



Product Certifications

Lithium cell and battery certifications through industrial and international standards



Agenda

- 1** International safety standards and certifications
- 2** International performance standards
- 3** ATEX
- 4** REACH
- 5** RoHS
- 6** CE Marking



1

International safety standards and certifications



International **safety** standards

■ IEC 61438

- > Possible safety and health hazards in the use of alkaline secondary cells and batteries - Guide to equipment manufacturers and users



■ IEC 61959

- > Secondary cells and batteries containing alkaline or other non-acid electrolytes - Mechanical tests for sealed portable secondary cells and batteries

■ IEC 62133

- > Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications

■ IEC 62188

- > Secondary cells and batteries containing alkaline or other non-acid electrolytes - Design and manufacturing recommendations for portable batteries made from sealed secondary cells

International **safety** standards (example)

- This is **the** international standard for cell & battery **safety requirements**.
- All small format cells will have their safety measured in a standard and comparable way (for **seven** IEC equipment standards)
- Failure is not an option
- The driver is **Industry OEM's, Legislation and Law**



Ref	Safety Tests (IEC 62133:2011) Cells	Acceptance Criteria (cells)	INP 174565 Integration™
8.1.2	Conditioning	Pass	Pass
8.2.1	Continuous charge at constant voltage	NF, NE, NL	NF, NE, NL
8.3.1	*External short circuit	NF, NE	NF, NE
8.3.3	Free fall	NF, NE	NF, NE
8.3.4	*Thermal abuse	NF, NE	NF, NE
8.3.5	*Crush	NF, NE	NF, NE
8.3.7	Forced discharge	NF, NE	NF, NE
8.3.8	UN Manual of Tests & Criteria 38.3 (T1-T8)	Pass	Pass
8.3.9	*Design Evaluation - Forced internal short circuit	NF	NF

International **safety** standards require IEC 62133



- IEC 60601
 - > Medical electrical equipment
- IEC 60745
 - > Hand-held motor-operated electric tools – Safety
- IEC 60335 Household and similar electrical appliances
 - > Household and similar electrical appliances - Safety
- IEC 62368
 - > Audio/video, information and communication technology equipment - Part 1: Safety requirements
- IEC 60065
 - > Audio, video and similar electronic apparatus - Safety requirements
- IEC 60950 Information technology equipment
 - > Information technology equipment - Safety

International **safety** standards

- The international standard for the safety requirements of portable Li-ion, Ni-MH, Ni-Cd batteries and cells is regulated by the standard **IEC 62133**
- The IECEE Certification Management Committee (CMC) recently scheduled the introduction of the IEC 62133 test requirements to be applicable to **batteries** used in Tools, IT ,Audio, Video, Household appliances, Technology equipment and Medical into its conformity assessment scheme (CB scheme).
- What does this mean?
 - > Your customers using batteries that are for equipment manufactured to the previous six IEC standards and where **conformity** to those standards is a required prerequisite, the equipment OEM will need to have the finished battery tested by a Certification Body Test Laboratory (CBTL) for compliance to the IEC 62133 standard.

International **safety** standards

- Underwriters Laboratories

- > Are the authors and maintainers of national (American) and international standards originally for insurance underwriting purposes



- UL 1642

- > Standard for Safety for Lithium Batteries

- UL 2054

- > Standard for Safety for Household and Commercial Batteries



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International performance standards and certifications



International **performance** standards



■ IEC 61951-1 ed2.1

- > Secondary cells and batteries containing alkaline or other non-acid electrolytes - Portable sealed rechargeable single cells - Part 1: Nickel-cadmium

■ IEC 61951-2 ed3.0

- > Secondary cells and batteries containing alkaline or other non-acid electrolytes - Portable sealed rechargeable single cells - Part 2: Nickel-metal hydride

■ IEC 61960 ed2.0

- > Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for portable applications

International **performance** standards (example)

30.11.2010

EN

Official Journal of the European Union

L 313/3



REGULATIONS

COMMISSION REGULATION (EU) No 1103/2010

of 29 November 2010

establishing, pursuant to Directive 2006/66/EC of the European Parliament and of the Council, rules as regards capacity labelling of portable secondary (rechargeable) and automotive batteries and accumulators

(Text with EEA relevance)

Article 3

Unit of capacity measurement

1. The capacity of portable secondary (rechargeable) batteries and accumulators shall be expressed in 'milliampere-hour(s)' or 'ampere-hour(s)', using the abbreviations mAh or Ah respectively.

