

## UL TEST REPORT AND PROCEDURE

<b>Standard:</b>	UL 62368-1, 3rd Ed, 2021-10-22 (Audio/video, information and communication technology equipment Part 1: Safety requirements) CAN/CSA C22.2 No. 62368-1:19, 3rd Ed, 2021-10-22 (Audio/video, information and communication technology equipment Part 1: Safety requirements)
<b>Certification Type:</b>	Component Recognition
<b>CCN:</b>	AZOT2, AZOT8 (Audio/video, Information and Communication Technology Equipment)
<b>Complementary CCN:</b>	BBFS2 (Batteries, Household and Commercial)
<b>Product:</b>	Rechargeable Li-Polymer Battery Pack
<b>Model:</b>	C41N2503
<b>Rating:</b>	15.6Vdc, 3174mAh/3082mAh/49.5Wh
<b>Applicant Name and Address:</b>	SIMPLO TECHNOLOGY CO., LTD. 471 PA TEH RD, SEC 2 HU KOU HSINCHU HSIEN 303 TAIWAN

This is to certify that representative samples of the products covered by this Test Report have been investigated in accordance with the above referenced Standards. The products have been found to comply with the requirements covering the category and the products are judged to be eligible for Follow-Up Service under the indicated Test Procedure. The manufacturer is authorized to use the UL Mark on such products which comply with this Test Report and any other applicable requirements of UL LLC ('UL') in accordance with the Follow-Up Service Agreement. Only those products which properly bear the UL Mark are considered as being covered by UL's Follow-Up Service under the indicated Test Procedure.

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UL authorizes the applicant to reproduce the latest pages of the referenced Test Report consisting of the first page of the Specific Technical Criteria through to the end of the Conditions of Acceptability.

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL.

Prepared By: Lily Su / Project Handler

Reviewed By: Richard Lin / Reviewer

- The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of : 45 degree C

- The following are available from the Applicant upon request : Installation (Safety) Instructions / Manual provided by end product
- The charging/ discharging specification are listed as below:
  - Maximum specified charging voltage/ current:
  - (1) 0°C to 15°C: 616mA to 4.5V/Cell;
  - (2) 15°C to 20°C: 1541mA to 4.5V/Cell;
  - (3) 20°C to 43°C: 3390mA to 4.25V/Cell, 2157mA to 4.5V/Cell
  - (4) 43°C to 45°C: 1541mA to 4.45V/Cell;
  - (Tested with 18V, 3624mA as the worst condition)
  
  - Max Discharging Power: 4.53A
  - End of discharge voltage is 12Vdc
- The product was investigated to the following additional standards:
  - IEC 62368-1:2018
  - EN IEC62368-1:2020+A11:2020
  - UL62368-1 3rd Edition, 2021-10-22
  - CSA Group CSA C22.2 No. 62368-1:2019, 3rd Ed, 2021-10-22
  - UL 2054 STANDARD FOR HOUSEHOLD AND COMMERCIAL BATTERIES - Edition 3 - Revision
  - Date 2022/03/10
  - IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021, EN 62133-2:2017/A1:2021
  - UN38.3 which represent IEC 62281 requirement
  - BS EN IEC 62368-1:2020 + A11:2020
  - J62368-1(2023)
- Annex M.4.4 was evaluated together with end product.

**Engineering Conditions of Acceptability**

For use only in or with complete equipment where the acceptability of the combination is determined by UL LLC. When installed in an end-product, consideration must be given to the following:

- The following output circuits are at ES1 energy levels : Whole battery circuit and output connector.
- The following output circuits are at PS3 energy levels : Battery output connector and Internal cell module
- The investigated Pollution Degree is : 2
- The following end-product enclosures are required : Fire and Mechanical Enclosure shall be provided and evaluated in end-product. If not provided in end-product, suitable evaluation shall be re-considered.
- The following components require special consideration during end-product Thermal (Heating) tests due to the indicated maximum temperature measurements during component-level testing : - PWB (130°C), - Cell (90°C), - Plastic frame, Label, Connector (80°C)
- Accessible parts: TS1, plastic parts, T (>1S and <10S)
- The product Battery Pack and Battery Cell were investigated to the following additional standards: UN38.3, which represent IEC 62281 requirement.
- This battery pack has been evaluated based upon manufacturer's specifications for charging, discharging and temperature limits. They have not been evaluated in combination with charger(s) or host product(s). Additional evaluation to determine compliance will be required on the combination(s) in the end product evaluation.
- Instruction safeguard to prevent reasonably foreseeable misuse: Shall be checked in end product's instruction. Symbol "see enclosure ID 7-05 for detail" is provided on battery pack body; Instructions to prevent reasonably foreseeable misuse of this battery pack and related warning should be considered and provided in the end product evaluation.
- The following parameters are used for Annex M.3 criteria:
  - Battery allowable temperature charging and discharging 90°C.

