TEST & ASSESSMENT REPORT
RAPPORT D'ESSAIS & D'EVALUATION

N°: 143728-690608 **Version : 00**

Subject / Objet	**Component for use in Explosive Atmosphere (ATEX)** **Tests and assessment according to standards:** **EN 60079-0:2012 + A11:2013 / EN 60079-11:2012**
Applicant / Demandeur	VITZROCELL Chusa-ro 235-35 Sinam-myun, Yesan-gun Chungcheongnam-do, 32417 South Korea
Manufacturer / Fabricant	VITZROCELL Chusa-ro 235-35 Sinam-myun, Yesan-gun Chungcheongnam-do, 32417 South Korea
Apparatus under test / Appareil testé	
Product / Produit	Lithium primary battery
Trade mark / Marque commerciale	VITZROCELL or TEKCELL
Type	SB-A01, SB-AA11, SB-C02, SB-D02, SC-C01, SC-D01, SC-DD01 or SW-D03
Model / Modèle	-
Serial number(s) / Numéro(s) de série	-
Conclusion	Compliant
Number of pages / nombre de pages	33 pages

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2017-02-15

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2017-02-15

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S.A.S au capital de 15.745.984 €
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Version	Date	Author / Rédacteur	Modification
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REPORT CONTENT / CONTENU DU RAPPORT

1. GENERAL INFORMATION

TYPE OF ASSESSMENT

Equipment	☐	Component	☒	Protective system	☐
EC or EU type examination certificate (Annex III)		Initial issue	☒	New issue # …	☐
Voluntary type examination certificate		Initial issue	☐	New issue # …	☐
EC or EU unit verification certificate (Annex IX)		☐			
Product verification (Annex V)		☐			
Conformity to type (Annex VI)		☐			

DESCRIPTION OF EQUIPMENT, PROTECTIVE SYSTEM OR COMPONENT

The component is a Lithium primary battery which can be integrated as power supply in an intrinsic safety certified equipment.

RANGE DETAILS

N/A

DETAILS OF CHANGES OF RELEVANT ATEX CERTIFICATE

N/A, initial issue.

PRINCIPLE OF THE ASSESSMENT OF CHANGES

N/A, initial issue.

TEST NOT PERFORMED BY THE LCIE (SUB-CONTRACTING AND/OR TESTS RESULTS ACCEPTANCE)

N/A, all tests were performed by the LCIE.

MARKING & COPY OF MARKING PLATE

Full marking:
VITZROCELL or TEKCELL
Address: …
Type: SB-A01, SB-AA11, SB-C02, SB-D02, SC-C01, SC-D01, SC-DD01 or SW-D03
Serial number: …
Year of construction: …
Ⓔx II 1 G
Ex ia IIB Ga
LCIE 17 ATEX 3004 U
U_o:… ; I_o:… (1)
(1): completed with maximum open-circuit voltage and maximum short-circuit current in clause 12.

Reduced marking:
VITZROCELL or TEKCELL
Type: SB-A01, SB-AA11, SB-C02, SB-D02, SC-C01, SC-D01, SC-DD01 or SW-D03
Ⓔx II 1 G
Ex ia IIB Ga
LCIE 17 ATEX 3004 U

The marking is printed on plastic label:
VITZROCELL or TEKCELL
Type: SB-A01, SB-AA11, SB-C02, SB-D02, SC-C01, SC-D01, SC-DD01 or SW-D03
Ⓔx II 1 G Ex ia IIB Ga LCIE xx ATEX xxx U

Product Name	Marking		
	Brand name	Type of cell	
SB-A01	Tekcell	SB-A01	II 1 G Ex ia IIB Ga LCIE xx ATEX xxxx U
SB-AA11	Tekcell	SB-AA11	II 1 G Ex ia IIB Ga LCIE xx ATEX xxxx U
SB-C02	Tekcell	SB-C02	II 1 G Ex ia IIB Ga LCIE xx ATEX xxxx U
SB-D02	Tekcell	SB-D02	II 1 G Ex ia IIB Ga LCIE xx ATEX xxxx U
SC-C01	Vitzrocell	SC-C01	II 1 G Ex ia IIB Ga LCIE xx ATEX xxxx U
SC-D01	Vitzrocell	SC-D01	II 1 G Ex ia IIB Ga LCIE xx ATEX xxxx U
SC-DD01	Vitzrocell	SC-DD01	II 1 G Ex ia IIB Ga LCIE xx ATEX xxxx U
SW-D03	Tekcell	SW-D03	II 1 G Ex ia IIB Ga LCIE xx ATEX xxxx U

Copy of marking plate

RATINGS

Type	Brand name	Electrolyte	Operating ambient temperature	U_n (V)	U_{open} (V)	I_{sc} (A)
SB-A01	Tekcell	Li-$SOCl_2$	-55°C to 85°C	3.6	3.71	1.9
SB-AA11	Tekcell	Li-$SOCl_2$	-55°C to 85°C	3.6	3.69	3
B-C02	Tekcell	Li-$SOCl_2$	-55°C to 85°C	3.6	3.67	5.5
SB-D02	Tekcell	Li-$SOCl_2$	-55°C to 85°C	3.6	3.67	5.5
SC-C01	Vitzrocell	Li-SO_2Cl_2	-20°C to 100°C	3.91	3.93	10.78
SC-D01	Vitzrocell	Li-SO_2Cl_2	-20°C to 100°C	3.91	3.94	21.8
SC-DD01	Vitzrocell	Li-SO_2Cl_2	-20°C to 100°C	3.91	3.94	31.2
SW-D03	Tekcell	Li-$SOCl_2$	-55°C to 85°C	3.6	3.67	13.5

Ingress protection (IP) : Not required

Classification of installation and use : Stationary

Rated ambient temperature range (°C) : N/A

Rated service temperature range (°C) for Ex components : See ratings

SCHEDULE OF LIMITATIONS

a) The cells are suitable for temperature class T4 at ambient temperature range from -20°C to +40°C.
b) The maximum open-circuit voltage (U_{open}), the maximum short-circuit current (I_{sc}) and the temperature class of the cells were determined at ambient temperature range from -20°C to +40°C. When using within an intrinsic safety certified apparatus, conformity of the cell shall be verified as regards the requirements of EN 60079-0:2012 + A11:2013 and EN 60079-11:2012 standards.
c) The cells type SC-C01, SC-D01, SC-DD01 and SW-D03 cannot be replaced in the explosive atmosphere.

ROUTINE TESTS

Not required.

DESCRIPTIVE DOCUMENTS

N°	Title	Reference	Rev.	Date	Pages	Items
1	Technical file	1. Catalog, 2. MSDS	00	2016/10/11	46	10
2	Cell/Battery SB-A01 Operating instructions	-	2016 ver.	-	3	1
3	Cell/Battery SB-AA11 Operating instructions	-	2016 ver.	-	3	1
4	Cell/Battery SB-C02 Operating instructions	-	2016 ver.	-	3	1
5	Cell/Battery SB-D02 Operating instructions	-	2016 ver.	-	3	1
6	Cell/Battery SC-C01 Operating instructions	-	2016 ver.	-	3	1
7	Cell/Battery SC-D01 Operating instructions	-	2016 ver.	-	3	1
8	Cell/Battery SC-DD01 Operating instructions	-	2016 ver.	-	3	1
9	Cell/Battery SW-D03 Operating instructions	-	2016 ver.	-	3	1

