

Produkte

Products

Prüfbericht - Nr.: 17022377 002		Seite 1 von 17 Page 1 of 17	
Auftraggeber: Client:		EverExceed Industrial Company Limited Unit E, 3/F, Good Harvest Centre, 33 On Chuen Street, Fantling, New Territories, Hong Kong	
Gegenstand der Prüfung: Rechargeable Ni-Cd Battery Test Item:			
Bezeichnung: Identification:	SPL Series	Serien-Nr.: Serial No.:	N/A
Wareneingangs-Nr.: Receipt No.:	163088286	Eingangdatum: Date of receipt:	Oct 30, 2011
Prüfört: Testing location:	TÜV Rheinland (Shenzhen) Co., Ltd. 3&4 F, Cybio Technology Building No. 1, Langshan No. 2 Road South, 5th Industrial Area, High-Tech Industry Park North, Nanshan District, 518057 Shenzhen, P.R. China		
Prüfgrundlage: Test specification:	EN 62259-2:2004		
Prüfergebnis: Test Result:	Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n). The test item passed the test specification(s).		
Prüflaboratorium: Testing Laboratory:	TÜV Rheinland (Shenzhen) Co., Ltd. 3&4 F, Cybio Technology Building No. 1, Langshan No. 2 Road South, 5th Industrial Area, High-Tech Industry Park North, Nanshan District, 518057 Shenzhen, P.R. China		
geprüft/ tested by:		kontrolliert/ reviewed by:	
 Jan 24, 2012 Sean Pan / Assistant Manager		 Jan 25, 2012 Daniel Dai / Technical Certifier	
Datum: Date	Name/Stellung: Name/Position	Unterschrift: Signature	Datum: Date
Sonstiges/ Other Aspects:			
This report consists of:			
- EN 62259 test report 17 pages including this cover page - Equipment list 1 page (attachment 1) - Photo document 3 pages			
To issue AK certificate			
Abkürzungen:	Pass = entspricht Prüfgrundlage Fail = entspricht nicht Prüfgrundlage N/A = nicht anwendbar NT = nicht getestet	Abkürzungen:	Pass = durchgefallen Fail = gescheitert N/A = not applicable NT = not tested
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugswise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. This test report relates to the o. g. test sample. 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.			

Summary of testing:

Tests performed (name of test and test clause):

Testing location:

Test items:

See cover page

- Clause 7.2.1 – Discharge performance at 20°C
- Clause 7.2.2 – Discharge performance at 5°C
- Clause 7.2.3 – Discharge performance at -18°C
- Clause 7.2.4 – High rate current test
- Clause 7.3 – Charge retention test
- Clause 7.5 – Charge acceptance at constant voltage
- Clause 7.7 – Vent operation test
- Clause 7.8 – Electrolyte retention test
- Clause 7.9 – Determination of gas recombination efficiency test

Remark: test on model SPL200 to represent all models, totally 13 samples used for testing, they are numbered as A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12 and A13

Copy of Mark Plate:

EverExceed®
power your applications

SPL 200

Rechargeable

NI-Cd Industrial Batteries

1.2V 200Ah @5hrs



Note: the model SPL200 can be replaced by other models listed in table Appendix 1

Test item particulars:	
Information about the product needed to establish a correct test program, such as product mobility, type of power connections and similar.	(Test item particulars are selected by the TRF Originator based on the requirements in the standard)
Designation	SPL Series
Nominal voltage	1.2V
Nominal capacity	See Appendix 1 on page 4
Possible test case verdicts:	
Test case does not apply to the test object	N/A
Test object does meet the requirement	P(ass)
Test object does not meet the requirement	F(ail)
Testing:	
Date of receipt of test item	Oct 30, 2011
Date(s) of performance of tests	December 9, 2011 to January 10, 2012
General remarks:	
This report shall not be reproduced, except in full, without the written approval of the testing laboratory.	
The test results presented in this report relate only to the object tested.	
"See remark #)" refers to a remark appended to the report.	
"See appended table)" refers to a table appended to the report.	
"See attachment #)" refers to an attachment appended to the report.	
Throughout this report a point is used as the decimal separator.	
General product information:	
The SPL series are nickel-cadmium prismatic secondary single cells with partial gas recombination.	
The number following SPL indicates the rated capacity of the cell in ampere-hours., also see Appendix 1 for details.	