-- Overcharge caused by fault in battery with Pack's Q300, Q301 (pin 3-6) shorted, R502 (U100) opened, RT200, RT201, and all thermostats disabled

-- Overcharging test under system fault was charged with 24V/6.348A.

-- Excessive discharging: 4.53A Pack's Q300,Q301 (Pin 3-6) shorted, R502 (U100) opened, RT201 and all thermostats disabled.

The following parameters are used for Annex M.4.2 criteria:

Cell Max. charge Voltage: 4.5V

Cell Max. charge current: 0~15°C: 616.4mA Max to 4.5V, then CV to 154.1mA;

15~20°C: 1541mA Max to 4.5V, then CV to 154.1mA.

20~45°C: 3390.2mA Max to 4.25V, 2157.4mA to 4.5V, then CV to 154.1mA;

45~60°C: 1541mA Max to 4.1V, then CV to 154.1mA

Highest specified charging temperature: 90 degree C

Lowest specified charging temperature: 0 degree C

System fault –

- Battery maximum allowable charging voltage:

Pack's charge over voltage protection: 4.53V±0.01V / cell

- Battery maximum allowable charging current: ≥3.698A

Battery fault –

- Highest specified charging temperature: ≥ 60°C±3°C

- Lowest specified charging temperature: ≤ 0±3°C

See table M for details.

- M.6.1 Cell's internal short condition was evaluated and complied with UL 1642 Round Bar Crush Test., which is considered compliant with IEC 62281 Impact Test.

**Additional Information**

- Model C41N2503 was investigated in UL 2054 Third Edition. Test items were as below:

- (1) Short Circuit Test (At room temperature)
- (2) Short Circuit Test (At 55 temperature)
- (3) Abnormal Charging Tests
- (4) Abusive Overcharge Test
- (5) Forced Discharge Test
- (6) Battery Pack Component Temperature Test

- B.3 and B.4 tests result were refer to UL2054 fault condition.

- Sample Configuration: See Enclosure 07-31 for details.

**Additional Standards**

The product fulfills the requirements of: AS/NZS 62368.1:2022

GB 4943.1-2022

EN IEC 62368-1:2020+A11:2020; BS EN IEC 62368-1:2020 + A11:2020


National standard SASO-IEC 62368-1:2020

UL62368-1 3rd Edition, 2021-10-22

CSA Group CSA C22.2 No. 62368-1:2019, 3rd Ed, 2021-10-22

J62368-1(2023)

**Markings and Instructions**

Clause Title	Marking or Instruction Details
See Installation Instructions	The symbol 
Equipment identification marking – Manufacturer identification	Listee's or Recognized Company's name, Trade Name, Trademark or File Number
Equipment identification marking – model identification	Model Number
Date Code	See Enclosure-Miscellaneous 07-26 for definition.
Power rating- Rating	Nominal Voltage, Capacity in mAh or Ah or Wh.
Cautionary Marking/ Instructions	Each 1)battery pack; or 2)the smallest unit package, must be marked with; or 3)instructions provided with each battery, must include the following statements or equivalent:  a. An attention word such as "CAUTION", "WARNING", or "DANGER", and a brief description of possible hazards associated with mishandling of the battery pack such as burn hazard, fire hazard, explosion hazard, and b. A list of actions to take to avoid possible hazards, such as do not crush, disassemble, dispose of in fire, or similar actions.

