Standards:

The evaluation was conducted according to the requirements of:

i) **SANS/IEC 60079-0 : 2009 (Edition 4) "General Requirements";**
ii) **SANS/IEC 60079-1 : 2009 (Edition 4) "Equipment protection by flameproof enclosures "d"**
iii) **SABS IEC 60079-11:1999 "Equipment protection by intrinsic safety "i";**

Location	Zone 1	Underground (incl. coal dust).
Hazard Frequency	---	Intermittent as could occur under normal operating conditions in hazardous area
Environment	Group I	Methane and coal dust
Limiting Temperature	150°C	Mining
Ambient Temperature	-20°C to +60°C	

The use of apparatus in hazardous locations is subject to the following provisions as applicable, which shall be adhered to:

iv) SANS 10086 requirements;
v) Any conditions mentioned in the above report;
vi) Codes of Practice enforced in terms of Regulations 21.17.2 of Minerals Act, by Chief Inspector of Mines;
vii) Any restrictions and conditions enforced by Chief Inspectors of Mines, Principal Inspector (Group I equipment) of Chief Inspector of Factories (Group II equipment);
viii) Any relevant requirements of the MHS Act or the OHS Act.

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SPECIAL CONDITIONS OF SAFE USE (X):

1. The following parameters are to be taken into account during installation:

When the external connected system power sources are de-energised, and either the isolate switch assembly contacts are open or the isolate switch assembly is disconnected or the shutdown inputs are open circuited or the shutdown inputs are not driven, the connecting flying cables and wires from the Intrinsically Safe Battery apparatus have the following intrinsic safety entity parameters:

For the type CT11164[01], CT11164[02] and CT11164[05] types:

	Uo	Io	Co	Lo	Ui	Ii	Ci	Li
Charging Connection	22mV	20µA	1F	20mH	9V	Internally Limited	0F	0H
Power Output	37mV	50µA	0.4F	10mH	9V	Internally Limited	0F	0H
Data Port	0V	0A	*	*	24V	Internally Limited	100nF	0H
Control Inputs	9V	25mA	113µF	500µH	9V	Internally Limited	0F	0H
Shutdown Inputs**	9V*	25mA	113µF	500µH	9V	Internally Limited	0F	0H

*No practical limit, no electrical output from internal optical isolation.

For the type CT11164[03] and CT11164[04] types, covered by this Issue of the certificate:

	Uo	Io	Co	Lo	Ui	Ii	Ci	Li
Charging Connection	22mV	20µA	1F	20mH	15V	Internally Limited	0F	0H
Power Output	<1.1V	<200µA	40µF	10mH	15V	Internally Limited	0F	0H
Shutdown Inputs	15V	44mA	14µF	200mH	15V	Internally Limited	0F	0H

The isolate connection is specifically for connection to switch contacts, and cable parameters are specified for this connection.

	Max. Cable Capacitance	Max. Cable Inductance
Isolate Connection Cable	0.1 µF	200µH

The Intrinsically Safe Battery shall otherwise be treated as associated apparatus with no intrinsic safety outputs and installed using a separate means of explosion protection when in the hazardous area. All connections to the Intrinsically Safe Battery apparatus are limited by Um=24 V on all connections.

2. It is a condition of safe use that the Intrinsically Safe Battery terminal blocks / plugs and sockets be located and installed in accordance with intrinsic safety wiring practice, especially considering clearance distances from other circuits / terminals blocks.
3. It is a condition of safe use that the Intrinsically Safe Battery Apparatus must be installed in accordance with drawing No 1116-001.
4. It is a condition of safe use that the isolate switch assembly and connecting wiring must be installed in accordance with drawing No. 1116-001.
5. It is a condition of safe use that the thickness of insulation between the isolation switch assembly wiring conductors and any other conductor must be at least 0.5mm.
6. It is a condition of safe use that the isolate switch cable connector must be protected from invasion of foreign material when not mated.
7. It is a condition of safe use that the Intrinsically Safe Battery apparatus including connecting cable to the isolation switch and the isolation switch assembly shall be installed in one enclosure that provides ingress protection to IP55 and mechanical protection against a 20 Joule impact.