Appendix 1: models and features of SPL series:

Cell Type	Nominal Voltage (V)	Nominal Capacity (Ah)	Max. Weight (kg)	Cell Dimensions (mm)			Electrolyte Volume (L)	Container Material
				Length	Width	Height		
SPL 60	1.2	60	4.2	70	134	285	0.9	MBS or PP
SPL 70	1.2	70	5.2	53	166	410	1.5	MBS or PP
SPL 85	1.2	85	6.5	53	180	410	1.4	MBS or PP
SPL 135	1.2	135	8.5	70	190	410	1.8	MBS or PP
SPL 165	1.2	165	11.5	100	171	450	2.7	MBS or PP
SPL 200	1.2	200	13.5	100	171	450	2.5	MBS or PP
SPL 230	1.2	230	15.5	152	170	385	2.5	MBS or PP
SPL 255	1.2	255	18.0	152	170	385	2.4	MBS or PP
SPL 335	1.2	335	23.0	162	200	450	5.3	MBS or PP
SPL 430	1.2	430	23.5	162	200	450	5.0	MBS or PP
SPL 470	1.2	470	24.8	162	200	450	4.9	MBS or PP
SPL 510	1.2	510	24.5	162	200	450	4.8	MBS or PP



Critical Components Appendix 2:

Object/ part No.	Manufacturer/ trademark	Type/ model	Technical data	Standard	Mark(s) of conformity
NiSO ₄	1 Sichuan Hui Tong Energy and Material Co., Ltd. 2 Xinliang Jien Trading Company 3. Nickel Industry Co., Ltd.	--	--	JU003.004/JT	--
GdG	1. Ayutthaya Hengli Electric Material Factory 2. Lingling Lee Chang Chemical Building Materials Co., Ltd.	--	--	JU003.028/JT	--
KOH	1. Chengdu Huangong Chemical Company Limited 2. Jinhong Energy Kingtai Mining Group Limited Liability Company Taurus Polash Branch	--	--	082000	--
NaOH	1. Zigong Honghe Chemical Co., Ltd 2. Ningxia YingLiTa Chemical Co., Ltd	--	--	08209-1000	--
Cold rolling metal strip	1. Panzhihua Iron&Steel Group Company 2. Chaoyang City, North Machinery Co., Ltd. With Shougang Steel Plant 3. Wuhan Iron and Steel Group Corporation 4. Qianjiangdao Sino-up to the Quarter Metal Products Co., Ltd 5. Wuhan Honghai CLP Materials Co., LTD 6. Tangshan Steel Co., LTD 7. Baoshan Iron and Steel Group Company	08F- II -5M- TR- KH-Q	Thickness =0.1 mm	JU002.011/JT	--
Separator	1. Mianyang City, Ford Technology 2. Chongqing West Wing Plastic Products Factory 3. Baotou City, yun qiao, precision molds Co., Ltd. 4. Mianyang City Haiquan Electronic Plastic Factory 5. Mianyang Hongqi New Materials Technology Co., Ltd 6. Chongzhou Red Bridge Battery Material Co., Ltd	--	--	JU007.030/JT	--



EN 62259-2:2004			
Clause	Requirement - Test	Result - Remark	Verdict
4	General		P
	Parameter measurement tolerances	The overall accuracy of measured values was within required tolerances.	P
5	Designation and marking		P
5.1	Cell designation		P
	Vented nickel-cadmium prismatic secondary cells with partial gas recombination shall be designated by the letter K which signifies cadmium, followed by the letter G which signifies partial gas recombination, and followed by a letter L, M, H or X which signifies: - low rate of discharge (L); - medium rate of discharge (M); - high rate of discharge (H); - very high rate of discharge (X). NOTE: These types of cells are typically but not exclusively used for the following discharge rates: - L up to 0,5 I_A, - M up to 3,5 I_A, - H up to 7 I_A, - X up to and above 7 I_A. This group of two letters shall be followed by a group of figures indicative of the rated capacity of the cell in ampere-hours. Cells that have been tested at 20 °C and 5 °C but not at -18 °C shall carry an additional marking of T5. For example: KGH 185 or KGH 185 T5 Cells in cases of plastic material shall be designated by the letter "P" after the figures. For example: KGH 185 P or KGH 185 P T5	Cell designation comply with requirements, also see marking plate on page 2 and other models in Appendix 1 on page 4.	P
5.2	Cell termination		NA
	This standard does not specify cell termination.		NA
5.3	Marking		P
	Each cell or monobloc shall carry durable markings giving the following minimum information: - designation as specified in 5.1 (in addition, it is permissible for a manufacturer to use his own type designation); - name or identification of manufacturer or supplier; 'positive terminal': either a red washer or an indented or raised symbol. (see IEC 604-17 3005 [DS-2003-10])	Carrying label with type designation and name of manufacturer; Carrying raised symbol	P
5.4	Safety recommendations		
	The manufacturer shall provide recommendations for the safe handling of the cell. See also IEC 61438.	In user manual	P
6	Dimensions		