Lithium-ion battery pack caution	A lithium ion battery pack shall be marked with the following or equivalent: "CAUTION: Risk of Fire and Burns. Do Not Open, Crush, Heat Above (manufacturer's specified maximum temperature) or Incinerate. Follow Manufacturer's Instructions." This wording or equivalent shall also be included in the instructions packaged with the battery pack.
Charging Marking/Instructions	Recommended charging information is also provided on the product, its smallest packaging unit, or the instructions provided with each battery.
<b>Special Instructions to UL Representative</b> N/A	

<b>BD1.0</b>	<b>TABLE: Production-Line Testing Requirements</b>					
<b>BD1.1</b>	<b>Electric Strength Test Special Constructions – Refer to Generic Inspection Instructions, Part AC for further information.</b>					
Model	Component	Removable parts	Test probe location	Test V rms	Test V dc	Test Time, s
All Models	--	--	--	--	--	--
<b>BD1.2</b>	<b>Earthing Continuity Test Exemptions – This test is not required for the following models:</b>					
	All Models					
<b>BD1.3</b>	<b>Electric Strength Test Exemptions – This test is not required for the following models:</b>					
	All Models					
<b>BD1.4</b>	<b>Electric Strength Test Component Exemptions – The following solid-state components may be disconnected from the remainder of the circuitry during the performance of this test.</b>					
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<b>BE1.0</b>	<b>Sample and Test Specifics for Follow-Up Tests at UL</b>				
Model	Component	Material	Test	Sample (s)	Test Specifics
All Models	--	--	--	--	--

4.1.2	TABLE: List of critical components					Pass
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Product Category CCN(s)	Mark(s) of conformity	Supplement ID
1. Fuse (F500)	Dexerials Corp.	SFJ-1412W	12A, 36 Vdc.	JDYX2	UL	
1a. Fuse (F500) (alternate)	SCHOTT JAPAN CORPORATION	D6SC4-12	12A, 36 Vdc.	JDYX2	UL	
2. PWB*	Interchangeable	Interchangeable	V-0, 130 °C	ZPMV2	UL	
3. Pack Frame material	YEUN YIH ENTERPRISE CO LTD	C500-(+)	V-0, 80 °C. 0.8mm thickness. Secured together by plastic frame, label and Mylar	QMFZ2	UL	
3. Pack Frame material (alternate)	Interchangeable	Interchangeable	V-0, 80 °C. Secured together by plastic frame, label and Mylar	QMFZ2	UL	
4. Battery cell (4 cells provided, 1- parallel, 4-series)	AMPEREX Technology Ltd.	4236A5	3.9V, , 3082mAh, Polymer Lithium-Ion.	BBCV2	UL	
5. MOSFETs (Q300, Q301)	Sinopower	SM3421NSQAC- TRG	30Vdc, 14.3A	--	--	
5a. MOSFETs (Q300, Q301) (alternate)	AOS	AON7422G	30Vdc, 25A	--	--	
6. MOSFET (Q500)	Sinopower	SM2406NSANC- TRG	--	--	--	
6a. MOSFET (Q500) (alternate)	PANJIT	PJA3422	--	--	--	
7. IC(U200)	TI	BQ40Z50RSMR	--	--	--	
8. IC(U100)	UPI	uP8308PDN8-3K	--	--	--	
8a. IC(U100) (alternate)	Sinowealth	SH367201R3/008R 3Y-ABI00	--	--	--	



8b. IC(U100) (alternate)	Interchangeable	Interchangeable	--	--	--	
9. Resistor (R206)	TFT	MPC1206QR003FS -T5	3 m ohm, 1W	--	--	
9a. Resistor (R206) (alternate)	Interchangeable	Interchangeable	3 m ohm, 1W	--	--	
10. Thermistor (RT200)	Thinking Electronic Industrial Co., Ltd.	TSM0A103F34D1R Z	NTC type, 10 K ohm	XGPU2	UL	
10a. Thermistor (RT200) (alternate)	JOYIN	JSNA103F344FT	NTC type, 10K ohm at 25°C	XGPU2	UL	
10b. Thermistor (RT200) (alternate)	MURATA	NCP15XH103F03R C-S	NTC type, 10K ohm at 25°C	XGPU2	UL	
10c. Thermistor (RT200) (alternate)	Interchangeable	Interchangeable	NTC type, 10K ohm at 25°C	XGPU2	UL	
11. Connectors and Receptacles	Interchangeable	Metal/Plastic	Copper alloy pins housed in bodies of plastic rated V-0. Min. 80°C	QMFZ2	UL	
11a. Connectors and Receptacles (alternate)	Interchangeable	Interchangeable	plastic rated V-0. Min. 80°C	ECBT2, RTRT2	UL	
12. Internal Plastic Part Materials (except less than 1750mm <sup>3</sup> or 4g)	Interchangeable	Interchangeable	V-0 or VTM-0	QMFZ2	UL	
13. Label	SUZHOU DACHANG PRINTING TECH CO LTD	HY-32-S22	Max. 80°C	PGDQ2	UL	
13a. Label (alternate)	Interchangeable	Interchangeable	Max. 80°C	PGDQ2	UL	
14. Mylar	SICHUAN COREMER	FRPC200	Max. 80°C 0.1~0.25 mm	QMFZ2	UL	

