The Industry Committee for Emergency Lighting Ltd

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ICEL 1010

SCHEME OF REGISTRATION OF BATTERY CELL(S) AND BATTERIES FOR EMERGENCY LIGHTING USE

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1. INTRODUCTION

THIS ISSUE CHANGES THE REFERENCE FROM "MANUFACTURER" TO "PRODUCER" TO ALIGN WITH THE BATTERY DIRECTIVE TERMINOLOGY AND RESPONSIBILITIES AND UPDATES THE CONTACT DETAILS FOR ICEL. THERE ARE NO OTHER CHANGES. THIS ISSUE COMES INTO FORCE ON 31ST JULY 2009.

This ICEL scheme is intended to bridge the gap between the reliability established by current international battery standards and the reliability required for emergency lighting. Current IEC standards do not go far enough to ensure batteries meet the life requirements under the conditions imposed by emergency lighting. Specifically, in emergency lighting, the prevailing temperature often exceeds the rating intended by the IEC battery standards and residual battery capacity after a four-year life is required to be much greater. Although the conditions prevailing in emergency application exceed IEC battery specification, many battery types are still capable of operating satisfactorily.

Inevitably the performance of any battery is gradually degraded during its life. The conditions of temperature and continuous overcharge prevailing in emergency lighting are particularly harsh and accelerate the degradation. Current standards for emergency lighting, both product standards and application standards, require a battery life of four years and up to that life the emergency lighting must be capable of providing emergency light for its full rated duration.

ICEL offers this registration scheme to producers of battery cells and/or batteries for use in emergency lighting, allowing them to demonstrate their product achieves levels of reliability commensurate with best industry practice. To the emergency lighting industry the scheme identifies battery products that have met the more exacting requirements described in this scheme. The scheme deals with battery cells and batteries, and their respective producers, separately in order to fully control the quality of the end product.

2. Disclaimer

Neither the Lighting Industry Federation Ltd or Industry Committee for Emergency Lighting Ltd, nor any person acting on its behalf, makes any warranty of representation, expressed or implied, with respect of the information contained in this scheme, or assumes any liability with respect to the use of, or damages resulting from the use of this information.

3. SCOPE

This document defines the requirements for registration of the NiCd and NiMH battery cell(s), and batteries for emergency lighting use.

Batteries with lead-acid chemistry are beyond the scope of the scheme.

The scheme applies to batteries made up of individual battery cell(s) described in the table below.

Table 1					
Chemistry	Geometry	Standard	Cell operating temperature (^{0}C)	**IEC designation**	**ICEL designation**
Nickel Cadmium (NiCd)	Cylindrical	IEC61951-1: 2003	5 to 40	T	E40
Nickel Cadmium (NiCd)	Cylindrical	IEC61951-1: 2003	5 to 50	U	E50
Nickel Cadmium (NiCd)	Cylindrical	IEC61951-1: 2003	5 to 55	-	E55
Nickel Metal Hydride (NiMH)	Cylindrical	IEC61951-2: 2003	5 to 40	T	E40
Nickel Metal Hydride (NiMH)	Cylindrical	IEC61951-2: 2003	5 to 50	-	E50
Nickel Metal Hydride (NiMH)	Cylindrical	IEC61951-2: 2003	5 to 55	-	E55

4. Definitions

For the purposes of this scheme the following definitions apply:

4.1 Battery cell(s)

A basic electrical energy storage device not prepared for use in a practical application. Specific types of battery cell are defined explicitly in IEC 61951.

4.2 Battery (ies)

An electrical energy storage device, assembled from one or more battery cell(s). Some times also referred to as ‘battery pack(s).’

5. Registration Scheme

The registration scheme will be applied separately to the battery cell(s) producer and the battery producer.

5.1 Issue of ICEL Licence and Application of ICEL Label

Upon compliance, with the *Requirements for registration*, ICEL will issue a certificate to the battery cell producer or battery producer to document acceptance into the scheme. A copy of the licence

is shown in Annex A. The producers will also be entitled to apply the ICEL label to the battery and/or literature. Details of the label are shown in Annex B. A database for registered batteries and battery cell(s), and their respective producers and suppliers will be kept by ICEL and made available on its website.

5.2 Annual Registration

The registration must also be maintained on an annual basis in accordance with the *Requirements for registration*.