EN 62259-2004			
Clause	Requirement - Test	Result - Remarks	Verdict
	No preferred dimension are specified in this standard		N/A
7	Electrical tests		P
	Charge and discharge currents for the tests in accordance with 7.1 to 7.10 inclusive shall be based on the value of the rated capacity (C) Ah. These currents are expressed as a multiple of I A, where I A = C/6h/1 h.	Testing requirements are followed	P
7.1	Charging procedure for test purpose		P
	Prior to charging, the cells shall have been discharged at 20 °C ± 5 °C, at a constant current of 0,2 I A, down to a final voltage of 1,0 V. Unless otherwise specified in this standard, the charge preceding the various discharge tests scheduled, shall be carried out in an ambient temperature of 20 °C ± 5 °C and at a constant current of 0,1 I A. The duration of the charge shall be 14 h to 16 h.	Testing requirements are followed	P
7.2	Discharge performance		P
	The following discharge tests shall be carried out in the sequence given. All cells shall be tested at 20 °C as well as at +5 °C and/or -18 °C.	Testing requirements are followed	P
7.2.1	Discharge performance at 20 °C		P
7.2.1.1	Test procedure		P
	The cell shall have been charged in accordance with 7.1. After charging, the cell shall be stored for not less than 1 h and not more than 4 h in an ambient temperature of 20 °C ± 5 °C. It shall then be discharged in the same ambient temperature and as specified in Table 1. The discharge test with 0,2 I A is performed in order to verify the rated capacity of the cell.	Testing requirements are followed	P



EN 60259-2004			
Clause	Requirement - Test	Result - Remarks	Verdict

Table 1 – Discharge performance at 20 °C							0,2 I _N discharge duration: A1: 5h 37min A2: 5h 38min A3: 5h 35min A4: 5h 30min A5: 5h 32min	P
Discharge conditions		Minimum discharge duration						
Rate of constant current	Final voltage	Cell designation						
A	V	L	M	H	X			
0,2 I _N	1,0	5 h ^a	5 h ^a	5 h ^a	5 h ^a			
1,0 I _N	1,0	–	38 min	48 min	54 min			
5,0 I _N ^b	0,8	–	–	2 min 30 s	6 min 30 s			
10,0 I _N ^b	0,8	–	–	–	1 min 30 s			
a Five cycles are permitted for this test which shall however be terminated at the end of the first cycle which meets the requirement								
b Before the 5 I _N and the 10 I _N discharge tests, a conditioning cycle may be included if necessary. This cycle shall consist of charging at 0,1 I _N and discharging at 0,2 I _N in accordance with 7.1 and 7.2.1.								
7.2.1.2	Acceptance criteria							P
	The duration of discharge shall be not less than the minimum specified in Table 1.						See test result in 7.2.1.1	P
7.2.2	Discharge performance at +5°C							P
7.2.2.1	Test procedure							P
The cell shall have been charged in accordance with 7.1. After charging, the cell shall be stored in an ambient temperature of +5 °C ± 2 °C, for 24 h. Means shall be provided to ensure that the electrolyte temperature has reached +5 °C ± 2 °C within 24 h. It shall then be discharged in the same ambient temperature and as specified in Table 2.							Testing requirements are followed 0,2 I _N discharge duration: A1: 5h 05min A2: 5h 07min A3: 5h 03min A4: 5h A5: 5h 05min	P
Table 2 – Discharge performance at +5 °C								
Discharge conditions		Minimum discharge duration						
Rate of constant current	Final voltage	Cell designation						
A	V	L	M	H	X			
0,2 I _N	1,0	3h 24min	3h 24min	3h 54min	4h 10min			
1,0 I _N	1,0	–	25min	39min	44min			
2,0 I _N ^a	1,0	–	–	10min	18min 30s			
3,0 I _N ^b	0,8	–	–	–	10min 30s			
a Before the 2 I _N and 3 I _N tests, a conditioning cycle may be included if necessary. This cycle shall consist of charging at 0,1 I _N and discharging at 0,2 I _N in an ambient temperature of 20 °C ± 5 °C, in accordance with 7.1 and 7.2.1.								