	MATERIALS CO LTD					
14a. Mylar (alternate)	Interchangeable	Interchangeable	Max. 80°C	QMFZ2	UL	

## Enclosures

Type	Supplement Id	Description
Photographs	03-07	Overall view-1
Photographs	03-08	Overall view-2
Photographs	03-09	Internal view
Photographs	03-10	PWB view-1
Photographs	03-11	PWB view-2
Diagrams	04-01	Enclosure Dimension
Schematics + PWB	05-02	PWB Layout
Miscellaneous	07-05	Special Symbol (Caution)
Miscellaneous	07-26	Date Code
Miscellaneous	07-31	Sample configurations

## Enclosure National Differences

USA / Canada

<b>ATTACHMENT TO TEST REPORT</b> <b>IEC 62368-1</b> <b>U.S.A. AND CANADA NATIONAL DIFFERENCES</b> (Audio/video, information and communication technology equipment – Part 1: Safety requirements)	
<b>Differences according to.....:</b>	CSA/UL 62368-1:2019
<b>TRF template used.....:</b>	IECEE OD-2020-F3, Ed. 1.1
<b>Attachment Form No.....:</b>	US_CA_ND_IEC62368_1E
<b>Attachment Originator.....:</b>	UL(US)
<b>Master Attachment.....:</b>	Dated 2022-03-04
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<b>IEC 62368-1 - US and Canadian National Differences</b> <b>Special National Conditions based on Regulations and Other National Differences</b>			
1 (1DV.1) (1.3)	All equipment is to be designed to allow installation in accordance with the National Electrical Code (NEC), ANSI/NFPA 70, the Canadian Electrical Code (CEC), Part 1, CAN/CSA C22.1, and when applicable, the National Electrical Safety Code, IEEE C2. Also, for such equipment marked or otherwise identified, installation is allowed per the Standard for the Protection of Information Technology Equipment, ANSI/NFPA 75.	See Test Item Particulars (TIP).	Pass
1 (1DV.2.1)	This standard includes additional requirements for equipment used for entertainment purposes intended for installation in general patient care areas of health care facilities. See Annex DVB.		N/A
1 (1DV.2.2)	This standard includes additional requirements for equipment intended for mounting under cabinets. See Annex DVC.		N/A
1 (1DV.2.3)	IEC 62368-3 clause 5 for DC power transfer at ES1 or ES2 voltage levels is considered informative. IEC 62368-3 clause 6 for remote power feeding telecommunication (RFT) circuits is considered normative (see ITU K.50). Alternatively, equipment with RFT circuits are given in either UL 2391 or CSA/UL 60950-21. RFT-C circuits are not permitted unless the RFT-C circuit complies with RFT-V limits ( $\leq 200V$ per conductor to earth).		N/A
1 (1DV.3)	For protection against direct lightning strikes, reference is made to NFPA 780 and CAN/CSA-B72 for additional requirements.		N/A
1 (1DV.5)	Additional requirements apply to some forms of power distribution equipment, including sub-assemblies.		Pass
4.1 (4.1.17)	For lengths exceeding 3.05 m, external interconnecting cable assemblies are required to be a suitable cable type (e.g., DP, CL2) specified in the NEC.		N/A

