NATIONAL PRODUCT SAFETY GROUP.

UK practitioner experts for product safety & compliance.

Supported by the Office for Product Safety & Standards.

Guidance Note on the safety enforcement of electrical cells intended for consumer applications.

1. Scope.

A Guidance Note for Trading Standards Practitioners on the safety of consumer electrical cells supplied for general consumer use. A brief signpost reference is also made to their transportation and associated waste/environmental legislation; however, this Note does not include:

- products designed for commercial equipment
- products specifically designed to fit certain consumer products or consumer machinery
- nor products already located within toys, consumer machinery or other consumer products where there already exists product specific safety legislation.

2. Definitions.

The following definitions are taken from the most recent non-legislative European safety standards. There also exist similar definitions contained in the older waste/environmental regulations.

Cell – a basic functional unit, consisting of an assembly of electrodes, electrolyte, container, terminals and usually separators that is a source of electric energy obtained by direct conversion of chemical energy.

Battery **-** one or more cells electrically connected and fitted in a case, with terminals, markings and protective devices etc, as necessary for use.

Primary cell or battery - a cell or battery that is not designed to be electrically recharged.

Secondary cell or battery – a cell or battery that is designed to be electrically recharged.

Button or coin cell - a small round cell where the overall height is less than the diameter. A metal can forms the bottom body and positive terminal of the cell. An insulated top cap is the negative terminal.

Small cell/battery – a cell or battery fitting entirely within the limits of the truncated cylinder. As per the harmonised standard on the Safety of Toys – Mechanical and physical properties EN71-1. Clause 8.2. This may be a button/coin cell or other.

3. Legal compliance framework.

There is no UK nor EU product specific safety legislation for cells within the scope of this Note. In particular there is no product specific safety legislation:

- requiring CE marking
- prescribing specific conformity documentation or
- requiring conformity attestation procedures.

However, the maintenance and storage of suitable quality assurance records will assist an economic operator in illustrating their establishment of a due diligence system to Trading Standards under the non-product specific legislation - below.

To assist, there are numerous supporting voluntary European safety standards upon which an assessment of product safety may be made – as below. Additionally, there are comprehensive environmental performance/waste and safety of transport legislation and standards. Where these latter requirements are not met - this may be an indication that product safety legal requirements are also not met.

Certain European safety standards – as below – require cells to be labelled in a specified manner. However, the standards are not harmonised and there may be failings found by officers in the product or in its packaging/labelling that are not addressed by the standards. For example, the use of multiple language labelling should not impact on the legibility of the suitable warnings due to the text size being reduced.

There is no requirement or permission to mark cells with CE marking and should this be prevented under article R12.4 of EU Decision 768/2008 and article 30.2 of EU Regulation 765-2008. The recycling logotypes – mobius loop or green dot – are both voluntary labelling. Apart from the Directive 2001/95/EC on General Product Safety (detailed below) the only other compulsory labelling is prescribed in the environmental performance/waste legislation:

- the “crossed-out wheeled bin”, symbol - without the bar below it
- for rechargeable cells - the electrical capacity marking in milliampere-hours (mAh) or ampere-hours (Ah), and
- the chemical symbol Hg when containing more than 0.0005% mercury, the chemical symbol Cd when containing more than 0.002% cadmium and the chemical symbol Pb when containing more than 0.004% lead. If the content is higher for more than one of the substances in question, all relevant chemical symbols shall be marked

in a visible, legible and indelible format. This should be on the product but there is a small product labelling exemption where it is allowed on the retail packaging.

3.1 Directive 2001/95/EC on General Product Safety (GPSD). Implemented within the UK by the General Product Safety Regulations 2005 SI 1803, as amended by the Consumer Rights Act 2015 SI 1630 and the European Union (Withdrawal) Act 2018 / The Product Safety, Metrology and Mutual Recognition Agreement (Amendment) (EU Exit) Regulations 2019 SI 1246. Trading Standards enforce this legislation for products within the scope of this Note. Further general guidance can be found here: CTSI Guidance .
In particular:

- professional products that have migrated to the consumer market are included (recital 10)

- products likely, under reasonably foreseeable conditions, to be used by consumers even if not intended for them – are also included (article 2(a))

- products must be particularly assessed by producers as safe for the intended category of consumer – in particular vulnerable consumers e.g. young children or consumers using the product in a higher risk situation, e.g. high energy cells used in products continually used adjacent to the human body (recital 8)

- only "safe" consumer products shall be placed on the market (article 3.1). i.e. any product which under normal or reasonably foreseeable conditions of use presents no risk or only the minimum risk compatible with the product's use and which is consistent with a high level of protection for consumers.

