Release note

Li-SAFE Methodology – version 1.0

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Revision	Date	Description of the modification	Author
1.0	30-09-2014	Release note for the Li-SAFE Methodology v1.0 release	Suzanne Van Poppel

Contents

1. Contents of the Li-SAFE Methodology release

1.1 Information database

1.1.1 Requirements

The information of following standards is new in this release:

ISO 6469 Part 1	Requirements for operational safety means and protection against failures related to hazards specific to electrically propelled road vehicles (EV's, FCV's, HEV's) up until 600V
ISO 6469 Part 2	Requirements for operational safety means and protection against failures related to hazards specific to electrically propelled road vehicles (EV's, FCV's, HEV's) up until 600V
ISO 6469 Part 3	Part 3: Protection of persons against electric shock
ISO 12405 Part 1	Electrically propelled road vehicles -- Test specification for lithium-ion traction battery packs and systems -- Part 1: High-power applications
ISO 12405 Part 2	Electrically propelled road vehicles -- Test specification for lithium-ion traction battery packs and systems -- Part 2: High-energy applications
ISO/IEC 17000	Conformity assessment - Vocabulary and general principles
ISO/IEC 16898	Electrically propelled road vehicles - Battery system design - Requirements on dimensions for lithium-ion cells for vehicle propulsion
ISO 17025	General requirements for the competence of testing and calibration laboratories
ISO 16750 Part 1	Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 1: General requirements
ISO 16750 Part 2	Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 2: Electrical loads
ISO 16750 Part 3	Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 3: Mechanical loads
ISO 16750 Part 4	Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 4: Climatic loads
ISO 16750 Part 5	Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 5: Chemical loads
IEC 62660 - Part 1	SECONDARY LITHIUM-ION CELLS FOR THE PROPULSION OF ELECTRIC ROAD VEHICLES - PART 1: PERFORMANCE TESTING
IEC 62660 - Part 2	Secondary lithium-ion cells for the propulsion of electric road vehicles - Part 2: Reliability and abuse testing
IEC 61851	ELECTRIC VEHICLE CONDUCTIVE CHARGING SYSTEM - PART 1: GENERAL REQUIREMENTS
CEI/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 60068-2-64	Environmental testing - Part 2: Test methods - Test Fh: Vibration, broad-band random (digital control) and guidance
IEC 1434	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Guide to designation of current in alkaline secondary cell and battery standards
IEC 62281	Safety of primary and secondary lithium cells and batteries during transport
EN 15194	Safety requirements and test methods for electrically power assisted cycles (EPAC's)
UL 1642	Standards for Lithium Batteries
UL 2054	Standards for Household and Commercial Batteries
UL 2580	Standard for batteries for use in electric vehicles
IEEE 1625	IEEE Standard for Rechargeable Batteries for Multi-Cell Mobile Computing Devices
IEEE 1725	IEEE Standard for Rechargeable Batteries for Cellular Telephones
SAE J2929	Safety Standard for Electric and Hybrid Vehicle Propulsion Battery Systems Utilizing Lithium-based Rechargeable Cells
SAE J2344	Guidelines for Electric Vehicle Safety.
SAE J2464	EV & HEV Rechargeable Energy Storage System (RESS) Safety and Abuse Testing Procedure
SAE J2380	Vibration Testing of Electric Vehicle Batteries
SAE J2289	Electric-Drive Battery Pack System: Functional Guidelines
SAE J1798	Recommended Practice for Performance Rating of Electric Vehicle Battery Modules
SAE J1797	Recommended Practice for Packaging of Electric Vehicle Battery Modules
JIS C8714	Safety tests for portable lithium ion secondary cells and batteries for use in portable electronic applications
NEMA ANSI C8.2M Part 1: 2007	For portable rechargeable cells and batteries - general and specifications
NEMA ANSI C18.2M Part 2: 2007	For portable rechargeable cells and batteries - safety standard
BATSO 01	
DOE/ID-11069 October 2003	FreedomCAR Battery Test Manual for power-assist Hybrid Electric Vehicles, Ocober 2003
SAND 2005-3123 June 2005	Electric energy storage system - Abuse test manual for electric and hybrid electric vehicle applications; June 2005