	For lengths 3.05 m or less, external interconnecting cable assemblies that are not types specified in the NEC generally are required to have special construction features and identification markings.		N/A
4.6 (4.6.2)	Wire-wrap terminals have special construction and performance requirements.		N/A
4.8 (4.8.3, 4.8.4.5, 4.8.5)	Coin / button cell batteries have modified special construction and performance requirements.		N/A
5.4.2.3.2 (5.4.2.3.2.1)	Surge Arrestors and Transient Voltage Surge Suppressors installed external to the equipment are required to comply with the appropriate NEC and CEC requirements.		N/A
5.5.9	Receptacles, rated 125-V, single phase, 15- or 20-A accessible to either ordinary, instructed, or skilled persons are required to be provided with GFCI Protection for Personnel if the equipment containing the receptacles is installed outdoors. The protection devices are required to comply with UL 943, and CAN/CSA C22.2 No.144.		N/A
5.6.3	Protective earthing conductors comply with the minimum conductor sizes in Table G.7, except as required by Table G.7ADV.1 for cord connected equipment, or Annex DVH for permanently connected equipment.		N/A
5.7.8 (5.7.8.1)	Equipment intended to receive telecommunication ringing signals is required to comply with a special touch current measurement tests.		N/A
6.5.1	PS3 wiring outside a fire enclosure is required to comply with single fault testing in B.4, or be current limited per one of the permitted methods.		N/A
Annex F (F.3.3.9)	Output terminals provided for supply of other equipment, except mains supply, are required to be marked with a maximum rating or reference to equipment permitted to be connected.		N/A
Annex F (F.3.7)	Outdoor Enclosures are required to be classified and marked in accordance with UL 50 or 50E, or CAN/CSA C22.2 No. 94.1 or 94.2.		N/A
Annex G (G.7)	Permanent connection of equipment to the mains supply by a power supply cord is not permitted, except for certain equipment, such as ATMs.		N/A
	Power supply cords are required to have attachment plugs rated not less than 125 percent of the rated current of the equipment.		N/A
	Flexible power supply cords are required to be compatible with Article 400 of the NEC, and Tables 11 and 12 of the CEC.		N/A
	Minimum cord length is required to be 1.5 m, with certain constructions such as external power supplies allowed to consider both input and output cord lengths into the requirement. Power supply cords are required to be no longer than 4.5 m in length if used in ITE Rooms.		N/A
	Power supply cords for outdoor equipment are required to be suitable outdoor use type as		N/A

	required by Section 400.4 of the NEC and Rule 4-012 of the CEC, i.e., marked "W."		
Annex H.2	Continuous ringing signals under normal operating conditions up to 16 mA only are permitted if the equipment is subjected to special installation and performance restrictions.		N/A
Annex H.4	For circuits with other than ringing signals and with voltages exceeding 42.4 V <sub>peak</sub> or 60 V <sub>d.c.</sub> , the maximum acceptable current through a 2000 ohm resistor (or greater) connected across the voltage source with other loads disconnected is 7.1 mA peak or 30 mA d.c. under normal operating conditions.		N/A
Annex Q (Q.3)	Equipment with paired conductor and/or coax communications cables/wiring connected to building wiring are required to have special voltage, current, power and marking requirements.		N/A
Annex DVA (1)	Equipment that is designed such that it may be powered from a separate electrical service, is required to meet applicable requirements for service equipment for control and protection of services and their installation and complies with Article 230 of the National Electrical Code (NEC), NFPA 70 and Section 6 of the Canadian Electrical Code, Part I, CSA C22.1.		N/A
	Equipment intended for use in spaces used for environmental air (plenums) are subjected to special flammability requirements for heat and visible smoke release.		N/A
	For ITE room applications, automated information storage systems with combustible media greater than 0.76 m <sup>3</sup> (27 cu ft) are required to have a provision for connection of either automatic sprinklers or a gaseous agent extinguishing system with an extended discharge.		N/A
	Consumer products designed or intended primarily for children 12 years of age or younger are subject to additional requirements in accordance with U.S. and Canadian Regulations.		N/A
	Baby monitors are required to additionally comply with ASTM F2951, Consumer Safety Specification for Baby Monitors.		N/A
	Storage batteries and battery management equipment, other than associated with lead-acid batteries, and including battery backup systems that are not an integral part of stationary AV and ICT equipment, such as provided in separate cabinets, are required to be certified (listed) to the appropriate standard(s) for such storage batteries and equipment.		N/A
Annex DVA (5.6)	For Pluggable Equipment Type A, the protection in the installation is assumed to be 20A.		N/A
Annex DVA (6.3)	The maximum quantity of flammable liquid stored in equipment is required to comply with NFPA 30.		N/A
Annex DVA (6.4.8)	For ITE room applications, enclosures with combustible material measuring greater than 0.9 m <sup>2</sup> (10 sq ft) or a single dimension greater than 1.8 m (6 ft) are required to have a flame spread		N/A