2. EXTR STANDARD EN 60079-0:2012 + A11:2013 AND EN 60079-11:2012

EN 60079-0:2012 + A11:2013			
Clause	Requirement – Test	Result – Remark	Verdict
1	Scope		
2	Normative references		
3	Terms and definitions		
4	Equipment grouping	Group IIB component.	Pass
4.1	Group I	Not Group I equipment	N/A
4.2	Group II	Group IIB component.	Pass
4.3	Group III	Not Group III equipment	N/A
4.4	Equipment for a particular explosive atmosphere	Not intended for particular explosive atmosphere.	N/A
5	Temperatures		
5.1	Environmental influences		
5.1.1	Ambient temperature	Operating ambient temperature: From -55°C to +85°C for types: SB-A01, SB-AA11, SB-C02, SB-D02, SW-D03. From -20°C to +100°C for types: SC-C01, SC-D01, SC-DD01.	Pass
5.1.2	External source of heating or cooling	No external source of heating or cooling.	N/A
5.2	Service temperature	Not required as Ex component. Conformity of the cells shall be verified as regards the requirements of EN 60079-0:2012 and EN 60079-11:2012 standards when using within an intrinsic safety certified apparatus. Only ambient temperature range is defined as in §5.1.1.	N/A
5.3	Maximum surface temperature		

EN 60079-0:2012 + A11:2013			
Clause	Requirement – Test	Result – Remark	Verdict
5.3.1	Determination of maximum surface temperature	Not required as Ex component. Conformity of the cells shall be verified as regards the requirements of EN 60079-0:2012 and EN 60079-11:2012 standards when using within an intrinsic safety certified apparatus	N/A
5.3.2	Limitation of maximum surface temperature		
5.3.2.1	Group I electrical equipment	Not considered.	N/A
5.3.2.2	Group II electrical equipment	Not considered.	N/A
5.3.2.3	Group III electrical equipment		
5.3.2.3.1	Maximum surface temperature determined without a dust layer	Not considered.	N/A
5.3.2.3.2	Maximum surface temperature with respect to dust layers	Not considered.	N/A
5.3.3	Small component temperature for Group I or Group II electrical equipment	Not considered.	N/A

6	Requirements for all electrical equipment		
6.1	General	In complement to the requirements of this standards, the equipment complies with the requirements of EN 60079-11:2012 standard.	Pass
6.2	Mechanical strength of equipment	Excluded by Table 1 of EN 60079-11:2012	N/A
6.3	Opening times	Excluded by Table 1 of EN 60079-11:2012	N/A
6.4	Circulating currents in enclosures (e.g. of large electrical machines)	Excluded by Table 1 of EN 60079-11:2012	N/A
6.5	Gasket retention	Excluded by Table 1 of EN 60079-11:2012	N/A
6.6	Electromagnetic and ultrasonic energy radiating equipment		
6.6.1	Radio frequency sources	No radio frequency source.	N/A
6.6.2	Lasers or other continuous wave sources	No laser or other continuous wave source.	N/A
6.6.3	Ultrasonic sources	No ultrasonic source.	N/A
7	Non-metallic enclosures and non-metallic parts of enclosures		
7.1	General		

EN 60079-0:2012 + A11:2013			
Clause	Requirement – Test	Result – Remark	Verdict
7.1.1	Applicability	Excluded by Table 1 of EN 60079-11:2012	N/A
7.1.2	Specification of materials		
7.1.2.1	General	Excluded by Table 1 of EN 60079-11:2012	N/A
7.1.2.2	Plastic materials	Excluded by Table 1 of EN 60079-11:2012	N/A
7.1.2.3	Elastomers	Excluded by Table 1 of EN 60079-11:2012	N/A

7.2	Thermal endurance		
7.2.1	Tests for thermal endurance	Excluded by Table 1 of EN 60079-11:2012	N/A
7.2.2	Material selection	Excluded by Table 1 of EN 60079-11:2012	N/A
7.2.3	Alternative qualification of elastomeric sealing O-rings	Excluded by Table 1 of EN 60079-11:2012	N/A

7.3	Resistance to light	Excluded by Table 1 of EN 60079-11:2012	N/A

7.4	Electrostatic charges on external non-metallic materials		
7.4.1	Applicability	Not required as Ex component. Conformity of the cells shall be verified as regards the requirements of EN 60079-0:2012 and EN 60079-11:2012 standards when using within an intrinsic safety certified apparatus	N/A
7.4.2	Avoidance of a build-up of electrostatic charge on Group I or Group II electrical equipment	Not considered.	N/A
7.4.3	Avoidance of a build-up of electrostatic charge on equipment for Group III	Not equipment of Group III.	N/A

7.5	Accessible metal parts	Not considered, see §7.4.1.	N/A

8	Metallic enclosures and metallic parts of enclosures

8.1	Material composition	Not considered, see §7.4.1.	N/A

8.2	Group I	Not equipment of Group I	N/A

8.3	Group II	Not considered, see §7.4.1.	N/A

8.4	Group III	Not equipment of Group III.	N/A

9	Fasteners

EN 60079-0:2012 + A11:2013			
Clause	Requirement – Test	Result – Remark	Verdict
9.1	General	Excluded by Table 1 of EN 60079-11:2012	N/A
9.2	Special fasteners	Excluded by Table 1 of EN 60079-11:2012	N/A
9.3	Holes for special fasteners		
9.3.1	Thread engagement	Excluded by Table 1 of EN 60079-11:2012	N/A
9.3.2	Tolerance and clearance	Excluded by Table 1 of EN 60079-11:2012	N/A
9.3.3	Hexagon socket set screws	Excluded by Table 1 of EN 60079-11:2012	N/A
10	Interlocking devices	Excluded by Table 1 of EN 60079-11:2012	N/A
11	Bushings	Excluded by Table 1 of EN 60079-11:2012	N/A
12	Materials used for cementing	Excluded by Table 1 of EN 60079-11:2012	N/A
13	Ex Components		
13.1	General	The cells are assessed as Ex component in accordance with the requirements given in Annex B of this standards and EN 60079-11:2012 standard.	Pass
13.2	Mounting	Not required as Ex component. Conformity of the cells shall be verified as regards the requirements of EN 60079-0:2012 and EN 60079-11:2012 standards when using within an intrinsic safety certified apparatus	N/A
13.3	Internal mounting	Not required as Ex component. Conformity of the cells shall be verified as regards the requirements of EN 60079-0:2012 and EN 60079-11:2012 standards when using within an intrinsic safety certified apparatus	N/A
13.4	External mounting	Not required as Ex component. Conformity of the cells shall be verified as regards the requirements of EN 60079-0:2012 and EN 60079-11:2012 standards when using within an intrinsic safety certified apparatus	N/A
13.5	Ex Component certificate	The requirements of this clause were considered during assessment.	Pass
14	Connection facilities and termination compartments		

EN 60079-0:2012 + A11:2013			
Clause	Requirement – Test	Result – Remark	Verdict
14.1	General	Excluded by Table 1 of EN 60079-11:2012	N/A
14.2	Termination compartment	Excluded by Table 1 of EN 60079-11:2012	N/A
14.3	Type of protection	Excluded by Table 1 of EN 60079-11:2012	N/A
14.4	Creepage and clearance	Excluded by Table 1 of EN 60079-11:2012	N/A
15	Connection facilities for earthing or bonding conductors		
15.1	Equipment requiring earthing		
15.1.1	Internal	Excluded by Table 1 of EN 60079-11:2012	N/A
15.1.2	External	Excluded by Table 1 of EN 60079-11:2012	N/A
15.2	Equipment not requiring earthing	Excluded by Table 1 of EN 60079-11:2012	N/A
15.3	Size of conductor connection	Excluded by Table 1 of EN 60079-11:2012	N/A
15.4	Protection against corrosion	Excluded by Table 1 of EN 60079-11:2012	N/A
15.5	Secureness of electrical connections	Excluded by Table 1 of EN 60079-11:2012	N/A
16	Entries into enclosures		
16.1	General	Excluded by Table 1 of EN 60079-11:2012	N/A
16.2	Identification of entries	Excluded by Table 1 of EN 60079-11:2012	N/A
16.3	Cable glands	Excluded by Table 1 of EN 60079-11:2012	N/A
16.4	Blanking elements	Excluded by Table 1 of EN 60079-11:2012	N/A
16.5	Thread adapters	Excluded by Table 1 of EN 60079-11:2012	N/A