Article 2

Determination of capacity

1. The electric charge that a battery or an accumulator can deliver under a specific set of conditions shall be considered as the capacity of the battery or the accumulator.
2. The capacity of portable secondary (rechargeable) batteries and accumulators shall be determined on the basis of IEC/EN 61951-1, IEC/EN 61951-2, IEC/EN 60622, IEC/EN 61960 and IEC/EN 61056-1 standards depending on chemical substances contained therein as specified in Annex II, Part A.
3. The capacity of automotive batteries and accumulators shall be determined on the basis of standard IEC 60095-1/EN 50342-1 depending on chemical substances contained therein as specified in Annex II, Part B.

International **performance** standards (example)

- This is **the** comparative measurement for **performance**.
- All small format rechargeable batteries will have their performance measured in a standard and comparable way.
- EU directive <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32010R1103:EN:NOT>



Ref	Performance tests (IEC 61960)	Performance Criteria (cells)	INP 174565 Integration™
3.5	Rated capacity	C ₅ Ah	4.25
5.3	Cell designation	A ₁ A ₂ A ₃ N ₂ /N ₃ /N ₄	INP19/45/65
7.2.1	Discharge (+20°C) Ah	100% C ₅ Ah	100%
7.2.2	Discharge (-20°C) Ah	30% C ₅ Ah	100%
7.2.3	High rate discharge (+20°C) Ah	70% C ₅ Ah	100%
7.3	Charge (capacity) retention	70% C ₅ Ah	100%
7.3	Charge (capacity) recovery	85% C ₅ Ah	100%
7.4	Capacity recovery after storage	50% C ₅ Ah	90%
7.5.1	Endurance in cycles	400 cycles	850
7.5.2	Endurance in cycles (accelerated)	60% C ₅ Ah	95%
7.6.1	Internal AC resistance	mΩ	21
7.6.2	Internal DC resistance	mΩ	21
7.7	Electrostatic discharge (ESD)	Not applicable	---



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ATEX



ATEX. often mentioned – rarely understood!

- ATEX : the French acronym « ATmospheres EXplosives »
- European 94/9/EC directive
 - equipment and protective systems intended for use in potentially explosive atmospheres
- **Not similar** to any other 99/92/EC directive
 - Applies to the safety and health of workers
- Explosive atmospheres
 - Flammable gases and dusts: Methane, hydrogen
 - Mines, grain silos, gas pipelines, ...
- ATEX products : safety torches, gas detectors, ...



ATEX Directive : 94/9/CE

- Aim: to allow free trade of concerned equipment within the EU
- Who: manufacturer/supplier of the end-user product
- Scheme: known as IECEx, run by *Notified Certified Bodies*
 - > Inspection, testing, auditing
- Marking: CE marking, + Ex : part of the CE mark when relevant
 - > CE mark applies on final product, Ex also and eventually on components



LCIE II 2 G/D Ex ib IIC T4 -25°C < Ta <60°C IP51

Intrinsic safety standard (IEC 60079-11)

- The IS standard is part of ATEX and applies to:
 - Wiring, circuitry, connectors, plugs, fuses, converters, ...
- IS standard items applicable to cells:
 - Short-circuit test (3mΩ) without any protection feature to simulate an internal short:
 - No electrolyte leakage [10.5.2]
 - Maximum temperature classified from T1 to T6 [10.5.3b]
 - IEC62133 Compliant [ExTAG decision sheet DS2006/007]
- What can you give/say to customers:
 - INT 174565 cell is compliant with these items applicable at the cell level only (so, relevant to SAFT)
 - INT 174565 cell is T4 : meaning less than +135°C temperature rise at a +40°C ambient test temperature.

Example of an ATEX application

- Customer : Ion Science (UK)
- Product : 1P INT174565
- Qty : 1K to 2K / year
- Application : **PhoCheck[®] Tiger - Revolutionary VOC Detector**

- > accurate detection of volatile organic compounds (VOCs)
- > dynamic detection range of 1 parts per billion (ppb) to 20,000 parts per million (ppm)



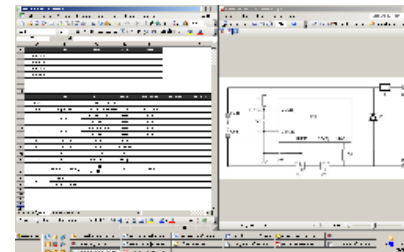
Several Saft products are ATEX IS compliant



As an example; what Saft can offer ?

■ Saft offer:

- INT174565 bare cell
 - With sleeve : P/N 07674Z
 - Without sleeve P/N 07485C
- Certificate from DEKRA
 - Compliance to the relevant parts of the IEC60079-11
 - Temperature classification : T4, +135°C max.
- Technical assistance on battery assembly on request
- Standard circuit or design share
 - GP16385



What about MSHA ?



- MSHA is the [Mine Safety and Health Administration](#) of the US
- MSHA certificate needed for: US, Canada, Australia
 - > *(in applications related to mining)*
- Requirements are similar to ATEX, however some differences in interpretation have an impact on what products we can offer.



