



INDUSTRY COMMITTEE FOR EMERGENCY LIGHTING

ICEL 1004:2014

Requirements for the Re-Engineering of Luminaires for Emergency Lighting Use

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1 **Scope**

This document is designed to define the marking, testing and responsibility requirements for re-engineering luminaires into emergency lighting luminaires complying, where applicable, with the requirements of EN 60598-1, EN 60598-2-22, EN 61347-1, EN 61347-2-3 Annex J, EN 61347-2-7, EN 61347-2-13, EN 55015, EN 61547 and EN 61000-3-2. These standards cover the following light source types: filament, fluorescent and LED.

It specifies that the whole process should be carried out under the control of a competent person in an ISO 9001:2008 registered quality control environment.

2 **Legal Requirements**

Luminaires re-engineered for emergency lighting use shall be electrically and mechanically safe.

The organisation that re-engineers a luminaire for emergency lighting use, takes responsibility for the product, its warranty and for affixing its identification mark together with the relevant label in accordance with Appendix C.

The CE Marking and identification of the original manufacturer/supplier shall be removed or obliterated and replaced by a new CE Mark and supplier identity applied by the ICEL 1004 licensee.

A Technical File to support the CE mark conformity shall be produced. The re-engineering company shall also take on the responsibility for the requirements of all other pertinent product directives (WEEE, RoHS, etc.).

3 **Definitions**

The following definitions are additional to those given in the standards:

3.1 Original manufacturer/supplier:

The organisation that supplied the original luminaire which is to be re-engineered.

3.2 Re-engineering organisation:

The ICEL 1004 registered company.

3.3 Competent person:

A competent person is someone who has the necessary knowledge, training, experience and abilities to carry out the work of re-engineering the luminaire.

3.4 Emergency Lighting Control Module

An emergency lighting control circuit designed to comply with the relevant parts of EN 61347.

3.5 Emergency Lighting Control Kit (also known as conversion kit or conversion unit)

Kit or kits, comprising where appropriate a supply changeover system, a compliant battery pack, a charging device and a means for testing. For luminaires with tubular fluorescent lamps, an inverter and lamp ballast may also be included in the unit.

3.6 Enclosure

An enclosure is that part of a luminaire providing electrical and/or mechanical protection.

3.7 Remote Enclosure (also known as remote box, conversion enclosure, remote unit, or remote mounting housing)

A remote enclosure designed to accommodate all, or part, of an emergency lighting control module and intended to be mounted separate from, but adjacent to, a re-engineered luminaire.

3.8 Dedicated Emergency Luminaire

A luminaire originally engineered as an emergency luminaire, complying with EN 60598-2-22.

3.9 Technical File (see also Appendix B)

A document which has been drawn up and maintained by the manufacturer, or their authorised supply agent, or the organisation carrying out the re-engineering. It will contain technical information, the aim of which is to demonstrate conformity of the product with the essential requirements of all appropriate directives, to enable the product to be CE marked. It shall be retained for 10 years.

3.10 Third Party Certification

An arrangement whereby an independent body which possesses the necessary competence and ability, (e.g. National Standard Authority) issues certificates of conformity affirming that products comply with stated requirements and ensures that the products continue to comply with those requirements by regular surveillance of production.

3.11 System of Assessed Capability

A means of third party assessment and subsequent surveillance, based on the ISO 9001:2008 standard, to provide an independent assurance of an organisation's capability of producing to relevant product design, testing and manufacturing specifications in accordance with the criteria laid down in a quality assessment schedule.

4 *Types of Emergency Lighting Luminaires*

Emergency lighting luminaires can be produced in the following types:

- 4.1 A dedicated luminaire for emergency lighting (not covered by this scheme).
- 4.2 A luminaire re-engineered for emergency use by the addition of an emergency lighting control kit. This luminaire may be self contained or slave.
- 4.3 A luminaire used as a slave from a central emergency power system.
- 4.4 A special variation of a dedicated emergency luminaire.
- 4.5 A luminaire re-engineered for emergency use by the addition of a dedicated light source and appropriate emergency lighting control kit.