EN 60079-0:2012 + A11:2013			
Clause	Requirement – Test	Result – Remark	Verdict
16.6	Temperature at branching point and entry point	Excluded by Table 1 of EN 60079-11:2012	N/A
16.7	Electrostatic charges of cable sheaths	Excluded by Table 1 of EN 60079-11:2012	N/A
17	Supplementary requirements for rotating machines		
17.1	Ventilation		
17.1.1	Ventilation openings	Excluded by Table 1 of EN 60079-11:2012	N/A
17.1.2	Materials for external fans	Excluded by Table 1 of EN 60079-11:2012	N/A
17.1.3	Cooling fans of rotating machines		
17.1.3.1	Fans and fan hoods	Excluded by Table 1 of EN 60079-11:2012	N/A
17.1.3.2	Construction and mounting of the ventilating systems	Excluded by Table 1 of EN 60079-11:2012	N/A
17.1.3.3	Clearances for the ventilating system	Excluded by Table 1 of EN 60079-11:2012	N/A
17.1.4	Auxiliary motor cooling fans	Excluded by Table 1 of EN 60079-11:2012	N/A
17.1.5	Ventilating fans		
17.1.5.1	Applicability	Excluded by Table 1 of EN 60079-11:2012	N/A
17.1.5.2	General	Excluded by Table 1 of EN 60079-11:2012	N/A
17.1.5.3	Fan and fan hoods	Excluded by Table 1 of EN 60079-11:2012	N/A
17.1.5.4	Construction and mounting	Excluded by Table 1 of EN 60079-11:2012	N/A
17.1.5.5	Clearances for rotating parts	Excluded by Table 1 of EN 60079-11:2012	N/A
17.2	Bearings	Excluded by Table 1 of EN 60079-11:2012	N/A
18	Supplementary requirements for switchgear		
18.1	Flammable dielectric	Excluded by Table 1 of EN 60079-11:2012	N/A
18.2	Disconnectors	Excluded by Table 1 of EN 60079-11:2012	N/A
18.3	Group I – Provisions for locking	Excluded by Table 1 of EN 60079-11:2012	N/A
18.4	Doors and covers	Excluded by Table 1 of EN 60079-11:2012	N/A

EN 60079-0:2012 + A11:2013			
Clause	Requirement – Test	Result – Remark	Verdict
19	Supplementary requirements for fuses	Excluded by Table 1 of EN 60079-11:2012	N/A
20	Supplementary requirements for plugs, sockets outlets and connectors		
20.1	General	Excluded by Table 1 of EN 60079-11:2012	N/A
20.2	Explosive gas atmospheres	Excluded by Table 1 of EN 60079-11:2012	N/A
20.3	Explosive dust atmospheres	Excluded by Table 1 of EN 60079-11:2012	N/A
20.4	Energized plugs	Excluded by Table 1 of EN 60079-11:2012	N/A
21	Supplementary requirements for luminaires		
21.1	General	Excluded by Table 1 of EN 60079-11:2012	N/A
21.2	Covers for luminaires of EPL Mb, EPL Gb, or EPL Db	Excluded by Table 1 of EN 60079-11:2012	N/A
21.3	Covers for luminaires of EPL Gc or EPL Dc	Excluded by Table 1 of EN 60079-11:2012	N/A
21.4	Sodium lamps	Excluded by Table 1 of EN 60079-11:2012	N/A
22	Supplementary requirements for caplights and handlights		
22.1	Group I caplights	Not a caplight or handlight.	N/A
22.2	Group II and Group III caplights and handlights	Not a caplight or handlight.	N/A
23	Apparatus incorporating cells and batteries		
23.1	General	The requirements in §23.2 to §23.12 were considered.	Pass

EN 60079-0:2012 + A11:2013			
Clause	Requirement – Test	Result – Remark	Verdict
23.2	Batteries	Excluded by Table 1 of EN 60079-11:2012.	N/A
23.3	Cell types	Cells of type Li-$SOCl_2$: Voltage considered for spark ignition: 3.9 V Voltage considered for surface temperature : 3.6 V Cells of type Li-SO_2Cl_2: Voltage considered for spark ignition: 4.1 V Voltage considered for surface temperature : 3.91 V	Pass
23.4	Cells in a battery	Primary cell, not a battery.	N/A
23.5	Ratings of batteries	Not required as Ex component. Conformity of the cells shall be verified as regards the requirements of EN 60079-0:2012 and EN 60079-11:2012 standards when using within an intrinsic safety certified apparatus	N/A
23.6	Interchangeability	Not required as Ex component. Conformity of the cells shall be verified as regards the requirements of EN 60079-0:2012 and EN 60079-11:2012 standards when using within an intrinsic safety certified apparatus	N/A
23.7	Charging of primary batteries	Not required as Ex component. Conformity of the cells shall be verified as regards the requirements of EN 60079-0:2012 and EN 60079-11:2012 standards when using within an intrinsic safety certified apparatus	N/A
23.8	Leakage	No leakage detected during test of cell.	Pass
23.9	Connections	Not required as Ex component. Conformity of the cells shall be verified as regards the requirements of EN 60079-0:2012 and EN 60079-11:2012 standards when using within an intrinsic safety certified apparatus	N/A
23.10	Orientation	Not required as Ex component. Conformity of the cells shall be verified as regards the requirements of EN 60079-0:2012 and EN 60079-11:2012 standards when using within an intrinsic safety certified apparatus	N/A
23.11	Replacement of cells or batteries	Not required as Ex component. Conformity of the cells shall be verified as regards the requirements of EN 60079-0:2012 and EN 60079-11:2012 standards when using within an intrinsic safety certified apparatus	N/A
23.12	Replaceable battery pack	Not replaceable battery pack.	N/A

EN 60079-0:2012 + A11:2013			
Clause	Requirement – Test	Result – Remark	Verdict
24	Documentation	Technical file and instruction notice give a full description of apparatus safety aspects.	Pass
25	Compliance of prototype or sample with documents	Sample compliant with technical file.	Pass
26	Type tests		
26.1	General	Only test of batteries according to EN 60079-11:2012 was performed.	Pass
26.2	Test configuration	Test performed in accordance with the configuration requirements of EN 60079-11.	Pass
26.3	Tests in explosive test mixtures	No test in explosive test mixture is necessary.	N/A
26.4	Tests of enclosures		
26.4.1	Order of tests		
26.4.1.1	Metallic enclosures, metallic parts of enclosures and glass parts of enclosures	Excluded by Table 1 of EN 60079-11:2012	N/A
26.4.1.2	Non-metallic enclosures or non-metallic parts of enclosures	Excluded by Table 1 of EN 60079-11:2012	N/A
26.4.1.2.1	Group I electrical equipment	Excluded by Table 1 of EN 60079-11:2012	N/A
26.4.1.2.2	Group II and Group III electrical equipment	Excluded by Table 1 of EN 60079-11:2012	N/A
26.4.2	Resistance to impact	Excluded by Table 1 of EN 60079-11:2012	N/A
26.4.3	Drop test	Not required as Ex component. Conformity of the cells shall be verified as regards the requirements of EN 60079-0:2012 and EN 60079-11:2012 standards when using within an intrinsic safety certified apparatus	N/A
26.4.4	Acceptance criteria	Excluded by Table 1 of EN 60079-11:2012	N/A
26.4.5	Degree of protection (IP) by enclosures		
26.4.5.1	Test procedure	Not required as Ex component. Conformity of the cells shall be verified as regards the requirements of EN 60079-0:2012 and EN 60079-11:2012 standards when using within an intrinsic safety certified apparatus	N/A
26.4.5.2	Acceptance criteria	Not considered	N/A
26.5	Thermal tests		
26.5.1	Temperature measurement		