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8. It is a condition of safe use that the exposed surface of the encapsulation shall be inspected and the Intrinsically Safe battery apparatus rejected for service if signs of physical wear or damage are evident.

CONDITIONS FOR THE APPLICATION OF THE INTRINSICALLY SAFE BATTERY IN A FLAMEPROOF ENCLOSURE

1. Additional compliance with the safety requirements of relevant industrial standards must be investigated and achieved.
2. The battery is for use in group I flameproof enclosures only.
3. The battery pack was estimated to dissipate a maximum of 11.5W of power under normal conditions, for temperature rise considerations of the flameproof enclosure.
4. Compliance with installation rules according to the relevant codes of practice and manufacturers recommendations shall be achieved.
5. Installation of the battery pack shall maintain sufficient segregation between intrinsically safe and non-intrinsically safe circuits.
6. The ambient temperature limitation of the certified battery shall not be exceeded considering the internal temperature rise and expected external ambient temperatures of the enclosure.
7. The flameproof enclosure should be marked (inside or outside) clearly indicating the manufacturer and the type of battery pack used. In addition, the information should appear in the instructions for the flameproof enclosure.
8. The warning label “WARNING – DO NOT OPEN WHEN AN EXPLOSIVE GAS ATMOSPHERE IS PRESENT” should be applied to the flameproof enclosure.
9. The battery pack must be securely mounted (e.g. held in place by a purpose designed clip or bracket).
10. During installation, the segregation around the battery pack and its associated connections and circuitry shall comply with the requirements of table 1 of AS/NZS 60079.7:2006 (Ed 4.0), according to the highest voltage applicable around the relevant parts.
11. Safety devices shall ensure that the charging rate of 1.25A maximum is not exceeded.
12. The flameproof enclosure internal free volume is limited to a minimum of 25 liters. For smaller enclosures the charge current shall be cut off when the battery / cells are overcharged (voltage) according to the battery / cell manufacturer’s ratings.
13. All safety devices must form safety related parts of a control system. It is the responsibility of the installer / Flameproof enclosure designer to assess that the safety integrity of the control system is consistent with the level of safety required by AS/NZS 60079.1:2007 (Ed 6.0).

CONDITIONS OF MANUFACTURE

It is a condition of manufacture that each apparatus is to be capable of withstanding a test voltage of not less than 500 Volts 50 Hz applied between all connections and case for a period not less than 1 minute.

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Mining And Surface Certification (Pty) Ltd Reg No: 2015/021934/07
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CONDITIONS OF CERTIFICATION:

1. This Certificate remains valid based on a three yearly review covered by an official MASC letter.
2. The apparatus must be additionally marked with the MASC marking details above.
3. This letter of approval only covers the equipment as certified above and does not include any scheduled additions or variations/amendments/new issues to the certificate(s), made after the above date.
4. The equipment does not need to be re-tested when used on the conditions and with such restrictions as prescribed by ITACS and in this approval.
5. The ITACS certification must remain valid.
6. The extent of the requirements in the ARP 0108 (or regulations) and SANS 10108 on the certification of the equipment must remain unchanged.
7. The Ex quality assurance notification for the equipment must remain valid.

F du Toit
TECHNICAL SPECIALIST

Mining And Surface Certification

This document is issued based on Mining And Surface Certification's Standard Contract terms and conditions available on request.

While every endeavour is made to ensure that a test / assessment is representative and accurately performed, and that a report is accurate in the quoted results and conclusions drawn from the test / assessment, MASC or its members/employees shall in no way be liable for any error made in carrying out the test / assessment or for any erroneous statement, whether in fact or in opinion, contained in a report issued pursuant to a test / assessment.

MASC takes no responsibility for any non-conformances, exclusions or any results / assessments not in compliance with the standards. By marking the equipment in accordance with the documentation / standard, the manufacturer attests on his own responsibility that the equipment has been constructed in accordance with the applicable requirements of the relevant standards and that the routine verifications and routine tests have been successfully completed and the product complies with the documentation and standard(s).

This document is only for use and application in South Africa. It is issued based on National interpretations and accepted practises.

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