EN 62268-2:2014																																															
Clause	Requirement - Test			Result - Remark	Verdict																																										
7.2.2.2	Acceptance criteria				P																																										
	The duration of discharge shall be not less than the minimum specified in Table 2.			See test result in 7.2.2.1	P																																										
7.2.3	Discharge performance at -18°C				P																																										
7.2.3.1	Test procedure																																														
	The cell shall have been charged in accordance with 7.1. After charging, the cell shall be stored, in an ambient temperature of $-18\text{ °C} \pm 2\text{ °C}$, for 24 h. Means shall be provided to ensure that the electrolyte temperature has reached $-18\text{ °C} \pm 2\text{ °C}$ within 24 h. It shall then be discharged in the same ambient temperature and as specified in Table 3. Table 3 – Discharge performance at -18 °C <table border="1"> <thead> <tr> <th colspan="2">Discharge conditions</th><th colspan="4">Minimum discharge duration</th></tr> <tr> <th>Rate of constant current</th><th>Final voltage</th><th colspan="4">Cell designation</th></tr> <tr> <th>A</th><th>V</th><th>L</th><th>M</th><th>H</th><th>X</th></tr> </thead> <tbody> <tr> <td>0,2 I_N</td><td>1,0</td><td>2 h 58 min</td><td>2 h 24 min</td><td>2 h 59 min</td><td>3 h 54 min</td></tr> <tr> <td>1,0 I_N</td><td>0,9</td><td>—</td><td>12 min</td><td>21 min</td><td>27 min</td></tr> <tr> <td>2,0 I_N^a</td><td>0,9</td><td>—</td><td>—</td><td>8 min</td><td>9 min</td></tr> <tr> <td>3,0 I_N^a</td><td>0,8</td><td>—</td><td>—</td><td>—</td><td>4 min</td></tr> </tbody> </table> ^a Before the 2 A A and 3 A A tests, a conditioning cycle may be included if necessary. This cycle shall consist of charging at 0,1 A and discharging at 0,2 A A, in an ambient temperature of 20 °C $\pm$ 5 °C, in accordance with 7.1 and 7.2.1.			Discharge conditions		Minimum discharge duration				Rate of constant current	Final voltage	Cell designation				A	V	L	M	H	X	0,2 I _N	1,0	2 h 58 min	2 h 24 min	2 h 59 min	3 h 54 min	1,0 I _N	0,9	—	12 min	21 min	27 min	2,0 I _N ^a	0,9	—	—	8 min	9 min	3,0 I _N ^a	0,8	—	—	—	4 min	Testing requirements are followed 0,2 I_N discharge duration: A1: 3h 51min A2: 3h 43min A3: 3h 51min A4: 3h 40min A5: 3h 54min	P
Discharge conditions		Minimum discharge duration																																													
Rate of constant current	Final voltage	Cell designation																																													
A	V	L	M	H	X																																										
0,2 I _N	1,0	2 h 58 min	2 h 24 min	2 h 59 min	3 h 54 min																																										
1,0 I _N	0,9	—	12 min	21 min	27 min																																										
2,0 I _N ^a	0,9	—	—	8 min	9 min																																										
3,0 I _N ^a	0,8	—	—	—	4 min																																										
7.2.3.2	Acceptance criterion				P																																										
	The duration of discharge shall be not less than the minimum specified in Table 3.			See test result in 7.2.3.1	P																																										
7.2.4	High rate current test				P																																										
	This test is to evaluate the ability of a cell to withstand high currents				P																																										
7.2.4.1	High rate current test				P																																										