- producers shall "adopt measures commensurate" with the characteristics of the cell/battery products to enable them to be informed of risks and to take appropriate action, e.g. by marking the product or the packaging with identity of the producer and a satisfactory product reference - (article 5).

  "Commensurate measures" includes the traceability of both the product and the economic operator. In particular - except where it is not reasonable to do so - an indication by means of the product or its packaging of:
  - the name and address of the producer
  - the product reference or, where applicable, the batch of products to which it belongs.

"Producer" is defined as:

(a) the manufacturer of a product, when he is established in a Member State and any other person presenting himself as the manufacturer by affixing to the product his name, trademark or other distinctive mark, or the person who reconditions the product

(b) when the manufacturer is not established in a Member State—

(i) if he has a representative established in a Member State, the representative,

(ii) in any other case, the importer of the product from a state that is not a Member State into a Member State;

(c) other professionals in the supply chain, insofar as their activities may affect the safety properties of a product.

4. Supporting voluntary standards for the GPSD.

There are no harmonised European safety standards offering a presumption of conformity for economic operators but there are extensive European standards which have been sourced from International (global) standards. Some of these standards contain safety provisions and their references are reproduced below. Certain standards and authoritative guidance use the term "battery"– particularly in the title - to refer to both cells and batteries. Because these voluntary safety standards have evolved in a piecemeal way – care must be taken to ensure the product falls within the scope of the standard.

4.1 EN IEC 60086 series on primary batteries:

- EN IEC 60086-1:2016 Primary Batteries. General. This document standardises the dimensions, nomenclature, marking and some test methods, for primary batteries. It refers only briefly to safety and environmental aspects. Annex G contains a general code of practice for the packaging, shipment, storage, use and disposal but does not contain detailed tests. For example, they should be adequately packaged to prevent moisture ingress or to prevent short circuits.

- EN IEC 60086-2:2016 Primary batteries. Physical and electrical specifications. This document has little product safety relevance. It specifies the physical dimensions, discharge test conditions and discharge performance requirements.

- EN IEC 60086-3:2016 Primary batteries. Watch batteries dimensions, designation. Not a safety standard but may be relevant when determining the cell dimensions and chemical make up for subsequent safety assessment.

All cells and batteries have standardised codified names. These are most commonly drawn from the International Electrotechnical Commission (IEC) standard. An example is the CR2032 coin cell. The first letter, C, denotes that the cell chemistry is Lithium. The R denotes that the cell is round. Cells can also be Flat (F), Square (S), or Not Round (P). The three- or four-digit reference numbers indicate the size of the cell. The very common button cell 2032 indicates that the cell is nominally 20 mm in diameter and 3.2 mm thick – rounded down to the next whole number. However, manufacturers often use their own labelling for marketing and brand loyalty purposes and there are other sets of naming standards used around the world such as the American National Standards Institute (ANSI) standard.

- EN IEC 60086-4:2019. Primary batteries. The safety of lithium batteries. This recent document specifies voluntary safety tests and requirements for primary lithium cells to ensure their safe operation under intended use and reasonably foreseeable misuse e.g. tests for short circuit failure, for leakage failure etc. The standard specifies cautionary markings, cautionary pictograms and instructions. Additionally, the safety standard introduces a voluntary packaging performance test for the higher risk coin cells with a diameter of 16 mm and larger. In particular the annex E2 bending, torsion, tearing and pushing tests.

- EN IEC 60086-5:2016. Primary batteries. The safety of batteries with aqueous electrolyte. This standard generally replicates for the cells within scope of the safety requirements of the above EN IEC 60086-4:2019.

- EN IEC 60086-6: 2019. Primary batteries. This standard provides guidance on the scientific protocols for testing the environmental performance of cells; the symbols used to convey messages for collection, recycling, or other ideas; and the aspects and functional unit(s) to be included in assessing the environmental impact of batteries with modern life-cycle analysis techniques.

4.2 EN IEC 62133 series on the safety of portable secondary (rechargeable) cells and batteries:

- EN 62133-1:2017 Secondary cells and batteries containing alkaline or other non-acid electrolytes — Safety requirements for portable sealed secondary cells, and for batteries – Nickel Systems. This standard specifies requirements and tests for the safe operation of portable sealed secondary nickel cells and batteries containing alkaline electrolyte, under intended use and reasonably foreseeable misuse. It includes voluntary safety guidance on packaging and labelling – including button cells.

- EN 62133-2:2017 Secondary cells and batteries containing alkaline or other non-acid electrolytes — Safety requirements for portable sealed secondary cells, and for batteries - Lithium systems. This standard specifies requirements and tests for the safe operation of portable sealed secondary lithium cells and under intended use and reasonably foreseeable misuse. It replicates part 1 but for lithium cells.