5 *Marking*

- 5.1 Any modification of the original manufactured luminaire such as re-engineering, or addition, of any components within a luminaire will invalidate existing certifications or approvals and warranty of the luminaire. As such, the original label/ marks will be invalid and must be removed or indelibly obliterated. The luminaire must then be re-labelled to meet the requirements of EN 60598-2-22 and CE Marking, as detailed in the legal requirements of Section 2, and to give the identity of the modifying organisation.
- 5.2 Any luminaire used for emergency lighting operation should be clearly labelled as an emergency lighting luminaire in accordance with EN 60598-2-22 and should include a visible safety warning stating for example "this luminaire may be live although no lamp is operating". See also Appendix A.

6 Requirements

6.1 General

Tests verifying compliance to the LVD and EMC, such as those specified in EN 60598-2-22 and EN 55015 and any immunity and harmonics standards such as EN 61547 and EN 61000-3-2, are required. Especially when the location of components may be modified, tests will ensure that safety requirements and the maximum component temperature limits are complied with. The use of an approved emergency lighting control module and approved compatible battery will further demonstrate compliance.

When converting luminaires with LED products, to avoid damaging them by ESD (Electro-Static Discharge) mishandling, it is required that the advice in the LIA Technical Statement LIA TS12 is applied. See also BS EN 61340-5-1:2007 and BS EN 61340-5-2:2007.

A copy of LIA TS12 is available for free download from www.thelia.org.uk

6.2 Battery

The battery shall be compatible with the control module and be shown to have a design life of 4 years normal operation as specified in EN 60598-2-22 when located within the luminaire or remote enclosure.

6.3 The emergency lighting control module shall be compliant with:

For fluorescent lamps - safety to EN 61347-2-1, EN 61347-2-3, EN 6137-2-7 and for performance to EN 60925:

For LEDs - for safety to EN 61347-2-1, EN 61347-2-13 and for performance to EN 62384 and shall be installed and tested in accordance with the component supplier's instructions.

All additional components introduced as part of the re-engineering shall be shown to comply with the requirements of their own EN/IEC safety standards.

6.4 Compliance

The procedure of compliance to 6.1 to 6.3 should be shown in the Technical File (see Appendix B) and re-engineering work should be carried out within a System of Assessed Capability in an ISO 9001-2008 scheme environment.

6.5 Photometry

The re-engineered luminaire should be accompanied with the photometric data as defined in Appendix B.3.

7 *Component Compatibility*

7.1 Lamp Compatibility

The emergency circuit components shall be suitable for operating the lamp type specified, mode of operation, and for the number of intended/recommended times and duration the emergency circuit is to be operated.

7.2 Battery Compatibility

The type, number and size of cells shall be compatible with the emergency lighting controls module.

7.3 Component Compatibility

The emergency lighting control module shall be compatible with the normal mains lighting components and not adversely affect their life.

7.4 Verification of Compatibility Requirements

Proof of compatibility shall be included in the Technical File.

8 *Testing*

Testing shall be carried out in accordance with 8.1 and 8.2.

8.1 Initial Sample Tests

8.1.1 The luminaire should be tested in accordance with EN 60598-2-22.

Note; A remote unit should be treated as a recessed luminaire and thermally tested in a "test recess" (as defined in EN 60598-1 Annex D).

8.1.2 The luminaire shall be tested in accordance with EN 55015, EN 61000-3-2 and EN 61547 to confirm conformity to the EMC Directive.

8.1.3 The photometry should be made in accordance with ISO 30061 and CIE 121 Part 2-1. The photometry of emergency luminaires and the results used to produce scheme design data.