6. Requirements for Registration

6.1 Battery Cells

In order to register a battery cell under the scheme its producer shall:

a) Be registered and regularly audited, by a National Accreditation Certification Body, under a quality assurance scheme equivalent to ISO 9001:2000 or better, and the requirements of this scheme included in the scope of the registration. Accreditation shall be traceable to European Co-operation for Accreditation (EA), or the International Accreditation Forum (IAF).

b) Provide a written quality plan.

c) Provide annual reports on internal quality audits, including the audit described in this scheme.
NOTE. The frequency of the internal audits is under consideration.

d) Provide third party or audited supervised manufacturer's (producer's) testing verification of compliance with the IEC standard appropriate to the battery cell with the provision that the test in IEC 61951 subclause 7.4.1 shall meet a minimum of 200 cycles.

e) Provide, from a suitable test house (see clause 8.2), verification of compliance with the additional test(s), appropriate to the battery cell, described in Section 9.

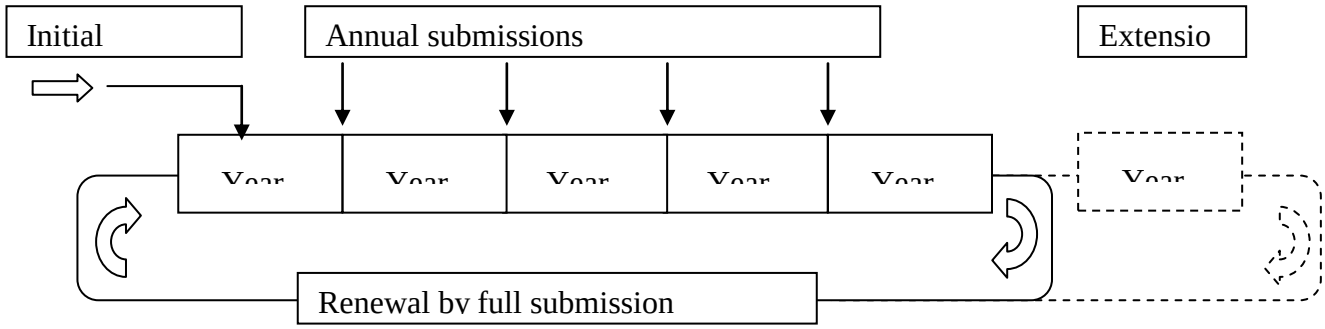
f) Provide a data sheet of cell performance to include claimed technical data; capacity depreciation curves; whole performance envelope.

g) Provide, annually, a written statement attesting that no significant changes have been made to the battery or battery cell(s) design since registration testing.

h) Provide annual reports, from a suitable test house (see clause 8.2), verification of compliance with the additional audit test(s), appropriate to the battery cell, described in Section 12.

Registration shall last for five-years, with a full submission of all data required to renew the registration for a further 5 year period. During the five-year period of registration, annual submissions of information will be required at a fixed point in the calendar determined by the ICEL Battery Scheme Administrator. Should a failure be recorded at the end of the testing, the test results shall be referred to the Scheme Administrator for review. Pending further test results, the Scheme Administrator may authorize an extension of registration to a sixth year.

Figure 1



6.2 Registration of Batteries

In order to register a battery under the scheme its producer must:

a) Be registered and regularly audited, by a competent body, under a quality assurance scheme equivalent to ISO 9001:2000 or better with audited procedures to ensure compliance with this scheme – ICEL 1010. Accreditation shall be traceable to European Co-operation for Accreditation (EA), or the International Accreditation Forum (IAF).

b) Provide a written quality plan.

c) Use only battery cells that are registered under this scheme.

6.3 Registration Fees

Details of the current annual registration fees for a battery cell(s) or battery producer are obtainable from ICEL. These fees may be subject to change as decided by ICEL Council.

7. Confidentiality

Only information relating directly to the registration will be made publicly available by ICEL. Test reports and test data will not be available to any organisation or individual without the written permission of the battery cell(s) or battery supplier.

8. Testing

All test data shall be presented to ICEL within formal reports.

8.1 Sample Selection

Battery cell(s) samples shall be selected according to the approving authority's rules.