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REACH



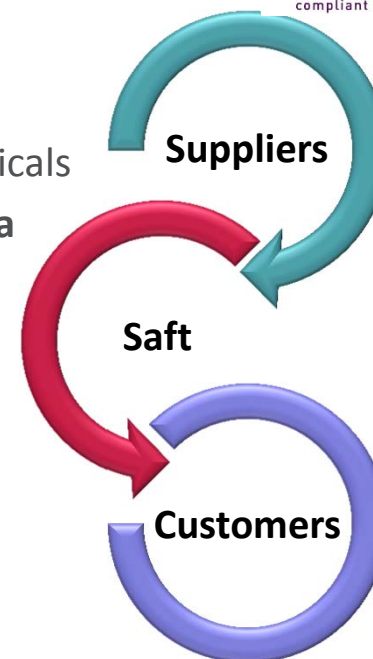
EU chemicals management policy: REACH

■ **Registration, Evaluation, Authorisation of CHemicals** : a single, coherent chemicals management system for new and existing chemicals – NO DATA, NO MARKET

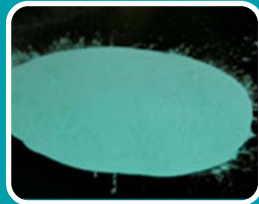


■ **Main objectives:**

- > To improve the protection of human health and the environment from the risks that can be posed by chemicals
- > To place every Substance of Very High Concern under a potential Authorisation Process
- > To enhance the transparency and the communication along the all supply chain of chemicals



REACH: Main definitions



SUBSTANCE:

- A chemical element and its compounds in the natural state or obtained by any manufacturing process (for instance $\text{Ni}(\text{OH})_2$)



PREPARATION:

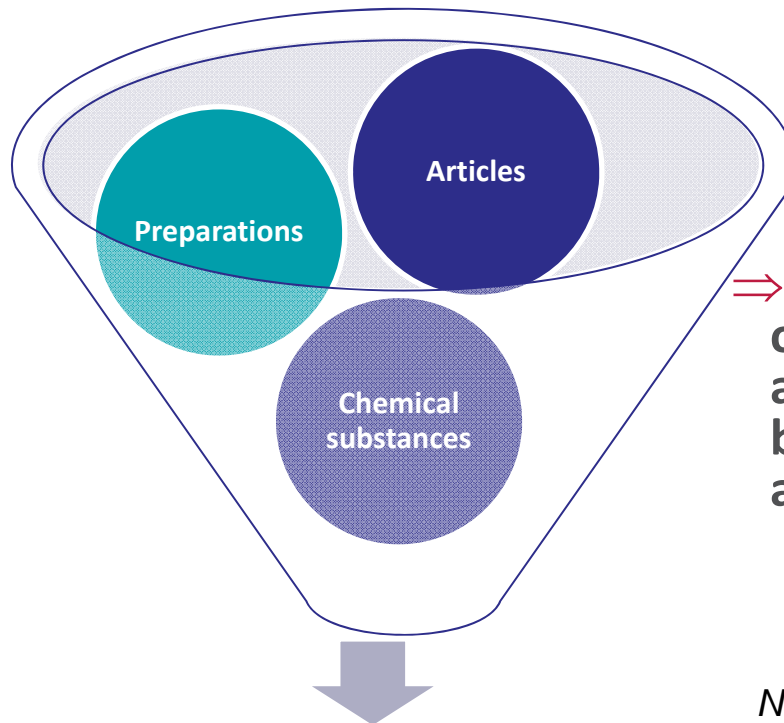
- Mixture or solution composed of two or more substances (without chemical reaction) (for instance an electrolyte, a resin)



ARTICLE:

- an object which during production is given a specific shape, surface or design which determines its function to a greater degree than does its chemical composition (for instance a nickel foam or a copper collector or a battery)

Saft's major activity: Manufacturer of articles



Batteries (=articles)

⇒ Saft is « Downstream User » of substances, preparations and articles to manufacture bigger articles (= batteries and battery systems)

NB: In a limited number of cases (<20), Saft is « Manufacturer/importer » of substances/preparations



Structure set up for REACH implementation

- **Several SRPMs** (Site Reach Project Manager) designed *for all European Saft legal entities*: interface with both technical and purchasing local teams, in charge of substances inventories and mailings with suppliers
- **One Reach Corporate Manager** (reporting to Patrick de Metz) in charge of general coordination, Saft's registration via REACH IT and participation to Reach consortia and SIEFs
- **Dedicated IntraSaft website**



Site Reach Project Managers in Europe



■ IBG:

- Bordeaux: Christiane Marty
- Nersac: Gilles Bertin
- Oskarshamn and Ferak: Sven-Erik Mattsson

■ SBG:

- Poitiers LBD: Fabrice Vigier
- Poitiers Defense: André Petit
- Poitiers Space : André Tortochaux
- Southshields : Alan Holmes
- Tadiran Germany and Friwo: Stefan Wagner

REACH (Registration, Evaluation, Authorization of **C**hemicals)



- REACH main goal
 - > To enhance scientific knowledge of chemical substances used within EU
 - > To limit the availability of substances of very high concern
- Obligations of manufacturers and importers of substances
 - > to register all chemical substances produced or imported at more than 1 ton per year per legal entity
 - > to assess the risks arising from their uses
 - > Substances of very high concern subject to authorization regardless of tonnage
- Regulation entered into force in June 2007
- Battery status
 - > Classified as *articles*
 - > **Do not fall within the registration obligation**

REACH regulation

■ Saft implemented actions

- > Extensive inventory of all substances manufactured and/or purchased by EU subsidiaries
- > Pre-registrations of substances manufactured by Saft or imported from non-EU suppliers
- > Best reasonable efforts to receive confirmation from EU-based suppliers that they have registered on time
- > Best identification efforts as regards the set of substances currently listed in the ECHA candidate list
- > Based on the information Saft received from its suppliers, no ECHA candidate list substances (above 0.1% w/w threshold) are intentionally incorporated into our Lithium product line manufactured in EU
- > Continuous monitoring of regulation evolutions





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RoHS



RoHS (Restriction Of the Use of Hazardous Substances)



■ RoHS main objective

- > Restriction of use of hazardous substances in electrical and electronic equipment
- > Protection of human health and environmental friendly disposal of waste

■ Prohibited substances

- > Lead (Pb)
- > Mercury (Hg)
- > Cadmium (Cd)
- > Hexavalent Chromium
- > Polybrominated Biphenyls (PBB)
- > Polybrominated diphenyl ethers (PBDE)

■ Battery status

- > Recital (9) of RoHS directive confirms that batteries are **out of scope**

ROHS directive



■ Actions implemented by Saft

- > Since 2006, voluntary compliance program with RoHS
- > Saft's Primary Lithium and Li-ion cells compliant with RoHS II (*certificate available*)
- > To the maximum extent, compliance at battery level
- > Exceptions:
 - Active materials used in the electrochemical heart of its batteries and accumulators (eg. Cd)
 - Batteries where the specification is frozen by our customer
 - Batteries where the quantity manufactured is so low that the costs would not be commensurate with the environmental benefits



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CE Marking



Why the CE mark?

- CE Marking is a European marking of conformity that indicates a product complies with the essential requirements of the applicable European laws or directives with respect to safety, health, environment and consumer protection.
- Generally, this conformity to the applicable directives is done through self-declaration.
- The CE Marking is required on products in the countries of the European Economic Area (EEA) to facilitate trade among the member countries.
- The CE Marking provides a means for a manufacturer to demonstrate that a product complies with a common set of laws required by all of the countries in the EEA to allow free movement of trade within the EEA countries.



What is CE marked and has portable batteries?

- Active implantable medical devices
- Eco-design of energy related products
- Electromagnetic compatibility
- Equipment and protective systems intended for ATEX use
- In vitro diagnostic medical devices
- Low Voltage Devices
- Machinery
- Measuring Instruments
- Medical devices
- Non-automatic weighing instruments
- Personal protective equipment
- Radio and telecommunications terminal equipment
- Safety of toys



<http://ec.europa.eu/enterprise/policies/single-market-goods/cemarking/>

Are batteries to be CE marked?

- If a battery is permanently fixed into a device of a category that requires a CE mark, then most likely **no**.
- If a battery is a readily removable accessory to a device that requires a CE mark, then most likely, **yes**.
- If a battery is a part of certain of devices requiring a CE mark (medical for example) then **yes**, the legislation pertaining to the category requires CE marking regardless of the above two points.
- Outside of the above three points a battery does not specifically require a CE mark.
- It is the customers responsibility to inform Saft that their device requires that the battery has a CE mark. They need to seek professional council in this regard.





About Saft

Saft (Euronext: Saft) is a world specialist in the design and manufacture of high-tech batteries for industry. Saft batteries are used in high performance applications, such as industrial infrastructure and processes, transportation, space and defence. Saft is the world's leading manufacturer of nickel batteries for industrial applications and of primary lithium batteries for a wide range of end markets. The group is also the European leader for specialised advanced technologies for the defence and space industries and world leader in lithium-ion satellite batteries. Saft is also delivering its lithium-ion technology to new applications in clean vehicles and energy storage systems. With approximately 4,000 employees worldwide, Saft is present in 19 countries. Its 15 manufacturing sites and extensive sales network enable the group to serve its customers worldwide. Saft is listed in the SBF 120 index on the Paris Stock Market. **For more information, visit Saft at www.saftbatteries.com**

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