EN 60079-0:2012 + A11:2013			
Clause	Requirement – Test	Result – Remark	Verdict
26.5.1.1	General	Not considered, see also §5.2.	N/A
26.5.1.2	Service temperature	Not considered, see also §5.2.	N/A
26.5.1.3	Maximum surface temperature	Not considered, see also §5.2.	N/A
26.5.2	Thermal shock test	Excluded by Table 1 of EN 60079-11:2012	N/A
26.5.3	Small component ignition test (Group I and Group II)		
26.5.3.1	General	Not considered.	N/A
26.5.3.2	Procedure	Not considered.	N/A
26.5.3.3	Acceptance criteria	Not considered.	N/A
26.6	Torque test for bushings		
26.6.1	Test procedure	Excluded by Table 1 of EN 60079-11:2012	N/A
26.6.2	Acceptance criteria	Excluded by Table 1 of EN 60079-11:2012	N/A
26.7	Non-metallic enclosures or non-metallic parts of enclosures		
26.7.1	General	Excluded by Table 1 of EN 60079-11:2012	N/A
26.7.2	Test temperatures	Excluded by Table 1 of EN 60079-11:2012	N/A
26.8	Thermal endurance to heat	Excluded by Table 1 of EN 60079-11:2012	N/A
26.9	Thermal endurance to cold	Excluded by Table 1 of EN 60079-11:2012	N/A
26.10	Resistance to light		
26.10.1	Test procedure	Excluded by Table 1 of EN 60079-11:2012	
26.10.2	Acceptance criteria	Excluded by Table 1 of EN 60079-11:2012	N/A
26.11	Resistance to chemical agents for Group I electrical equipment	Excluded by Table 1 of EN 60079-11:2012	N/A
26.12	Earth continuity	Excluded by Table 1 of EN 60079-11:2012	N/A
26.13	Surface resistance test of parts of parts of enclosures of non-metallic materials	Not considered, see §7.4.1.	N/A
26.14	Measurement of capacitance		
26.14.1	General	Not considered, see §7.4.1.	N/A
26.14.2	Test procedure	Not considered, see §7.4.1.	N/A

EN 60079-0:2012 + A11:2013			
Clause	Requirement – Test	Result – Remark	Verdict
26.15	Verification of ratings of ventilating fans	No ventilating fan.	N/A
26.16	Alternative qualification of elastomeric sealing O-rings	Excluded by Table 1 of EN 60079-11:2012	N/A
27	Routine tests	No routine test required.	Pass
28	Manufacturer's responsibility		
28.1	Conformity with the documentation	Responsibility of the manufacturer.	N/A
28.2	Certificate	Responsibility of the manufacturer.	N/A
28.3	Responsibility for marking	Responsibility of the manufacturer.	N/A
29	Marking		
29.1	Applicability	The markings used comply with the requirement of this clause.	Pass
29.2	Location	The markings are visible on the enclosure.	Pass
29.3	General	The markings used comply with the requirement of this clause (see Marking plate part).	Pass
29.4	Ex marking for explosive gas atmospheres	The markings used comply with the requirement of this clause (see Marking plate part).	Pass
29.5	Ex marking for explosive dust atmospheres	Group II apparatus.	N/A
29.6	Combined types (or levels) of protection	Not used.	N/A
29.7	Multiple types of protection	Not used.	N/A
29.8	Ga equipment using two independent Gb types (or levels) of protection	Not used.	N/A

EN 60079-0:2012 + A11:2013			
Clause	Requirement – Test	Result – Remark	Verdict
29.9	Ex Components	The markings used comply with the requirement of this clause (see Marking plate part).	Pass
29.10	Small equipment and small Ex Components	Reduced marking can be used (see Marking plate part).	Pass
29.11	Extremely small equipment and extremely small Ex Components	Not an extremely small equipment.	N/A
29.12	Warning markings	No warning marking.	N/A
29.13	Alternate marking of equipment protection levels (EPLs)	Alternate marking is not used.	N/A
29.13.1	Alternate marking of type of protection for explosive gas atmospheres	Not used.	N/A
29.13.2	Alternate marking of type of protection for explosive dust atmospheres	Not used.	N/A
29.14	Cells and batteries	The cells will be verified as regard the requirements of this clause when using within an intrinsic safety certified apparatus (see specific condition).	N/A
29.15	Converter-fed electrical machines	Not a converter-fed electrical machine.	N/A
29.16	Examples of marking	Marking is in accordance with examples provided.	Pass
30	Instructions		
30.1	General	The manufacturer's notice includes following instructions: - Product marking. - Manufacturer address - Electrical parameters. - Ambient temperature range. - Standards list.	Pass
30.2	Cells and batteries	The cells will be verified as regard the requirements of this clause when using within an intrinsic safety certified apparatus (see specific condition).	N/A
30.3	Electrical machines	Not an electrical machine.	N/A
30.4	Ventilating fans	No ventilating fan.	N/A

EN 60079-0:2012 + A11:2013			
Clause	Requirement – Test	Result – Remark	Verdict
Annex A (Normative)	Supplementary requirements for cable glands		
A.1	General	Excluded by Table 1 of EN 60079-11:2012	N/A
A.2	Constructional requirements		
A.2.1	Cable sealing	Excluded by Table 1 of EN 60079-11:2012	N/A
A.2.2	Filling compounds	Excluded by Table 1 of EN 60079-11:2012	N/A
A.2.3	Clamping		
A.2.3.1	General	Excluded by Table 1 of EN 60079-11:2012	N/A
A.2.3.2	Group II or III cable glands	Excluded by Table 1 of EN 60079-11:2012	N/A
A.2.4	Lead-in of cable		
A.2.4.1	Sharp edges	Excluded by Table 1 of EN 60079-11:2012	N/A
A.2.4.2	Point of entry	Excluded by Table 1 of EN 60079-11:2012	N/A
A.2.5	Released by a tool	Excluded by Table 1 of EN 60079-11:2012	N/A
A.2.6	Fixing	Excluded by Table 1 of EN 60079-11:2012	N/A
A.2.7	Degree of protection	Excluded by Table 1 of EN 60079-11:2012	N/A
A.3	Type tests		
A.3.1	Tests of clamping of non-armoured and braided cables		
A.3.1.1	Cable glands with clamping by the sealing ring	Excluded by Table 1 of EN 60079-11:2012	N/A
A.3.1.2	Cable glands with clamping by filling compound	Excluded by Table 1 of EN 60079-11:2012	N/A
A.3.1.3	Cable glands with clamping by means of a clamping device	Excluded by Table 1 of EN 60079-11:2012	N/A
A.3.1.4	Tensile test	Excluded by Table 1 of EN 60079-11:2012	N/A
A.3.1.5	Mechanical strength	Excluded by Table 1 of EN 60079-11:2012	N/A
A.3.2	Tests of clamping of armoured cables		
A.3.2.1	Tests of clamping where the armourings are clamped by a device within the gland	Excluded by Table 1 of EN 60079-11:2012	N/A
A.3.2.1.1	Tensile test	Excluded by Table 1 of EN 60079-11:2012	N/A
A.3.2.1.2	Mechanical strength	Excluded by Table 1 of EN 60079-11:2012	N/A
A.3.2.2	Tests of clamping where the armourings are not clamped by a device within the gland	Excluded by Table 1 of EN 60079-11:2012	N/A
A.3.3	Type test for resistance to impact	Excluded by Table 1 of EN 60079-11:2012	N/A
A.3.4	Test for degree of protection (IP) of cable glands	Excluded by Table 1 of EN 60079-11:2012	N/A
A.4	Marking		
A.4.1	Marking of cable glands	Excluded by Table 1 of EN 60079-11:2012	N/A
A.4.2	Marking of cable-sealing rings	Excluded by Table 1 of EN 60079-11:2012	N/A