8.2 Test Facility Requirements

Testing of battery cell(s) in accordance with the requirements of this scheme, including the audit test regime, shall be carried out by a test house mutually agreed with ICEL. All test reports or certification shall be issued by an Organisation that is accredited to ISO/IEC 17025 and has competency in battery cell(s) testing. Accreditation of the Organisation shall be by a National Accreditation Body and traceable to International Laboratory Accreditation Co-operation (ILAC).

All costs are the responsibility of the battery or battery cell(s) producer.

9. TEST SPECIFICATION FOR THE REGISTRATION AND AUDIT OF HIGH TEMPERATURE BATTERY CELLS

9.1 Electrical Testing Procedure

9.1.1 Measurement Tolerances

Unless otherwise stated, the overall accuracy of each parameter listed with this document shall be within the following tolerances:

a)	+/-1%	for voltage
b)	+/-1%	for current
d)	+/-5°C	for ambient temperature of 20°C
	+/-2°C	for all other ambient temperatures
e)	+/-0.1%	for time

These tolerances comprise the combined accuracy of the measuring equipment. Details of the instrumentation used shall be provided in each report of the test results. Charge and discharge currents for the tests shall be based on the rated capacity.

9.2 Initial Cell Characterisation

The test shall be performed at 20°C +/- 5°C. Prior to charging, the cell shall have been discharged at a constant current of 0.2C to a cut off voltage of 1.0V.
The cell shall be charged for 16 hours at 0.1C or 32 hours minimum at 0.05C followed by a discharge of 0.2C. The test shall be conducted three times for each, measuring the time taken for the battery to discharge down to a terminal potential of 1.00V.

The discharge time shall not be less than 5 hours. The longest of the three measured discharge times shall be used to calculate the rated battery capacity which shall be recorded.

9.3 Charge acceptance at an ambient temperature as specified in Table 2

The cell shall undergo a charge acceptance test as specified in Table 3, cycles 1 to 3, at an ambient temperature, appropriate to the battery cell(s) rating, as specified in Table 2. The actual discharge duration shall be recorded and reported and the minimum discharge duration shall be no less than 3 hours at a final voltage of 1.00V. The longest discharge time from cycles 2 and 3 shall be used to calculate the battery capacity (this is to be used in cycles 7, 8 and 9).

Then the cell(s) shall undergo a permanent charge endurance test (as described in 9.4) intended to simulate the ageing of the cells during 4 years.

After completion of the permanent charge endurance test, the cell shall be stored, in an ambient temperature appropriate to the battery cell(s) rating, specified in Table 2, for not less than 16 hours and not more than 24 hours.

Then 3 final cycles of charge acceptance (7,8,9) , as detailed in Tables 3 are then performed. The minimum discharge period of 3 hours shall be achieved and the actual duration recorded.

Table 2: Temperature for Charge Acceptance at (T°C +/- 2°C).

Ni-Cd cells T°C range	Ni-Cd IEC Cells type	Ni-Cd ICEL Cells type	Temperature (T°C) for Charge Acceptance Test.
40°C	T	E40	40°C
50°C	U	E50	50°C
55°C	-	E55	55°C
Ni-MH cells T°C range	**Ni-MH IEC Cells type**	**Ni-MH ICEL Cells type**	**Temperature (T°C) for Charge Acceptance test**
40°C	T	E40	40°C
50°C	-	E50	50°C
55°C	-	E55	55°C

Table 3: Charge Acceptance Regime Prior and after the permanent charge endurance test					
Cycle Number	Charge Conditions		Discharge Conditions		Minimum Discharge Duration h/min
	Rate of Constant Current, A	Time of Charge h	Rate of Constant Current, A	Final Voltage V	
1	0.05C	48h	0.25C	1.00	None required
2	0.05C	24h	0.25C	1.00	3h minimum
3	0.05C	24h	0.25C	1.00	3h minimum
Permanent charge endurance test (as per 9.4)					
7	0.05C	48h	0.25C	1.00	None required
8	0.05C	24h	0.25C	1.00	3h minimum
9	0.05C	24h	0.25C	1.00	3h minimum

9.4 Permanent Charge Endurance Test

The permanent charge endurance test shall be performed in two steps according to that detailed in Table 4 and shall be carried out only if cells pass the cycles (1,2,3) detailed in Table 3.

The discharge duration of the 3 cycles at 70°C shall be recorded. Leakage of electrolyte shall not occur during this test.