EN 62359-2:2004													
Clause	Requirement - Test	Result - Remark	Verdict										
	The cell shall have been charged in accordance with 7.1. After charging, the cell shall be stored, in an ambient temperature of $20\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$, for not less than 1 h and not more than 4 h. It shall then be discharged for 5 s in the same ambient temperature and at the currents given in Table 4. During the discharge the cell voltage shall be recorded. Table 4 – Currents to be used for the High rate current test <table><tr><th>Cell type</th><th>Rate of constant current</th></tr><tr><td>L</td><td>6 I_A</td></tr><tr><td>M</td><td>10 I_A</td></tr><tr><td>H</td><td>15 I_A</td></tr><tr><td>X</td><td>20 I_A</td></tr></table>	Cell type	Rate of constant current	L	6 I _A	M	10 I _A	H	15 I _A	X	20 I _A	Terminal voltage is 1,32V minimum Discharge with 6 I_A Tested on samples A1, A2, A3, A4 and A5	P
Cell type	Rate of constant current												
L	6 I _A												
M	10 I _A												
H	15 I _A												
X	20 I _A												
7.2.4.2	Acceptance criteria		P										
	The cell voltage during the discharge shall show no discontinuity. No fusing, no deformation of cell case, no deformation of internal cell components shall be observed.	No fusing, or deformation of cell case observed	P										
7.3	Charge retention		P										
7.3.1	Test procedure		P										
	After charging in accordance with 7.1, the cell shall be stored on open circuit for 28 days. The average ambient temperature shall be $20\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$. The temperature may be allowed to vary within the range of $20\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ for short periods during the storage. The cell shall then be discharged under the conditions specified in 7.2.1 at a rate of 0,2 A/A.	Testing requirements are followed Discharge duration: A6: 4h 37min A7: 4h 39min A8: 4h 36min A9: 4h 35min A10: 4h 37min	P										
7.3.2	Acceptance criteria		P										
	The duration of the discharge shall be not less than 4 h.	See test result in 7.3.1	P										
7.4	Endurance		P										
7.4.1	Endurance in cycles		P										
7.4.1.1	Test condition		P										
	The endurance test shall be carried out in an ambient temperature of $20\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$. Precautions shall be taken to prevent the electrolyte temperature from rising above $+40\text{ }^{\circ}\text{C}$ during the test by providing a forced air draught if necessary. The electrolyte may be topped up during the test with deionized or distilled water to the level recommended by the manufacturer. The cells shall be prepared according to 7.1.	Testing requirements are followed 	P										