EN 60079-0:2012 + A11:2013			
Clause	Requirement – Test	Result – Remark	Verdict
Annex B (Normative)	Requirements for Ex Components		
Table B.1	Clauses with which Ex Components shall comply	The requirements of this clause were considered during assessment.	Pass

Annex C (Informative)	Example of rig for resistance to impact test

Annex D (Informative)	Motors supplied by converters

Annex E (Informative)	Temperature rise testing of electric machines

Annex F (Informative)	Guideline flowchart for tests of non-metallic enclosures or non-metallic parts of enclosures (26.4)

EN 60079-11:2012			
Clause	Requirement – Test	Result – Remark	Verdict
1	Scope		
2	Normative references		
3	Terms and definitions		
4	Grouping and classification of intrinsically safe apparatus and associated apparatus	Ex ia IIB	Pass
5	Levels of protection and ignition compliance requirements of electrical apparatus		
5.1	General	“ia” protection level is applied.	Pass
5.2	Level of protection "ia"	“ia” protection level is applied.	Pass
5.3	Level of protection "ib"	“ia” protection level is applied.	N/A
5.4	Level of protection "ic"	“ia” protection level is applied.	N/A
5.5	Spark ignition compliance	Spark ignition compliance of the cells was verified by using reference curves and tables of Annex A. In addition, its conformity shall be verified as regard the spark ignition test (see specific conditions) when using within an intrinsic safety certified apparatus.	Pass
5.6	Thermal ignition compliance		
5.6.1	General	According to tests in §10.5, the cells are suitable for temperature class T4 at ambient temperature range from -20°C to +40°C.	Pass
5.6.2	Temperature for small components for Group I and Group II	Not considered, see §5.6.1.	N/A
5.6.3	Wiring within intrinsically safe apparatus for Group I and Group II	Not considered.	N/A
5.6.4	Tracks on printed circuit boards for Group I and Group II	Not considered.	N/A
5.6.5	Intrinsically safe apparatus and component temperature for Group III	Not considered.	N/A
5.7	Simple apparatus	It is not a simple apparatus.	N/A

EN 60079-11:2012			
Clause	Requirement – Test	Result – Remark	Verdict
6	Apparatus construction		
6.1	Enclosures		
6.1.1	General	The cells will be verified as regard the requirements of this clause when using within an intrinsic safety certified apparatus (see specific condition).	N/A
6.1.2	Enclosures for Group I or Group II apparatus		
6.1.2.1	General	The cells will be verified as regard the requirements of this clause when using within an intrinsic safety certified apparatus (see specific condition).	N/A
6.1.2.2	Apparatus complying with Table 5	Not considered, see §6.1.1.	N/A
6.1.2.3	Apparatus complying with Annex F	Not used.	N/A
6.1.3	Enclosures for Group III apparatus	Group II equipment.	N/A
6.2	Facilities for connection of external circuits		
6.2.1	Terminals	No terminal involved in intrinsic safety.	N/A
6.2.2	Plugs and sockets	No plug or socket.	N/A
6.2.3	Determination of maximum external inductance to resistance ratio (*Lo/Ro*) for resistance limited power source	Lo/Ro not used.	N/A
6.2.4	Permanently connected cable	No permanently connected cable.	N/A
6.2.5	Requirements for connections and accessories for IS apparatus when located in the non-hazardous area	No such a construction.	N/A
6.3	Separation distances		
6.3.1	General	Not considered as the intrinsic safety of cells does not depend on separation distances. Short-circuit conditions were applied on the cells during battery tests in §10.5 below.	N/A
6.3.2	Separation of conductive parts	Not considered.	N/A
6.3.2.1	Distances according to Table 5	Not considered.	N/A
6.3.2.2	Distances according to Annex F	Not considered.	N/A
6.3.3	Voltage between conductive parts	Not considered.	N/A
6.3.4	Clearance	Not considered.	N/A
6.3.5	Separation distances through casting compound	Not considered.	N/A
6.3.6	Separation distances through solid insulation	Not considered.	N/A
6.3.7	Composite separations	Not considered.	N/A

EN 60079-11:2012			
Clause	Requirement – Test	Result – Remark	Verdict
6.3.8	Creepage distance	Not considered.	N/A
6.3.9	Distance under coating	Not considered.	N/A
6.3.10	Requirements for assembled printed circuit boards	Not considered.	N/A
6.3.11	Separation by earthed screens	Not considered.	N/A
6.3.12	Internal wiring	Not considered.	N/A
6.3.13	Dielectric strength requirement	Not considered.	N/A
6.3.14	Relays	Not considered.	N/A

6.4	Protection against polarity reversal	The cells will be verified as regard the requirements of this clause when using within an intrinsic safety certified apparatus (see specific condition).	N/A

6.5	Earth conductors, connections and terminals	No such a construction.	N/A

6.6	Encapsulation		
6.6.1	General	Not used.	N/A
6.6.2	Encapsulation used for the exclusion of explosive atmospheres	Not used.	N/A

7	Components on which intrinsic safety depends

7.1	Rating of components	The intrinsic safety of cells does not depends on other component. Only §7.4 is considered.	N/A

7.2	Connectors for internal connections, plug-in cards and components	No connector.	N/A

7.3	Fuses	No fuse.	N/A

7.4	Primary and secondary cells and batteries		
7.4.1	General	The cells will be verified as regard the requirements of this clause when using within an intrinsic safety certified apparatus (see specific condition).	N/A
7.4.2	Battery construction	Sealed cells used.	Pass
7.4.3	Electrolyte leakage and ventilation	No electrolyte leakage during battery tests (refer to Measurement section for details).	Pass
7.4.4	Cell voltages	Refer to Measurement section for details.	Pass

EN 60079-11:2012			
Clause	Requirement – Test	Result – Remark	Verdict
7.4.5	Internal resistance of cell or battery	Refer to Measurement section for details.	Pass
7.4.6	Batteries in equipment protected by other types of protection	The cells will be verified as regard the requirements of this clause when using within an intrinsic safety certified apparatus (see specific condition).	N/A
7.4.7	Batteries used and replaced in explosive atmospheres	The cells will be verified as regard the requirements of this clause when using within an intrinsic safety certified apparatus (see specific condition).	N/A
7.4.8	Batteries used but not replaced in explosive atmospheres	In order to ensure spark ignition compliance, the cells type SC-C01, SC-D01, SC-DD01 and SW-D03 cannot be replaced in the explosive atmosphere. Otherwise, the cells will be verified as regard the requirements of this clause when using within an intrinsic safety certified apparatus (see specific condition).	Pass
7.4.9	External contacts for charging batteries	Not rechargeable cell.	N/A

7.5	Semiconductors		
7.5.1	Transient effects	No semiconductor used for safety, §7.5 is not considered.	N/A
7.5.2	Shunt voltage limiters	Not considered.	N/A
7.5.3	Series current limiters	Not considered.	N/A

7.6	Failure of components, connections and separations	Short-circuit conditions were taken into account for assessment.	Pass

7.7	Piezo-electric devices	No piezo-electric device used.	N/A

7.8	Electrochemical cells for the detection of gases	No such a construction.	N/A

8	Infallible components, infallible assemblies of components and infallible connections on which intrinsic safety depends