4.3 EN 61951 series on Secondary cells and batteries containing alkaline or other non-acid electrolytes. Secondary sealed cells and batteries for portable applications. This is not a safety standard but rather specifies marking, designation, dimensions, tests and requirements for secondary sealed nickel-cadmium and nickel-metal hydride cells and batteries.

4.4 EN 61959. Secondary cells and batteries containing alkaline or other non-acid electrolytes – Mechanical tests for sealed portable secondary cells and batteries. This standard specifies mechanical tests for portable secondary (rechargeable) cells and batteries during handling and normal use. It deals with the popular chemical systems of secondary cells.

5. Particular safety hazards.

5.1. Button cells/batteries.

Button cells/batteries are attractive to small children, they may put them in their mouths and swallow them. The ingested product can cause significant damage to internal organs as it reacts with bodily fluids, such as mucus or saliva, creating a circuit which can release an alkali that is strong enough to burn through human tissue. More than 50% of serious outcomes due to button/coin cell ingestion occur after an unwitnessed ingestion.

The mechanism of injury from impacted button/coin cells involves the generation of hydroxide ions at the negative pole of the cell causing liquefactive necrosis of surrounding tissues. The effects of this process are particularly severe when a product is lodged in one location (e.g. oesophagus, nostril) for more than one hour.

Child resistant packaging and safety labelling.
The safety risk to children from button batteries/cells arises when children can gain access to the products so reducing child access to small cells/batteries, regardless of size or chemistry, is essential.

Child resistant packaging should be used to create a physical barrier between a child and a potentially hazardous product and designed in a way that limits the ability for a child to access the product from the packaging. For example, the packaging does not permit the products to all spill out of the packaging.

Additionally, the labelling of products and their packaging with appropriate instructions and warnings offer an opportunity to educate and warn consumers about the potential hazards associated with batteries. Appropriate labelling can be found in the relevant safety standards for guidance.

5.2. Particular hazards – replacement cells/batteries for vaping products.

There have been particular concerns regarding the supply of replacement cells/batteries for vaping products – in particular that the replacement products were not designed to replace the original cells/batteries in the vaping product but rather the products were originally risk assessed and designed for non-vaping product purposes. As these products

are intended for higher risk scenarios where the product is contained in or adjacent to the mouth – information is required whether the products:

- are compatible regarding the electronic battery management system for the product
- are able to function under certain possible low resistance circuit conditions.

Further guidance should be sought from the established producer of the products.

6. Environmental / waste management legislation and supporting standards.
There is extensive legislation and supporting voluntary standards on this matter.

- **DIRECTIVE 2006/66/EC** on batteries and accumulators and waste batteries and accumulators (as amended by Directive 2008/12/EC, Directive 2008/103/EC and Directive 2013/56/EU). "The Batteries Directive".

- **Regulation (EU) No 1103/2010** regarding capacity labelling of portable secondary (rechargeable) and automotive batteries and accumulators.

Implemented in the UK by:

- **The Batteries and Accumulators (Placing on the Market) Regulations 2008 SI 2164**, as amended 2015, and the Waste Batteries and Accumulators (Charges) Regulations (Northern Ireland) 2009 SI 157.

- **The Waste Batteries and Accumulators Regulations 2009** as amended 2015.

These are enforced by OPSS on behalf of BEIS and more information can be found here:
OPSS BEIS guidance on waste / environmental rules

7. Packaging of cells & batteries for commercial transport - legislation and supporting standards.
There are international rules for the safe transport of dangerous goods by land, sea, inland waterway and air which are co-ordinated globally by the United Nations Economic Commission for Europe (UNECE or UN). All lithium cells and batteries are classified as dangerous for transport and there also requirements in place for other types of batteries (e.g. sodium, nickel-metal, acid, alkali). The requirements cover classification, packaging, marking and labelling of the packaging and placarding of the mode of transport used.

7.1 UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria. 7th revised edition 2019 Part III, subsection 38.3 p420. This legislation categorises lithium batteries as class 9 — "miscellaneous dangerous substances and articles" (other battery types fall under different classification) and before being permitted

to be transported they must be tested by the manufacturer and meet the criteria as stated in the manual. Some of the tests are similar to the product safety standards but the emphasis is more concerned with the safe transport of the product. Due to the hazards associated with lithium batteries, they are “articles” and are assigned their own UN numbers. Particularly relevant to this Note are:

- UN 3480 — lithium ion batteries (including lithium ion polymer batteries)
- UN 3481 — lithium ion batteries contained in equipment, or lithium ion batteries packed with equipment (including lithium ion polymer batteries).