EN 62259:2004																		
Clause	Requirement - Test	Result - Remark	Verdict															
7.4.1.2	Cycles 1 to 50		P															
	The cycling shall be carried out under the conditions specified in Table 5. Charge and discharge shall be carried out at constant current throughout. Cycling shall be continuous, except that it is permissible to allow the cell to stand for a short period at the end of discharge of each 49th and 50th cycle in order to start the next 50-cycle sequence at a convenient time. Table 5 – Endurance in cycles <table><tr><th>Cycle number</th><th>Charge</th><th>Discharge</th></tr><tr><td>1</td><td>0,1 A A for 14 h to 16 h</td><td>0,25 A A for 2 h 30 min</td></tr><tr><td>2 – 48</td><td>0,1 A A for 8 h 45 min</td><td>0,25 A A for 2 h 30 min</td></tr><tr><td>49</td><td>0,1 A A for 8 h 45 min</td><td>0,2 A A to 1,0 V</td></tr><tr><td>50</td><td>0,1 A A for 14 h to 16 h</td><td>0,2 A A to 1,0 V</td></tr></table>	Cycle number	Charge	Discharge	1	0,1 A A for 14 h to 16 h	0,25 A A for 2 h 30 min	2 – 48	0,1 A A for 8 h 45 min	0,25 A A for 2 h 30 min	49	0,1 A A for 8 h 45 min	0,2 A A to 1,0 V	50	0,1 A A for 14 h to 16 h	0,2 A A to 1,0 V	Testing requirements are followed	P
Cycle number	Charge	Discharge																
1	0,1 A A for 14 h to 16 h	0,25 A A for 2 h 30 min																
2 – 48	0,1 A A for 8 h 45 min	0,25 A A for 2 h 30 min																
49	0,1 A A for 8 h 45 min	0,2 A A to 1,0 V																
50	0,1 A A for 14 h to 16 h	0,2 A A to 1,0 V																
7.4.1.3	Acceptance Criteria		P															
	Cycles 1 to 50 shall be repeated until the discharge duration on any 50th cycle becomes less than 3 h 30 min. At this stage, a further cycle shall be carried out in accordance with 7.2.1 at a rate of 0,2 A A. The endurance test is considered complete when two such successive cycles, each give a discharge duration less than 3 h 30 min. The number of cycles obtained when the test is completed shall be not less than 500	Endurance-500 cycles Cells finishing 500 cycles are discharged to verify duration longer than 3h30min	P															
7.4.2	Permanent charge endurance		P															
7.4.2.1	Test procedure		P															
	Prior to the test, the electrolyte level shall be adjusted to the maximum level according to the manufacturer's instructions. The cell shall have been prepared according to 7.1. This shall be immediately followed by charging the cell at 0,02 A A for a period of 91 days. The cell shall then be discharged at 0,2 A A as specified in 7.2.1. This cycle shall be repeated an additional three times. A short delay between cycles shall be allowed in order to start a new cycle at a convenient time. Precautions shall be taken to prevent the cell case temperature from rising above 30 °C during the test by, for example, spacing the cells or providing a forced air draught, if necessary. The electrolyte may be topped up during this test. The amount of water added shall be recorded.	Testing requirements are followed	P															
7.4.2.2	Acceptance criteria		P															



EN 62258:2004											
Clause	Requirement - Test	Result - Remark	Verdict								
	The duration of discharge after completion of the four cycles as defined above shall be not less than 4 h (30 min). Leakage of electrolyte shall not occur during this test.	Discharge duration: A6: 4h 30min	P								
7.5	Charge acceptance at constant voltage		P								
7.5.1	Test procedure		P								
	The cell shall be prepared in accordance with 7.1. The cell shall then be charged at a constant voltage as specified in table 6. Table 6 – Constant voltage charging conditions <table><tr><th>Cell type</th><th>Charge voltage V</th></tr><tr><td>X</td><td>1,425 ± 0,005</td></tr><tr><td>M and H</td><td>1,455 ± 0,005</td></tr><tr><td>L</td><td>1,495 ± 0,005</td></tr></table> The charging current shall be limited to 0,1 A and the ambient temperature shall be 20 °C ± 5 °C. The duration of the charge shall be 24 h. After charging, the cell shall be stored, in an ambient temperature of 20 °C ± 5 °C, for not less than 1 h and not more than 4 h. It shall then be discharged under the conditions specified in 7.2.1 at a rate of 0,2 A.	Cell type	Charge voltage V	X	1,425 ± 0,005	M and H	1,455 ± 0,005	L	1,495 ± 0,005	Testing requirements are followed Discharge duration: A6: 4h 30min A7: 4h 30min A8: 4h 30min A9: 4h 50min A10: 4h 30min	P
Cell type	Charge voltage V										
X	1,425 ± 0,005										
M and H	1,455 ± 0,005										
L	1,495 ± 0,005										
7.5.2	Acceptance criterion		P								
	The duration of discharge shall be not less than 4 h	See test result in 7.5.1	P								
7.6	Overcharge		NA								
	This standard does not specify an overcharge test		NA								
7.7	Vent operation		P								
7.7.1	Where a cell is fitted with an overpressure vent, the following test shall be carried out in order to establish if it will allow the escape of gas when the internal pressure exceeds that pressure at which the vent opens. The cell shall undergo a forced discharge in an ambient temperature of 20 °C ± 5 °C, at a constant current of 0,2 A to a final voltage of 0,0 V. The current shall then be increased to 1 A and the forced discharge continued, in the same ambient temperature of 20 °C ± 5 °C, for 30 min.	Testing requirements are followed Tested on samples A11, A12 and A13	P								
7.7.2	Acceptance criteria		P								
	During and at the end of this discharge the cell shall not disrupt or burst. Leakage of electrolyte and deformation of the cell are acceptable	Cell was not disrupted or burst during and after the test	P								
7.8	Electrolyte retention		P								