SAND99-0497 July 1999	United States Advanced Battery Consortium Electrochemical storage system - abuse test procedure manual
TP-305-01 September 11, 2008	National Highway Traffic Safety Administration LABORATORY TEST PROCEDURE FOR FMVSS 305, ELECTRIC POWERED VEHICLES: ELECTROLYTE SPILLAGE AND ELECTRICAL SHOCK PROTECTION
INERIS	ELLICERT Référentiel de certification des cellules et packs pour véhicules électriques et hybrides rechargeables
Recharge	Lithium batteries – transport and packaging instructions

The information of following standards is updated in this release:

➔ As this is the first release of the portal no existing standards are updated.

For most of the standards the database contains only information on the main text of the standards and not on the appendices.

1.1.2 Recommendations

The database of recommendations contains:

- Recommendations derived from the HARA/HAZOP assessment of the battery lifecycle executed in WP1 of the Lithium ion battery safety project
- Recommendation derived from best practices
- Recommendation derived out of legislation

The information of following recommendations is updated in this release:

➔ As this is the first release of the portal no existing recommendations are updated.

1.1.3 Materials and components

The database of materials and components is derived from the literature study executed in WP3 of the Lithium ion battery safety project.

The information of following materials and components is updated in this release:

➔ As this is the first release of the portal no existing materials and components are updated.

1.1.4 Test laboratories

5 test laboratories are given and linked to the different testing steps in the design and development process:

- TASS International
- RDW
- Ineris
- Interek
- SGS

The information of following test laboratories is updated in this release:

➔ As this is the first release of the portal no existing test laboratories are updated.

1.2 Processes

The following table contains all processes (steps, flows and decisions) which are defined in this release or for which content is added or changed.

Defined flows, steps, decisions	Content	Remarks
0101_cell_design_and_development	v_1.0	
0100_cell_production	v_1.0	
0102_end_of_line_testing_cell	v_1.0	
0103_cell_passed_end_of_line_test	decision (no content)	
0104_cell_producer_also_module_producer	decision (no content)	
0105_are_cells_damaged	decision (no content)	
0106_cells_design_and_requirements	v_1.0	
0107_cells_marking_and_labelling	v_1.0	
0108_cells_testing	v_1.0	
0109_cells_documentation	v_1.0	
0200_module_assembly	v_1.0	
0201_unpacking_cells	v_1.0	
0202_check_measure_cell	v_1.0	
0203_cell_in_casing	v_1.0	
0204_connecting_cells	v_1.0	
0205_adding_electronics_management_system	v_1.0	
0206_closing_module	v_1.0	
0301_module_design_and_development	v_1.0	
0302_is_module_damaged_after_module_assembly	decision (no content)	
0303_is_module_repairable_after_module_assembly	decision (no content)	
0304_repair_module_after_module_assembly	v_1.0	
0305_end_of_line_testing_module	v_1.0	
0306_module_passed_end_of_line_test	decision (no content)	
0307_module_producer_also_pack_producer	decision (no content)	
0308_is_module_damaged_before_pack_assembly	decision (no content)	
0309_is_module_repairable_before_pack_assembly	decision (no content)	
0310_repair_module_before_pack_assembly	v_1.0	
0311_modules_design_and_requirements	v_1.0	
0312_module_monitor_control	v_1.0	
0313_modules_marking_and_labelling	v_1.0	
0314_module_testing	v_1.0	
0315_module_documentation_information	v_1.0	