8.1	Level of Protection “ic”	It is not an “ic” level of protection.	N/A

8.2	Mains transformers		
8.2.1	General	No infallible transformer, §8.2 is not considered.	N/A
8.2.2	Protective measures	Not considered.	N/A
8.2.3	Transformer construction	Not considered.	N/A
8.2.4	Transformer type tests	Not considered.	N/A
8.2.5	Routine test of mains transformers	Not considered.	N/A

EN 60079-11:2012			
Clause	Requirement – Test	Result – Remark	Verdict
8.3	Transformers other than mains transformers	No infallible transformer used.	N/A
8.4	Infallible windings		
8.4.1	Damping windings	No infallible winding used, §8.4 is not considered.	N/A
8.4.2	Inductors made by insulated conductors	Not considered.	N/A
8.5	Current-limiting resistors	No current-limiting resistor used.	N/A
8.6	Capacitors		
8.6.1	Blocking capacitors	No capacitor used for safety purpose, 8.6 is not considered.	N/A
8.6.2	Filter capacitors	Not considered.	N/A
8.7	Shunt safety assemblies		
8.7.1	General	No such assembly used for safety purpose.	N/A
8.7.2	Safety shunts	Not considered.	N/A
8.7.3	Shunt voltage limiters	Not considered.	N/A
8.8	Wiring, printed circuit board tracks, and connections	No wiring, printed circuit board track or connection.	N/A
8.9	Galvanically separating components		
8.9.1	General	No galvanically separating component used.	N/A
8.9.2	Isolating components between intrinsically safe and non-intrinsically safe circuits	Not considered.	N/A
8.9.3	Isolating components between separate intrinsically safe circuits	Not considered.	N/A
9	Supplementary requirements for specific apparatus		
9.1	Diode safety barriers		
9.1.1	General	No such barrier used, §9.1 is not considered.	N/A
9.1.2	Construction		
9.1.2.1	Mounting	Not considered.	N/A
9.1.2.2	Facilities for connection to earth	Not considered.	N/A
9.1.2.3	Protection of components	Not considered.	N/A

EN 60079-11:2012			
Clause	Requirement – Test	Result – Remark	Verdict
9.2	FISCO apparatus	The equipment is not such an apparatus and does not use such communication bus.	N/A
9.3	Handlights and caplights	Apparatus does not contains light.	N/A
10	Type verifications and type tests		
10.1	Spark ignition test		
10.1.1	General	Spark ignition tests were not carried out. Annex A is used.	N/A
10.1.2	Spark test apparatus	Not considered.	N/A
10.1.3	Test gas mixtures and spark test apparatus calibration current		
10.1.3.1	Explosive test mixtures suitable for tests with a safety factor of 1.0 and calibration current of the spark test apparatus	Not considered.	N/A
10.1.3.2	Explosive test mixtures suitable for tests with a safety factor of 1.5 and calibration current of the spark test apparatus	Not considered.	N/A
10.1.4	Tests with the spark test apparatus		
10.1.4.1	Circuit test	Not considered.	N/A
10.1.4.2	Safety factors	Not considered.	N/A
10.1.5	Testing considerations		
10.1.5.1	General	Not considered.	N/A
10.1.5.2	Circuits with both inductance and capacitance	Not considered.	N/A
10.1.5.3	Circuits using shunt short-circuit (crowbar) protection	Not considered.	N/A
10.1.5.4	Results of spark test	Not considered.	N/A
10.2	Temperature tests	Not considered, see §5.2 of EN 60079-0.	N/A
10.3	Dielectric strength tests	Not considered.	N/A
10.4	Determination of parameters of loosely specified components	No such component used.	N/A
10.5	Tests for cells and batteries		
10.5.1	General	Requirements respected during test.	Pass

EN 60079-11:2012			
Clause	Requirement – Test	Result – Remark	Verdict
10.5.2	Electrolyte leakage test for cells and batteries	Ten test samples were subjected to short circuit until discharged. The samples were placed vertically over a piece of blotting paper for a period of at least 24 h after the applications of test. Refers to Measurement section for results.	Pass
10.5.3	Spark ignition and surface temperature of cells and batteries	Spark ignition testing was not carried out. Internal resistance of cell was determined from the measurement of open circuit voltage and short-circuit current of cells. The maximum surface temperature of cells was determined at the same time as tests in §10.5.2 above. Cells were heated up to the required maximum ambient temperature in a climatic chamber. Temperature of cells was measured by using thermocouple mounted on the metal surface (plastic decoration removed) in the middle of cell cylindrical body. Refers to Measurement section for results.	Pass
10.5.4	Battery container pressure tests	Safety does not depend on container strength.	N/A
10.6	Mechanical tests		
10.6.1	Casting compound	Casting compound is not used.	N/A
10.6.2	Determination of the acceptability of fuses requiring encapsulation	No fuse.	N/A
10.6.3	Partitions	Partition is not used.	N/A
10.7	Tests for intrinsically safe apparatus containing piezoelectric devices	Equipment without piezoelectric device.	N/A
10.8	Type tests for diode safety barriers and safety shunts	No such elements used.	N/A
10.9	Cable pull test	Apparatus without cable.	N/A
10.10	Transformer tests	No infallible transformer.	N/A
10.11	Optical isolators tests		
10.11.1	General	No such isolator used, §10.11 is not considered.	N/A
10.11.2	Thermal conditioning, dielectric and carbonisation test	Not considered.	N/A
10.11.2.1	Overload test at the receiver side	Not considered.	N/A
10.11.2.2	Overload test at the transmitter side	Not considered.	N/A
10.11.2.3	Thermal conditioning and dielectric strength test	Not considered.	N/A

EN 60079-11:2012			
Clause	Requirement – Test	Result – Remark	Verdict
10.11.2.4	Carbonisation test		
10.11.2.4.1	Receiver side	Not considered.	N/A
10.11.2.4.2	Transmitter side	Not considered.	N/A
10.11.3	Dielectric and short-circuit test	Not considered.	N/A
10.11.3.1	General	Not considered.	N/A
10.11.3.2	Pre-test dielectric	Not considered.	N/A
10.11.3.3	Short-circuit current test	Not considered.	N/A
10.11.3.4	Current limited short-circuit current test	Not considered.	N/A
10.11.3.5	Dielectric strength test	Not considered.	N/A
10.12	Current carrying capacity of infallible printed circuit board connections	No such a construction.	N/A
11	Routine verifications and tests		
11.1	Routine tests for diode safety barriers		
11.1.1	Completed barriers	No safety barrier.	N/A
11.1.2	Diodes for 2-diode “ia” barriers	No safety barrier.	N/A
11.2	Routine tests for infallible transformers	No infallible transformer used.	N/A
12	Marking		
12.1	General	The marking used complies with the requirements of this clause (see Marking plate part)	Pass
12.2	Marking of connection facilities	Marking of electrode is visible. No risk forecasted.	Pass
12.3	Warning markings	No warning marking.	N/A
12.4	Examples of marking	Marking is in accordance with examples provided.	Pass
13	Documentation	The manufacturer’s instruction notice complies with the requirements of this clause.	Pass
Annex A (Normative)	Assessment of intrinsically safe circuits		
A.1	Basic criteria	Refer to Measurement section for details.	Pass
A.2	Assessment using reference curves and tables	Refer to Measurement section for details.	Pass
A.3	Examples of simple circuits	Considered for assessment.	Pass

EN 60079-11:2012			
Clause	Requirement – Test	Result – Remark	Verdict
A.4	Permitted reduction of effective capacitance when protected by a series resistance	Not considered.	N/A

Annex B (Normative)	Spark test apparatus for intrinsically safe circuits		
B.1	Test methods for spark ignition		
B.1.1	Principle	Spark ignition tests were not carried out. Annex A was used.	N/A
B.1.2	Apparatus	Not considered.	N/A
B.1.3	Calibration of spark test apparatus	Not considered.	N/A
B.1.4	Preparation and cleaning of tungsten wires	Not considered.	N/A
B.1.5	Conditioning a new cadmium disc	Not considered.	N/A
B.1.6	Limitations of the apparatus	Not considered.	N/A
B.1.7	Modifications of test apparatus for use at higher currents	Not considered.	N/A