EN 62259-2:2004			
Clause	Requirement - Test	Result - Remark	Verdict
	During charge, gases are generated within the cell, and electrolyte may be carried out in a fine spray in this gas flow resulting in loss of electrolyte to the atmosphere. To prevent these losses, baffles may be inserted within the cell or within the venting system that closes the cell. This test is to evaluate the ability of a cell to prevent electrolyte losses.	Testing requirements are followed	P
7.8.1	Test procedure		P
	Prior to the test the electrolyte level shall have been adjusted to the maximum level according to the manufacturer's instructions. The cell shall have been charged in accordance with 7.1. The charge shall be continued, at a constant current of 0,05 A, for 2 h. The gas emerging from the cell vent during the 2 h overcharge shall be passed through 1/200 molar sulphuric acid contained in three collection bottles in series. After the overcharge the quantity of potassium hydroxide absorbed in the sulphuric acid solution of the three collection bottles shall be calculated.	Testing requirements are followed Tested on 3 samples, entrained KOH: A11: 0,010 mg/Ah A12: 0,010 mg/Ah A13: 0,011 mg/Ah	P
7.8.2	Acceptance criterion		P
	The total amount of entrained potassium hydroxide shall be not more than 0,05 mg/Ah overcharge.	See test result in 7.8.1	P
7.9	Determination of gas recombination efficiency		P
7.9.1	Test procedure		P



EN 62329-2004			
Clause	Requirement - Test	Result - Remarks	Verdict

In accordance with the test conditions shown in Table 7, gas recombination efficiency shall be determined from the amount of gas generated. A method to measure the gas volume is given in Figure 1 below, but alternative methods may be used, for instance the use of a flow meter. Method of gas collection The quantity of gas collected is converted to the value per Ah overcharged at 20 °C and 101,3 kPa, using formula (1). Finally, from the value obtained in formula (1), gas recombination efficiency is calculated by the formula (2). $v = \frac{P}{P_0} = \frac{293}{t + 273} \times \frac{P}{Q} \text{ (ml/Ah)} \quad (1)$ where v is the quantity of gas generated per Ah (ml/Ah), corrected to the value at 20 °C and 101,3 kPa; P is the atmospheric pressure at the time of measurement (kPa); P_0 is 101,3 kPa; t is the ambient temperature (°C); P is the amount of generated gas collected (ml); Q is the quantity of electricity (Ah) delivered to the cell during gas collection (Ah). $\eta = \left(1 - \frac{v}{673} \right) \times 100 \text{ (%) } \quad (2)$ where η is the gas recombination efficiency (%); 673 (ml) is the theoretical volume of gas generated, per Ah, at 20 °C and 101,3 kPa.	Testing requirements are followed Gas recombination efficiency: A11: 89.28% A12: 86.30% A13: 90.48%	P									
7.6.2	Acceptance criteria	P									
	Gas recombination efficiency shall be not less than 70 %. Table 7 – Conditions for the determination of the recombination efficiency <table><tr><th>Conditions</th><th>Requirements</th></tr><tr><td>Condition of gas generated</td><td>after charging, in absorption gas (i.e., the cell shall be recharged at 20 °C and 101,3 kPa). During the charge, the charge voltage and energy current shall be recorded. After the voltage is stabilized, measure gas collection. Refer to Figure 1.</td></tr><tr><td>Duration of gas collection</td><td>1 hour 0.001 A/h</td></tr><tr><td>Ambient temperature for testing</td><td>(20 °C ± 5 °C)</td></tr></table>	Conditions	Requirements	Condition of gas generated	after charging, in absorption gas (i.e., the cell shall be recharged at 20 °C and 101,3 kPa). During the charge, the charge voltage and energy current shall be recorded. After the voltage is stabilized, measure gas collection. Refer to Figure 1.	Duration of gas collection	1 hour 0.001 A/h	Ambient temperature for testing	(20 °C ± 5 °C)	See test result in 7.6.1	P
Conditions	Requirements										
Condition of gas generated	after charging, in absorption gas (i.e., the cell shall be recharged at 20 °C and 101,3 kPa). During the charge, the charge voltage and energy current shall be recorded. After the voltage is stabilized, measure gas collection. Refer to Figure 1.										
Duration of gas collection	1 hour 0.001 A/h										
Ambient temperature for testing	(20 °C ± 5 °C)										