0400_pack_assembly	v_1.0	
0401_unpacking_modules	v_1.0	
0402_check_measure_module	v_1.0	
0403_connecting_modules	v_1.0	
0405_add_cooling_system	v_1.0	
0406_add_electronics_management_system	v_1.0	
0407_close_battery_pack	v_1.0	
0501_pack_design_and_development	v_1.0	
0502_is_pack_damaged_after_pack_assembly	decision (no content)	
0503_is_pack_repairable_after_pack_assembly	decision (no content)	
0504_repair_pack_after_pack_assembly	v_1.0	
0505_end_of_line_testing_pack	v_1.0	
0506_pack_passed_end_of_line_test	decision (no content)	
0507_is_pack_damaged_before_vehicle_assembly	decision (no content)	
0508_pack_design_and_requirements	v_1.0	
0509_pack_monitor_control	v_1.0	
0510_pack_marking_and_labelling	v_1.0	
0511_pack_testing	v_1.0	
0512_pack_documentation_information	v_1.0	
0513_pack_approval_homolegastion	v_1.0	
0600_vehicle_assembly	v_1.0	
0601_preassembly	v_1.0	
0602_packs_damaged_after_preassembly	decision (no content)	
0603_mouting_battery_in_vehicle	v_1.0	
0604_commissioning	v_1.0	
0701_vehicle_design_and_development	v_1.0	
0702_is_vehicle_damaged	decision (no content)	
0703_repair_vehicle	v_1.0	
0706_vehicle_parking_lot	v_1.0	
0707_receiving_storage_garage	v_1.0	
0708_vehicle_to_customer	v_1.0	
0709_normal_use_by_customer	v_1.0	
0711_extract_battery_from_vehicle	v_1.0	
0713_bicycle	decision (no content)	
0714_bicycle_design_and_development	v_1.0	
0715_auto_bus_truck_design_and_development	v_1.0	
0716_auto_bus_truck_design_and_requirements	v_1.0	
0717_auto_bus_truck_thermal_management	v_1.0	
0718_auto_bus_truck_marking_labelling	v_1.0	

0719_auto_bus_truck_testing	v_1.0	
0720_auto_bus_truck_documentation	v_1.0	
0721_auto_bus_truck_type_approval	v_1.0	
0801_storage_packs_in_recycling_area	v_1.0	
0802_dismantling_process_packs	v_1.0	
0803_continue_process_1	decision (no content)	
0804_storage_modules_in_recycling_area	v_1.0	
0805_dismantling_process_modules	v_1.0	
0806_continue_process_2	decision (no content)	
0807_storage_cells_in_recycling_area	v_1.0	
0808_material_recycling	no content	No information from standards or recommendations added.
0809_pack_to_storage	decision (no content)	
0810_module_to_storage	decision (no content)	
0811_cell_to_storage	decision (no content)	
0900_transportation,(a,b,c,d,e,f,g)	v_1.0	Flow is 8 times defined (8xmls and 8 structure.xml. Reason: needed for SW to be able to cope with reoccurring processes
0901_transported_by_land	decision (no content)	
0902_transported_by_sea	decision (no content)	
0903_prepare_for_land_transport	v_1.0	
0904_prepare_for_sea_transport	v_1.0	
0905_prepare_for_air_transport	v_1.0	
0906_storage_transportation_process	v_1.0	
0907_transport_by_land	decision (no content)	
0909_transport_on_lorry	v_1.0	
0914_transport_by_sea	decision (no content)	
0917_unloading_ship	v_1.0	
0919_transportation_on_plane	v_1.0	
0927_in_same_package_land	decision (no content)	
0928_transported_by_land_without_equipment	v_1.0	