Annex C (Informative)	Measurement of creepage distances, clearances and separation distances through casting compound and through solid insulation

Annex D (Normative)	Encapsulation		
D.1	Adherence	Encapsulation is not used, annex D is not considered.	N/A
D.2	Temperature	Not considered.	N/A

Annex E (Informative)	Transient energy test

Annex F (Normative)	Alternative separation distances for assembled printed circuit boards and separation of components		
F.1	General	Annex F is not used and not considered.	N/A
F.2	Control of pollution access	Not considered.	N/A
F.3	Distances for printed circuit boards and separation of components		
F.3.1	Level of protection “ia” and “ib”	Not considered.	N/A
F.3.2	Level of protection “ic”	Not considered.	N/A

Annex G (Normative)	Fieldbus intrinsically safe concept (FISCO) – Apparatus requirements		
G.1	Overview	Apparatus does not include such bus, annex G is not considered.	N/A

EN 60079-11:2012			
Clause	Requirement – Test	Result – Remark	Verdict
G.2	Apparatus requirements		
G.2.1	General	Not considered.	N/A
G.2.2	FISCO power supplies		
G.2.2.1	General	Not considered.	N/A
G.2.2.2	Additional requirements of 'ia' and 'ib' FISCO power supplies	Not considered.	N/A
G.2.2.3	Additional requirements of 'ic' FISCO power supplies	Not considered.	N/A
G.3	FISCO field devices		
G.3.1	General	Not considered.	N/A
G.3.2	Additional requirements of 'ia' and 'ib' FISCO field devices	Not considered.	N/A
G.3.3	Additional requirement of 'ic' FISCO field devices	Not considered.	N/A
G.3.4	Terminator	Not considered.	N/A
G.3.5	Simple apparatus	Not considered.	N/A
G.4	Marking	Not considered.	N/A
G.4.1	Examples of marking	Not considered.	N/A

Annex H (Informative)	Ignition testing of semiconductor limiting power supply circuits

Measurement Section, including Additional Narrative Remarks (as deemed applicable)

1) Cell type SB-A01:

The following results were extracted from LCIE test report n°92959-585196 dated 2009-07-21.

Sample	U_{open} (V)	I_{sc} (A)	R_i (Ω)	T_a (°C)	T_{cell} (°C)	Leakage
1	3.71	1.9	1.952	32	103.2	No
2	3.71	-	-	32	111.1	No
3	3.71	-	-	32	110.7	No
4	3.71	-	-	32	109.7	No
5	3.71	1.63	2.276	23	96.7	No
6	3.71	-	-	23	99.6	No
7	3.71	-	-	23	102.7	No
8	3.71	-	-	23	105.2	No
9	3.71	1.7	2.182	23	98.3	No
10	3.71	-	-	23	101.2	No

Key: U_{open} = peak open circuit voltage; I_{sc} = peak short circuit current; R_i = internal resistance; T_a = test ambient temperature; T_{cell} = surface temperature of cell.

The maximum temperature of cell is 111.1°C measured at Ta = 32°C. The cell is suitable for temperature class T4 if the maximum ambient temperature Ta does not exceed 40°C.

According to Table A.1 of EN 60079-11:2012, for U ≤ 9 V, Group IIB with safety factor of 1.5, the maximum permitted current = 6 A. As I_{sc} = 1.9 A < 6 A, the cell SB-A01 complies with resistive spark ignition.

Internal capacitance and inductance of the cell are considered negligible.

2) Cell type SB-AA11:

The following results were extracted from LCIE test report n°113296 – 625086 dated 2012-04-18.

Cell	T_a (°C)	U_{open} (V)	I_{sc} (A)	R_i (Ω)	Temperature rise (°C)	Remark
SB-AA11	22	3.69	3	1.23	75	no electrolyte leakage

The maximum temperature of cell is 97°C measured at Ta = 22°C. The cell is suitable for temperature class T4 if the maximum ambient temperature Ta does not exceed 40°C.

According to Table A.1 of EN 60079-11:2012, for U ≤ 9 V, Group IIB with safety factor of 1.5, the maximum permitted current = 6 A. As I_{sc} = 3 A < 6 A, the cell SB-AA11 complies with resistive spark ignition.

Internal capacitance and inductance of the cell are considered negligible.

3) Cell type SB-D02:

The following results were extracted from LCIE test report n°94220-587934 dated 2009-09-07.

Sample	U_{open} (V)	I_{sc} (A)	R_i (Ω)	T_a (°C)	T_{cell} (°C)	Leakage
1	3.67	4.30	0.853	18.2	81.1	No
2	3.67	5.5	0.667	21.6	92.7	No
3	3.67	-	-	21.6	96.9	No
4	3.67	-	-	21.6	91.5	No
5	3.67	5.2	0.705	17.1	90.2	No
6	3.67	-	-	17.1	86.3	No
7	3.67	-	-	17.1	90.1	No
8	3.67	3.9	0.941	19.4	89.9	No
9	3.67	-	-	19.4	90.7	No
10	3.67	-	-	19.4	90.8	No

The maximum temperature of cell is 96.9°C measured at Ta = 21.6°C. The cell is suitable for temperature class T4 if the maximum ambient temperature Ta does not exceed 40°C.

According to Table A.1 of EN 60079-11:2012, for U ≤ 9 V, Group IIB with safety factor of 1.5, the maximum permitted current = 6 A. As I_{sc} = 5.5 A < 6 A, the cell SB-D02 complies with resistive spark ignition.

Internal capacitance and inductance of the cell are considered negligible.

4) Cell type SB-C02:

The following results were extracted from LCIE test report n°137599 – 677019 dated 2015-11-02.

Cell	T_a (°C)	U_{open} (V)	I_{sc} (A)	R_i (Ω)	Temperature rise (°C)	Remark
SB-C02	20	3.67	5.5	0.667	60	no electrolyte leakage

The maximum temperature of cell is 80°C measured at Ta = 20°C. The cell is suitable for temperature class T4 if the maximum ambient temperature Ta does not exceed 40°C.

According to Table A.1 of EN 60079-11:2012, for U ≤ 9 V, Group IIB with safety factor of 1.5, the maximum permitted current = 6 A. As I_{sc} = 5.5 A < 6 A, the cell SB-C02 complies with resistive spark ignition.

Internal capacitance and inductance of the cell are considered negligible.

5) Cell type SC-C01:

The following results were extracted from LCIE test report n°140177-682050 dated 2016-06-10.

Test results for cells without FUSE:

Sample	U_{open} (V)	I_{sc} (A)	R_i (Ω)	T_a (°C)	T_{cell} (°C)	Leakage
1	3.93	9.34	0.42	40.0	109.2	No
2	3.92	9.28	0.42	40.1	107.0	No
3	3.93	9.64	0.41	60.0	67.0	No
4	3.92	7.68	0.51	60.0	98.2	No
5	3.92	10.17	0.39	73.3	76.8	No
6	3.93	10.78	0.36	73.4	77.8	No
7	3.93	9.86	0.40	90.4	91.5	No
8	3.92	8.23	0.48	23.2	125.4	No
9	3.93	7.26	0.54	23.3	128.3	No
10	3.93	7.38	0.53	21.4	113.1	No

Test results for cells with FUSE:

Temperature rise of cells is less than 1°C for ambient temperature range from 20°C up to 92.0°C

No leakage of electrolyte after 24 h.

The maximum temperature of cell is 109.2°C measured at Ta = 40°C. The cell is suitable for temperature class T4 if the maximum ambient temperature Ta does not exceed 40°C.