- 8.2 Production tests to be performed on every re-engineered luminaire
- (i) Testing shall be made in accordance with Annex Q of EN 60598-1.
 - (ii) Operational test – to check that the luminaire operates as intended including that the charge healthy indicator is illuminated and on disconnection of the supply that the emergency circuit operates the emergency lamp correctly.
 - (iii) When more than one source of supply is available at the luminaire they shall be tested for both safety and segregation.

Appendix A

A. Luminaire Layout

When re-engineering mains voltage luminaires it is generally necessary to re-arrange the internal component layout to accommodate the emergency lighting equipment and to obtain the satisfactory thermal performance. This shall be carried out in the following manner:

A.1 *The Internal Components*

The internal components of the luminaire should, where necessary, be arranged to ensure the optimum physical layout, thermal performance, safety and EMC conformity. While doing this, any wires or components that are not suitable (short wire, unsuitable mains gear, etc) should be replaced with suitable wires or components and wires routed to ensure EMC compliance and safety.

Where it is not practical to mount all of the emergency equipment within the luminaire then a remote enclosure should be used. Where this can be mounted within one metre of the luminaire, the requirements of EN 60598-2-22 should apply. Separation of the remote enclosure of greater than one metre will require additional appropriate fire protection of the cable in accordance with BS 5266 and the relevant Harmonised Documents.

Note: If a remote enclosure is used the effect of the cabling must be checked to ensure that the operation of both the emergency and mains circuits are not adversely effected.

Full regard shall be paid to the requirements of EN 60598-2-22, EN 55015 and EN 61547 for both the luminaire and the re-engineered enclosure where appropriate.

- A.2 The unswitched mains supply connection to the emergency equipment shall be clearly identified.
- A.3 Marking, meeting the requirements of EN 60598-2-22, clause 22.5, shall be applied and where applicable be fixed to the luminaire.

Note: For recessed luminaires this information may be marked on the interior of the luminaire so that it is visible when the light controlling cover is removed.

- A.4 The location of the charger indicator shall enable it to be readily visible when the luminaire is installed.

Appendix B

B. Technical Files

Technical Documentation for CE Marking: To the CE Marking Directive, EMCD, and LVD (and CPD when applicable).

The Technical Documentation should be provided in three parts to facilitate the consultation, administration and performance aspects. B1 is the re-engineering company's CE declaration of conformity, B2 the proof of conformity relating to the design and production controls, and B3 the evidence of product performance. These need not be held in a dedicated Technical File so long as they are traceable and adequate control is provided by the manufacturer's System of Assessed Capability. Technical Files shall be retained for at least ten years.

B.1 CE Declaration of Conformity

This should contain:

- Name and address of the company or authorised representative undertaking the re-engineering.
- Description and data sufficient to identify the product.
- A reference to applicable harmonised standards.
- Where appropriate, a reference to the specifications (e.g. installation instructions) with which conformity is declared.
- Identification of the signatory who had been empowered to enter into commitments on behalf of the re-engineering company or his authorised representative.
- Date on which CE Marking was affixed.

B.2 Proof of Conformity

This should include:

- A general description of the electrical equipment.
- Design and manufacturing data and schemes of components, sub-assemblies, circuits etc.
- Descriptions and explanations necessary for the understanding of the data and schemes referred to above and for the operation of the electrical equipment.
- Results of design calculations, examinations carried out, including evidence of compatibility see Section 7.
- Test Reports as defined in B3.
- Statement on quality approvals.

B.3 Evidence of Product Performance

Verification of product performances should be given, i.e. the results recorded, the test equipment and test procedures used.