Table 4: Permanent Charge Endurance Test							
			Charge Conditions		Discharge Conditions		
Cell Type	Cycle Number	Ambient temperature °C	Rate of Constant Current, A	Time of Charge t, d/h/min	Rate of Constant Current, A	Final Voltage V	Minimum Discharge Duration h/min
Ni-Cd Ni-MH							
E40	4	70°C +/-2°C	0.05C	60d	0.25C	1.00	No requirement
E50;E55	4	70°C +/-2°C	0.05C	120d	0.25C	1.00	
E40	5	70°C +/-2°C	0.05C	60d	0.25C	1.00	No requirement
E50;E55	5	70°C +/-2°C	0.05C	120d	0.25C	1.00	
E40	6	70°C +/-2°C	0.05C	60d	0.25C	1.00	No requirement
E50;E55	6	70°C +/-2°C	0.05C	120d	0.25C	1.00	

10. TYPE TEST

For the first type tests, sample requirements shall be, 5 battery cells to be selected by the approved Certification Body/Test House from the battery cell producer's bonded store.
Tests shall be carried out in sequence on the group of cells under test.

11. BATTERY CELL COMPLIANCE

For **acceptance**, the number of compliant cells shall be at least 4 out of the batch of 5 tested. A cell shall be considered unacceptable if it does not comply with any of the requirements of the type tests. A full report on the cause of the failure of the cell shall be submitted to ICEL for acceptance of the failure mode. If the conditions of failure are found to be unacceptable, a full retest will be required.

12. AUDIT TEST REGIME

12.1 ICEL Charge Acceptance at Ambient Temperature as per Classification E40; E50 or E55.

Annually, the battery or battery cell(s) shall undergo the tests of clause 9.2 and clause 9.3 (cycles 1,2 and 3 only).

The respective capacities calculated from 9.2 and 9.3 shall correlate, within the following limits, with those calculated during the original type test which shall be recorded:

Calculated capacity	Correlation	
	Min	Max
9.2 Fall capacity at room ambient	95%	105%
9.3 Charge acceptance at rated temperature	85%	No limit

12.2 ICEL Audit Compliance

Sample requirements shall be 5 battery cells.

For compliance, no cells are allowed to fail the audit test.

A cell shall be considered unacceptable if it does not comply with a requirement of the audit test.

The results of these tests shall be submitted to ICEL for continued acceptance with the scheme.

Annex A

Certificate of Registration

The following Certificate will be issued to producers of battery cells and/or batteries to document acceptance of their products into the registration scheme.

CERTIFICATE OF REGISTRATION
to ICEL 1010

Certificate to use the ICEL Registation Labels

Registration No.

ICEL hereby grants to *[name]*

Of [insert company name]

(hereinafter called the Registrant) has the right to use the ICEL Registration Labels set out in the accompanying Schedule(s) and in respect of goods set out in the same Schedule(s) which are produced in accordance with the appropriate Standard referred to on the same Schedule as from time to time amended. The Registrant is granted subject to the Regulations in respect of the Labels and to any Undertakings into which the Registrant has been required to enter with ICEL prior to the granting of this Certificate and the Registrant hereby covenants with ICEL duly to observe and perform all the said Regulations and Undertakings.

Signed for and on behalf of ICEL

Director _____ Date _____

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Annex B

Registration and Assessment Labelling

Battery cells and batteries registered in accordance with this Guide may bear one of the following labels according to the method of assessment of conformity used viz:-

The label may be placed on the product or leaflet or both combinations.

OR

BATTERY CELLS AND
BATTERIES
FOR
EMERGENCY LIGHTING

ICEL: 1010: 2005

Temperature Rated @ Exx

Registration No ……

The organisation carrying out the production is entitled to affix the above label when they have the following:

Compliance with the requirements of this scheme and;

Having been registered with this scheme and paid the necessary fees and;

(ii) The Label must be used in conjunction with their registration number.

Annex C

Schedule

In respect of: Producing Company XXXX

Registration no: XXXX

SCHEDULE

In respect of ICEL 1010 Registration: Scheme of Battery Cells and Batteries for

Emergency Luminaires and Conversion Modules

Goods in respect of which the use of the label may be used	Standards and requirements IEC 61951-1 or IEC 61951-2 ICEL 1010

Signed for and on behalf of ICEL in respect of Registration no.------

Signature Date