The cell SC-C01 is not allowed to be replaced in hazardous area (see specific conditions), the spark ignition discharge at the terminals of a single cell does not require to be tested as U_{open} < 4.5 V. Otherwise, its conformity shall be verified as regards the requirements of EN 60079-0:2012 and EN 60079-11:2012 standards when using within an intrinsic safety certified apparatus.

Internal capacitance and inductance of the cell are considered negligible.

6) *Cells type SC-D01 and SC-DD01:*

The following results were extracted from LCIE test report n°135243 – 671537 dated 2015-06-16.

Cell with internal fuse :

Cell	T_a (°C)	U_{open} (V)	I_{sc} (A)	R_i (Ω)	Temperature rise (°C)	Remark
SC-D01	21	3.93	3.2*	1.80	< 1	no electrolyte leakage
SC-DD01	21	3.93	13.6*	0.29	< 1	no electrolyte leakage

* before destruction of fuse (less than 1s)

Cell without internal fuse :

Cell	T_a (°C)	U_{open} (V)	I_{sc} (A)	R_i (Ω)	Temperature rise (°C)	Remark
SC-D01	21	3.94	21.8*	0.18	< 1	no electrolyte leakage
SC-DD01	21	3.94	31.2*	0.12	< 1	no electrolyte leakage

* less than 1s before destruction of the cell

The temperature rise of the cell is less than 1°C. The cell is suitable for temperature class T4 if the maximum ambient temperature Ta does not exceed 40°C.

The cells SC-D01 and SC-DD01 are not allowed to be replaced in hazardous area (see specific conditions), the spark ignition discharge at the terminals of a single cell does not require to be tested as U_{open} < 4.5 V. Otherwise, their conformity shall be verified as regards the requirements of EN 60079-0:2012 and EN 60079-11:2012 standards when using within an intrinsic safety certified apparatus.

Internal capacitance and inductance of the cell are considered negligible.

7) *Cell type SW-D03:*

The following results were extracted from LCIE test report n°131934 - 665675 dated 2015-02-18.

Cell with internal fuse :

Cell	T_a (°C)	U_{open} (V)	I_{sc} (A)	R_i (Ω)	Temperature rise (°C)	Remark
SW-D03	21	3.66	< 6.5*	-	< 1	no electrolyte leakage

* before destruction of fuse (≈ 200 ms)

Cell without internal fuse :

Cell	T_a (°C)	U_{open} (V)	I_{sc} (A)	R_i (Ω)	Temperature rise (°C)	Remark
SW-D03	20	3.67	13.5*	0.272	8	no electrolyte leakage

* during 20s before destruction of the cell

The maximum temperature of cell is 28°C measured at Ta = 20°C. The cell is suitable for temperature class T4 if the maximum ambient temperature Ta does not exceed 40°C.

The cell SW-D03 is not allowed to be replaced in hazardous area (see specific conditions), the spark ignition discharge at the terminals of a single cell does not require to be tested as U_{open} < 4.5 V. Otherwise, its conformity shall be verified as regards the requirements of EN 60079-0:2012 and EN 60079-11:2012 standards when using within an intrinsic safety certified apparatus.

Internal capacitance and inductance of the cell are considered negligible.

3. ESSENTIAL HEALTH AND SAFETY REQUIREMENTS COMPLIANCE

		EN 60079-0	EN 60079-11		
EHSR	**Comment**	**2012**	**2012**	**Result - Remark**	**Verdict**
1.0.1	Integrated explosion safety	Covered	Covered	Covered by applied harmonised standard	**Pass**
1.0.2	Possible operating faults	Covered	Partially	Covered by applied harmonised standard	**Pass**
1.0.3	Checking and maintenace conditions	Covered	Partially	Covered by applied harmonised standard	**Pass**
1.0.4	Surrounding area conditions	Covered	Partially	Covered by applied harmonised standard	**Pass**
1.0.5	Marking	Covered	Partially	Covered by applied harmonised standard	**Pass**
1.0.6	Instructions	Covered	Partially	Covered by applied harmonised standard	**Pass**
1.1.1	Selection of materials	Covered	Partially	Covered by applied harmonised standard	**Pass**
1.1.2	Selection of materials	Covered		Covered by applied harmonised standard	**Pass**
1.1.3	Selection of materials	Covered		Covered by applied harmonised standard	**Pass**
1.2.1	Foreseeable lifetime	Covered	Partially	Covered by applied harmonised standard	**Pass**
1.2.2	Components	Covered	Partially	Covered by applied harmonised standard	**Pass**
1.2.3	Enclosed structures			Ex component, not considered.	**N/A**
1.2.4	Dust deposits	Covered	Partially	Covered by applied harmonised standard	**Pass**
1.2.5	Additional means of protection	Covered		Covered by applied harmonised standard	**Pass**
1.2.6	Safe opening	Covered	Partially	Covered by applied harmonised standard	**Pass**
1.2.7	Protection against other hazards	Covered		Covered by applied harmonised standard	**Pass**
1.2.8	Overloading	Covered	Partially	Covered by applied harmonised standard	**Pass**
1.2.9	Flameproof enclosure	Covered		Covered by applied harmonised standard	**Pass**
1.3.1	Different ignition sources	Covered	Partially	Covered by applied harmonised standard	**Pass**
1.3.2	Static electricity	Covered		Covered by applied harmonised standard	**Pass**
1.3.3	Stray electric and leakage currents	Covered		Covered by applied harmonised standard	**Pass**
1.3.4	Overheating	Covered		Covered by applied harmonised standard	**Pass**
1.3.5	Pressure compensation operations			The device does not contain pressure	**N/A**
1.4.1	External effects	Covered	Partially	Covered by applied harmonised standard	**Pass**
1.4.2	External effects	Covered	Partially	Covered by applied harmonised standard	**Pass**
1.5.1	Independant function of safety device			The device does not contain safety device	**N/A**
1.5.2	Safety device failure			The device does not contain safety device	**N/A**
1.5.3	Restart lockout of safety devices			The device does not contain safety device	**N/A**
1.5.4	Control and display units			The device does not contain control and display units	**N/A**
1.5.5	Devices with a measuring function			The device does not contain measuring device	**N/A**

		EN 60079-0	EN 60079-11		
EHSR	**Comment**	**2012**	**2012**	**Result - Remark**	**Verdict**
1.5.6	Measuring function device check			The device does not contain measuring device	**N/A**
1.5.7	Safety factor for measuring devices			The device does not contain measuring device	**N/A**
1.5.8	Software			No software.	**N/A**
1.6.1	Manual override			No manual override	**N/A**
1.6.2	Accumulated energy	Covered		Covered by applied harmonised standard	**Pass**
1.6.3	Power failure			Hazards arising from power failure is on the user responsibility	**N/A**
1.6.4	Connections	Covered		Covered by applied harmonised standard	**Pass**
1.6.5	Warning devices as parts of equipment			No warning device as part of the equipment	**N/A**
2.0.1	M1, Gr I	Covered		Group II	**N/A**
2.0.2	M2, Gr I	Covered		Group II	**N/A**
2.1.1	Cat. 1, Gr II	Covered	Covered	Group II, Category 1	**Pass**
2.1.2	Cat. 1, Gr II	Covered	Covered	Group II, Category 1	**Pass**
2.2.1	Cat. 2, Gr II	Covered	Covered	Group II, Category 1	**N/A**
2.2.2	Cat. 2, Gr II	Covered	Covered	Group II, Category 1	**N/A**
2.3.1	Cat. 3, Gr II	Covered	Covered	Group II, Category 1	**N/A**
2.3.2	Cat. 3, Gr II	Covered	Covered	Group II, Category 1	**N/A**
3	Protective systems			The device is not a protective system.	**N/A**