Appropriate performance requirements vary with the type of luminaire but minimum conditions are:

B.3.1 A Luminaire Re-engineered for Emergency Use – Self Contained

- (i) Lamp Light Output – initial and end of discharge – this may be obtained by multiplying the relevant Ballast Lumen Factor, the appropriate Minimum Lumen Factor (MLF detailed in ICEL 1001) and service factors, including maintenance factor, by the initial lamp lumens quoted by the lamp manufacturer.
- (ii) Intensity Distribution – The manufacturer shall make available the intensity distribution data's necessary for the calculation of the emergency lighting installation according ISO 30061. The intensity data in emergency mode may be provided in candelas or in relative cd/1000 lm.
- (iii) Spacing information for the luminaire shall be derived from above data.
- (iv) Duration – assessed in accordance with EN 60598-2-22.
- (v) Component Temperatures – that no temperature ratings have been exceeded.
- (vi) Supply Voltage Range – within which the luminaire will meet EN 60598-2-22 requirements for the intended market.
- (vii) Environment – maximum and minimum ambient temperature compliance and appropriate IP rating.
- (viii) Fire retardant parts – evidence of compliance of the enclosure, with the appropriate section of EN 60598-2-22 and a glow wire test temperature of 850°C unless complying with cl 22.15.
- (ix) EMC – evidence of compliance is required.

B.3.2 A Luminaire Re-engineered for Emergency Use – Centrally Supplied

- (i) Lamp Light Output – initial and end of discharge – this may be obtained by multiplying the relevant Ballast Lumen Factor, the appropriate factor to allow for supply cable voltage drop, and the appropriate Minimum Lumen Factor (MLF detailed in ICEL 1001) and service factors, including maintenance factor, by the initial lamp lumens quoted by the lamp manufacturer.

- (ii) Intensity Distribution – the manufacturer shall make available the intensity distribution data's necessary for the calculation of the emergency lighting installation according ISO 30061. The intensity data in emergency mode may be provided in candelas or in relative cd/1000 lm.
- (iii) Spacing information for the luminaire shall be derived from above data.
- (iv) Power Consumption – is required both in Watts and VA together with details of the starting surges as this is essential for assessing system compatibility and duration. Tungsten luminaires can be used with a variety of lamp ratings, therefore, the system engineer must ensure the correctly rated lamp is always used.
- (v) Component Temperatures – that no temperature ratings have been exceeded.
- (vi) Supply Voltage Ranges – must be defined for mains and emergency supplies.
- (vii) Environment – maximum and minimum ambient temperature compliance and appropriate IP rating.
- (viii) Fire Retardant Parts – evidence of compliance of the enclosure, with the appropriate section of EN 60598-2-22 and a glow wire test temperature of 850°C unless complying with cl 22.15.
- (ix) EMC – evidence of compliance is required. The luminaire should be assessed for EMC with the full range of supply voltages and types for which the unit was designed. If compliance is dependent upon any factor for example “earth screened supply cable” this must be clearly identified on the installation instructions and to the system designer.

B.3.3 A Luminaire Used as a Slave from an AC supplied Central Emergency Power System.

- (i) Lamp Light Output – initial and end of discharge – this may be obtained by multiplying the relevant Ballast Lumen Factor, the appropriate factor to allow for supply cable voltage drop, and the appropriate Minimum Lumen Factor (MLF detailed in ICEL 1001) and service factors, including maintenance factor, by the initial lamp lumens quoted by the lamp manufacturer.

- (ii) Intensity Distribution – as the manufacturer shall make available the intensity distribution data's necessary for the calculation of the emergency lighting installation according ISO 30061. The intensity data in emergency mode may be provided in candelas or in relative cd/1000 lm.
- (iii) Spacing information for the luminaire shall be derived from above data.
- (iv) Power Consumption – is required both in Watts and VA together with details of the starting surges for assessment of system compatibility and duration.
- (v) Component Temperatures – that no temperature ratings have been exceeded.
- (vi) Supply Voltage Range must be defined. If normal mains luminaires are to be used on non sinusoidal supplies, tests must also be made on the emergency supply to confirm that the temperature rating of components is not being exceeded and that the EMC requirements are met.
- (vii) Environment – maximum and minimum ambient temperature compliance and appropriate IP rating.
- (viii) Fire Retardant Parts– evidence of compliance of the enclosure, with the appropriate section of EN 60598-2-22 and a glow wire test temperature of 850°C unless complying with cl 22.15.
- (ix) Glow Starters. Particular reference should be made to EN 60598-2-22, clause 6.1, regarding the use of glow starters.
- (x) EMC – evidence of compliance is required. The luminaire must be tested for EMC with the full range of supply voltages and types for which the unit was designed. If compliance is dependent upon any factor for example “earth screened supply cable” this must be clearly identified on the installation instructions and to the system designer.