EN 62258-2:2004			
Clause	Requirement - Test	Result - Remark	Verdict
7.10	Storage		P
7.10.1	Test procedure		P
	The cells shall be prepared for storage according to the manufacturer's instructions. The cells shall then be stored for a period of 12 months in an average ambient temperature of $20\text{ °C} \pm 5\text{ °C}$ and at a relative humidity of $65\% \pm 20\%$. During the storage period the ambient temperature shall not at any time fluctuate beyond the limits of $20\text{ °C} \pm 10\text{ °C}$. After completion of the storage period, the cells shall be prepared for use according to the manufacturer's instructions. The cells are then subjected to the tests specified in 7.2.1.	Testing requirements are followed	P
7.10.2	Acceptance criteria		
	The cells shall meet all the requirements of 7.2.1.		
8	Mechanical tests		N/A
	Mechanical tests should be designed in relation to the intended application. This standard does not therefore specify mechanical tests, which should be the subject of agreement between the customer and the manufacturer.		N/A
9	Physical appearance		P
	Visual inspection shall be performed on cells. No cracking, damage or corrosion shall be apparent. Any deformation shall be within the tolerances of the dimensions specified in the manufacturers' drawings.	No abnormal phenomenon	P
10	Conditions for approval and acceptance		P
10.1	Type approval		P



EN 62259-2:2004

Clause	Requirement - Test	Result - Remark	Verdict
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For type approval the sample sizes and sequence of tests given in Table 8 shall be used. The total number of cells required for type approval is 25. Cells used for the testing shall be new cells just after delivery from the manufacturer.

All cells shall be subjected to the tests in group A, after which they shall be divided randomly into five groups of five cells each, denominated B, C, D, E and F respectively. This allows one spare cell which permits a repeat test to cover any incident which may occur outside the supplier's responsibility. Tests shall be carried out in sequence within each group of cells.

The number of defective cells tolerated per group, and in total, is given in Table 8. A cell is considered to be defective if it does not meet the requirements of all or part of the tests of a group.

Table 8 – Sequence of tests for type approval

Group	Sample size	Classen or subclauses	Tests	Number of defective cells	
				Per group	In total
A	25	3.3 3.4 7.2.1	Working Dimensions Discharge at 25 °C	0	0
B	5	3.2.2 and/or 7.2.2 7.2.4	Discharge at 5 °C and/or -15 °C High rate currents	1	
C	5	7.4.1	Endurance in cycles	1	
D	5	7.3 7.5 7.6 7.9	Charge acceptance at constant voltage Charge retention Electrolyte retention Performance of gas recombination efficiency	1	
E	5	7.4.2	Prolonged charge resistance	1	
F	5	7.10	Storage	1	

Testing requirements are followed except following conditions specified by the manufacturer:

- not requested to test according to clauses 7.4.1 and 7.4.2
- 3 pcs samples used for test of clause 7.8 and 7.9 test

P

10.2 Batch acceptance

These tests are applicable to deliveries of individual cells. Unless otherwise agreed between supplier and purchaser, inspections and tests shall be performed using inspection levels and AQLs (acceptable quality level) recommended in Table 9. The sampling procedure should be established in accordance with IEC 60410.

Table 9 – Recommended test sequence for batch acceptance

Group	Classen or subclauses	Inspection/Test	Recommendation	
			Inspection level	AQL %
A		Visual inspection	B	4
B	3	Physical inspection		
		Dimensions	B3	1
		Weight	B3	1
C	5.3	Marking	B3	1
		Electrical inspection		
	7.2.1	Open circuit voltage and polarity	B	0.65
		Discharge at 25 °C	B3	1

NOTE: Two or more failures on a single cell are not combination. Only the failures corresponding to the search AQLs in subsequent combination.

Testing requirements are followed

P

P



EN 60289:2004			
Clause	Requirement - Test	Result - Remark	Verdict

End of Report