0929_in_equipment_land	decision (no content)	
0930_transported_by_land_in_equipment	v_1.0	
0931_transported_by_land_with_equipment	v_1.0	
0932_in_same_package_sea	decision (no content)	
0933_transported_by_sea_without_equipment	v_1.0	
0934_in_equipment_sea	decision (no content)	
0935_transported_by_sea_in_equipment	v_1.0	
0936_transported_by_sea_with_equipment	v_1.0	
0937_in_same_package_air	decision (no content)	
0938_transported_by_air_without_equipment	v_1.0	
0939_in_equipment_air	decision (no content)	
0940_transported_by_air_in_equipment	v_1.0	
0941_transported_by_air_with_equipment	v_1.0	
0942_transport_waste_land	decision (no content)	
0943_transport_waste_by_land	v_1.0	
0944_transport_waste_sea	decision (no content)	
0945_transport_waste_by_sea	v_1.0	
0946_transport_waste_air	decision (no content)	
0947_transport_waste_by_air	v_1.0	
0999_prepare_transport	v_1.0	
1000_internal_logistics (a,b,c,d,e,)	v_1.0	Flow is 5 times defined (4 xmls and 4 structure.xml). Reason: needed for SW to be able to cope with reoccurring processes
1001_receiving_zone	v_1.0	
1002_receiving_zone_unpacking	v_1.0	
1003_production_line	decision (no content)	
1004_packaging_internal_transport	v_1.0	
1005_components_to_storage	decision (no content)	
1006_packaging_for_storage	v_1.0	
1007_internal_transport_to_storage	v_1.0	
1008_specific_area	decision (no content)	
1009_storage_in_battery_specific_area	v_1.0	

1010_storage_in_normal_area	v_1.0	
1011_to_production	decision (no content)	
1012_internal_transport_to_line	v_1.0	
1013_storage	v_1.0	
1100_damaged_components (a,b,c,d)	v_1.0	Flow is 5 times defined (5 xmls and 5 structure.xml). Reason: needed for SW to be able to cope with reoccurring processes
1101_damaged_pacs	v_1.0	
1102_pack_producer	decision (no content)	
1103_disassembly_damaged_packs	v_1.0	
1104_reuse_pack_components	decision (no content)	
1105_reuse_good_components_after_pack_disassembly	v_1.0	
1106_damaged_modules	v_1.0	
1107_module_producer	decision (no content)	
1108_disassembly_damaged_modules	v_1.0	
1109_reuse_module_components	decision (no content)	
1110_reuse_good_components_after_module_disassembly	v_1.0	
1111_damaged_cells	v_1.0	
1112_recycling_damaged_cells	v_1.0	

1.3 Work products

The following work products are new in this release:

Name of work product	Information
LiSafe_mastertemplate_High energy.doc	Battery pack and system testing for High energy applications
LiSafe_mastertemplate_High power.doc	Battery pack and system testing for High power applications
Rescue and training manual vehicles eng version 2014 8 29.docx	Guide with specific information about the vehicle and the electric dangers for first (fire fighters, police, medical personal, EMT) and second responders (towing and maintenance personal). This document is a template made by CTIF Commission for Extrication and New Technology. Designer is Kurt VOllmacher (project leader).
Rescue and training manual Lithium ion battery in a vehicle 2014 08 16.docx	Information for first (fire fighters, police, medical personal, EMT) and second responders (towing and maintenance personal) rescue and training manual, high voltage Lithium-ion batteries. This document is a template made by CTIF Commission for Extrication and New Technology in cooperation with RECHARGE. Designer is Kurt VOllmacher (project leader).
LiSafe_IATA_DGR_Transport_Document.doc	Document for transportation according due to the IATA regulation
LiSafe_ADR_Transport_Document.doc	Document for transportation according due to the ADR regulation
LiSafe_IMDG_Transport_Document.doc	Document for transportation according due to the IMDG regulation
LiSafe_VehicleUserManual.docx	Vehicle user manual to give the customer next to the normal vehicle information, information on the risks on high voltage components and safety guidelines.

The following work products are updated in this release:

Name of work product	Information

➔ As this is the first release of the portal no existing work products are updated.