The Manual supplements:

- The UN, "**Recommendations on the Transport of Dangerous Goods, Model Regulations**" and
- The UN "**Globally Harmonized System of Classification and Labelling of Chemicals (GHS)**".

A shipper of lithium cells/batteries must receive confirmation from the manufacturer or from their supplier that the cells/batteries have been tested and passed the UN 38.3 test series. From 1 January 2020 all the related national and international dangerous goods regulations will require manufacturers and distributors of lithium cells and batteries and equipment powered by cells and batteries to make available a “Test Summary” (for batteries manufactured after 30 June 2003) as specified in the UN Manual of Tests and Criteria, Seventh Revised Edition, Part III, sub-section 38.3, paragraph 38.3.5.

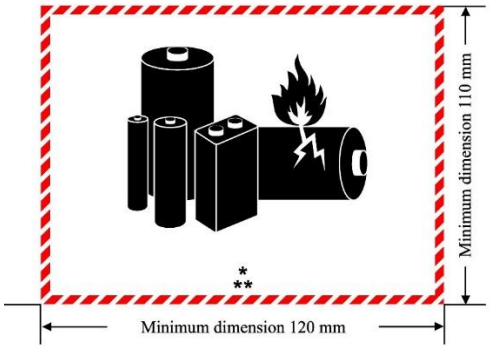
Lithium cells/batteries when transported, must follow the relevant international legislation for the mode of transport:

- for road —**the UNECE European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR 2019). Published: November 2018**
- for rail —**the Regulation concerning the International Carriage of Dangerous Goods by Rail (RID 2019). Published: November 2018**
- for inland waterways — **the European Agreement Concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN). (Note: The UK is not party to this Agreement)**
- for air — **the International Civil Aviation Organization (ICAO) Technical Instructions (TI) for the Safe Transport of Dangerous Goods by Air and the International Air Transport Association (IATA) Dangerous Goods Regulations**
- for sea — **the International Maritime Dangerous Goods Code (IMDG Code).**

7.2 European transposition.

Directive 2008/68/EC on the Inland Transport of Dangerous Goods (ITDGD) requires the UK to apply the provisions of ADR (road) and RID (rail), etc. Regardless of non-membership of the EU, the UK will remain a signatory state to these agreements.

For example, the requirements for lithium batteries in ADR for road transport are contained in section 2.2.9.1.7.. In addition, if a lithium battery meets the requirements of special provision 188 (which requires a "lithium battery mark" on the packaging), it is not subject to any of the other requirements of ADR. The lithium battery mark is as follows:



Lithium battery mark

* Place for UN number(s)

** Place for telephone number for additional information

7.3 UK enactment.

In the UK, the enacting regulations covering the safe consignment and carriage of lithium cells/batteries are:

- **Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 SI 1348 (CDG2009) amended by Carriage of Dangerous Goods and Transportable Pressure Receptacles (Amendment) Regulations 2011 (SI 2011 No. 1885) (CDG2011) and the Carriage of Dangerous Goods Regulations (2019).** These implement ADR and RID and set the legal framework in GB for road, and rail carriage. In Northern Ireland, separate but mirroring rules apply.

- **Air Navigation (Dangerous Goods) Regulations 2002 as amended 2017**. These implement the provisions of the ICAO Technical Instructions (TIs)for the Safe Transport of Dangerous Goods by Air. An amending statutory instrument is issued to apply the latest version of the ICAO TIs.

- **Merchant Shipping (Dangerous Goods and Marine Pollutants) Regulations 1997**. These implement the provisions of the International Maritime Dangerous Goods Code (IMDG). A Merchant Shipping Notice is issued to apply the latest version of the code.

There are different UK authorities responsible for enforcing the UK regulations for the safe transport by road, air and sea. Further contact information can be found here: **DOT on enforcement duties**

7.4 Supporting voluntary European standards.

EN IEC 62281:2019. Safety of primary and secondary lithium cells and batteries during transport. This standard specifies test methods and requirements for primary and secondary (rechargeable) lithium cells and batteries to ensure their safety during transport. This standard replaces the earlier standard of 2017 and deals with products other than for recycling or disposal. (However not referenced in the transport regulations).

In offering this advice NPSG wishes to make clear:

- only a court of law can interpret legislation with authority
- the advice is not intended to be a definitive guide to, or substitute for, the relevant law.
- the advice given is subject to revision in the light of further information
- NPSG advice is independent of the UK government or UK government agencies
- the advice is result of agreement between enforcement duty holders in the UK participating in the NPSG. Where other interested organisation are involved – this is indicated.
- independent legal advice should always be sought - if appropriate.

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