B.3.4 Special Variants of Dedicated Luminaires

The impact of re-engineering will require appropriate tests to demonstrate compliance. These should be identified and the components and tests made and recorded.

B.3.5 Spacing Information

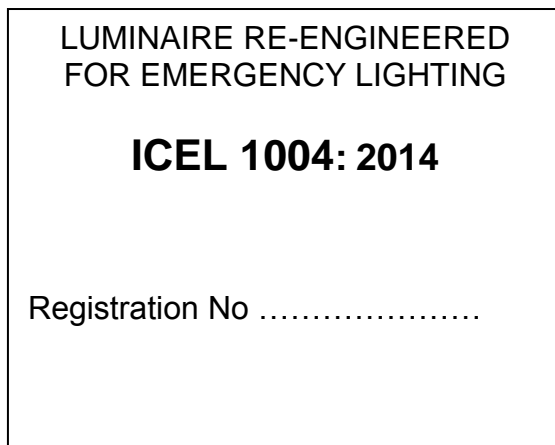
The competent person may produce tables that should simultaneously fulfil the centre line, centre band, glare and uniformity criteria or provide complete set of input data for computer programmes.

Appendix C

Certification and Assessment Labelling

The luminaires re-engineered 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 installation leaflet or literature or all combinations.

C.1 Self Certification in Accordance with this Guide



OR



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

- (i) Independently accredited to ISO 9001:2008 and their scope giving appropriate schedules for design, testing and re-engineering of luminaires for emergency lighting use.
- (ii) Registered with ICEL and entered their Registration Number on the label.
- (iii) Acceptance of product audit by ICEL or it's representative

C.2 Inspection and Testing Labelling

All modified luminaires shall bear a signed "inspected and tested" label or other suitable similar marking and shall be marked in such a way that the date and method of manufacture can be traced. Such information shall be distinctly and durably marked on the luminaire in a position where it can be seen during maintenance, if necessary after the removal of covers or similar components.



Were EMC tests for harmonics and immunity, conducted and radiated emissions, satisfactory?
Has documentation of the modification been made and retained as required by CE rules?
Have 100% of re-engineered units been operationally and safety tested?
Do all re-engineered luminaires comply to the requirements of ICEL 1004?
Signed by competent person: Date:
On behalf of modifying organisation: Name..... ICEL Registration Number:

E. BIBLIOGRAPHY

Relevant Standards

BS/EN 60598-1	Luminaires Part 1: general requirements & tests
BS/EN 60598-2-22	Luminaires for emergency lighting
EN 55015	Limits and methods of measurement of radio interference characteristics of fluorescent lamps and luminaires
EN 61000-3-2	Harmonics standard
EN 61347-1	Lamp controlgear – General and safety requirements
EN 61347-2-3	A.C. supplied electronic ballasts for tubular fluorescent lamps
EN 61347-2-13	Controlgear for LED modules
EN 61347-2-7	D.C. supplied electronic ballasts for tubular fluorescent lamps for emergency lighting
EN 61547	Immunity limits
ISO 9001: 2008	Standards for quality assurance
ICEL 1001	The photometry of battery operated emergency lighting luminaires

Relevant Directives

Low Voltage Directive (2006/95/EC)
Electro Magnetic Compatibility Directive (2004/108/EC)
Construction Products Directive (89/106/EEC)

List of ICEL Members

A list of ICEL members currently registered to this scheme is available from:

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