1.4 Guidelines

The following guidelines are included in this release:

Name of guideline	Information
LiSafe_UserManual.pdf	User manual for the Li-SAFE portal
Info Template training manual battery_ Li-ion 20140801.pdf	Information on the topics in the rescue and training manual, and the specific coloring. This document is a template made by CTIF Commission for Extrication and New Technology in cooperation with RECHARGE. Designer is Kurt Vollmacher (project leader).
Filled in template training manual battery_Li_ion_20140801.pdf	Example of the template 'Rescue and training manual battery for vehicle', made by CTIF Commission for Extrication and New Technology
Guidelines Template rescue and training manual vehicle Car 16 08 2014.pdf	Example of a 'Information for first and second responders rescue and training manual vehicle' sheet, made by CTIF Commission for Extrication and New Technology, Designer Kurt Vollmacher project leader.
Symbols to be used in the rescue and training manual and rescue sheet 20140625.pdf	Overview of the symbols used in the rescue and training manual for battery and for the vehicle.
LiSAFE_Standards_overviews.pdf	This document contains the meshes made in the Battery Safety project to identify the most important test and safety standards for Lithium-ion batteries
LiSAFE_Lithium-Ion batteries_storage guidelines.pdf	Document with guidelines for to store Lithium-ion batteries safely and guidelines on how to handle Lithium-ion batteries on fire
Information for rescue and emergency services lithium ion batteries in a storage facility.pdf	Example of a information sheet for rescue and emergency services concerning Lithium-ion batteries in storage facilities. This document is a template made by CTIF Commission for Extrication and New Technology in cooperation with RECHARGE. Designer is Kurt VOllmacher (project leader).

The following guidelines are updated in this release:

Name of guideline	Information

➔ As this is the first release of the portal no existing guidelines are updated.

2. Software of the Li-SAFE Methodology release

2.1 Front end

The following functionalities are introduced with this release:

- Graphical interface and navigation through the graphs
- Home page with tree view
- Search functionality
- Scaling functionality
- Query interface
- Comparison table of the tests described in the standards
- List of all general information of the standards
- Glossary list and list of symbol and abbreviations
- Page to browse the templates
- Function to add notes
- Function to send feedback to administrator
- Detailed information of steps and flows with links to information databases are accessible.

The following functionalities are updated with this release:

➔ As this is the first release of the portal no existing functionalities are updated.

2.2 Back end (administrator side)

The following functionalities are introduced with this release:

- The administrator can add all types of information
- The administrator can add, remove and changes roles of users
- The administrator can add steps and flows
- The administrator can export and import data to the server

The following functionalities are updated with this release:

➔ As this is the first release of the portal no existing functionalities are updated.

3. Known issues

1. The ‘scaled to’ attribute only has effect on the graying out of the flow when scaling is applied. If no scaling is applied the complete text is shown, without taken the ‘scaled to’ value into account.
   Example: If user opens transportation at cell level, info from modules and packs is also shown. If user scales the portal to module, transportation at cell level will be scaled out and the text in transportation at module level will only shown info about the modules.

2. Zooming and panning of the graph only works when pointer is on an element of the graph. This is due to chosen graphical package.

3. The glossary, symbols and abbreviations of a new standard cannot be easily added via the administrator interface of the portal. When a new standard is added, an extra xml-tag must be firstly defined in the glossary.xml and symbol_abbrevations.xml and in the corresponding xsd’s. Secondly the database model must be updated with the new tag. When this is done, the tag with a information field should appear in the administrator interface. From this moment on, the glossary, symbols and abbreviations values can be linked to this standard.

4. During the specification of the server, the following requirements was definef: The response time of Li-SAFE shall be less or equal to 1s for maximum of 5 simultaneous users without taking the data connection into account. Test results for the search function shows that this requirement is not met. The response times of the other functions faster.

4. AOB

Information to be added in a next release:

- Links between terms and their explanation in the glossary list and in the list of symbols and abbreviations
- Template for a ‘Workshop manual’. This was defined in the requirements but it is not available in this release