	rating of 50 or less. For equipment with the same dimensions for other applications, an external surface that is not a fire enclosure requires a minimum flammability classification of V-1.		
Annex DVA (10.3)	Equipment with lasers is required to meet the U.S. Code of Federal Regulations 21 CFR 1040 (and the Canadian Radiation Emitting Devices Act, REDR C1370).		N/A
Annex DVA (10.5)	Equipment that produces ionizing radiation is required to comply with the U.S. Code of Federal Regulations, 21 CFR 1020 (and the Canadian Radiation Emitting Devices Act, REDR C1370).		N/A
Annex DVA (F.3.3.4)	Equipment for use on a.c. mains supply systems with a neutral and more than one phase conductor (e.g. 120/240 V, 3-wire) require a special marking format for electrical ratings. Additional considerations apply for voltage ratings that exceed the attachment cap rating or that are lower than the "Normal Operating Condition" in Table 2 of CAN/CSA C22.2 No. 235."		N/A
Annex DVA (F.3.3.6)	Equipment identified for ITE (computer) room installation is required to be marked with the rated current.		N/A
Annex DVA (G.1)	Vertically-mounted disconnect switches and circuit breakers are required to have the "on" position indicated by the handle in the up position, where mounted in an enclosure, vertically mounted disconnect switches and circuit breakers with vertical operating means extending outside the enclosure are required to indicate in a location visible when accessing the external operating means whether the switch or circuit breaker is in the open (off) or closed (on) position.		N/A
Annex DVA (G.3.4)	Suitable NEC/CEC branch circuit protection rated at the maximum circuit rating is required for all standard supply outlets and receptacles (such as supplied in power distribution units) if the supply branch circuit protection is not suitable.		N/A
	Where a fuse is used to provide Class 2 or Class 3 current limiting, it is not operator-accessible unless it is non- interchangeable.		N/A
Annex DVA (G.4.2)	Equipment with isolated ground (earthing) receptacles is required to comply with NEC 250.146(D) and CEC 10-400 and 10-612.		N/A
Annex DVA (G.4.3)	Interconnection of units by conductors supplied by a limited power source, or a Class 2 circuit defined in the NEC/CEC may have field wiring connections other than specified in DVH.3, such as wire-wrap and crimp-on types, if the limited power source and Class 2 circuits are separated from all other circuits by barriers, routing or fixing.		N/A
Annex DVA (G.5.3)	Power distribution transformers distributing power at 100 volts or more, and rated 10 kVA or more, require special transformer overcurrent protection.		N/A

Annex DVA (G.5.4)	Motor control devices are required for cord-connected equipment with a mains-connected motor if the equipment is rated more than 12 A, or if the equipment has a nominal voltage rating greater than 120 V, or if the motor is rated more than 1/3 hp (locked rotor current over 43 A).		N/A
Annex DVA (G.7)	Flexible cords used outdoors are required to have the suffix "W" marked on the flexible cord.		N/A
Annex DVA (M)	For ITE room applications, equipment with battery systems capable of supplying 750 VA for five minutes are required to have a battery disconnect means that may be connected to the ITE room remote power-off circuit.		N/A
Annex DVA (Q)	If applicable per NEC 725.121(C), some limited power sources supplied from AV/ICT equipment are required to have a label indicating the maximum voltage and rated current output per conductor for each connection point. Where multiple connection points have the same rating, a single label is permitted to be used.		N/A
	Wiring terminals intended to supply Class 2 outputs in accordance with the NEC or CEC Part 1 are required to be marked with the voltage rating and "Class 2" or equivalent. The marking is located adjacent to the terminals and visible during wiring.		N/A
	Applicable parts of Chapter 8 of the NEC, and Rules 54 and 60 of the CEC, may be applicable to ITE installed outdoors with connections to communication systems.		N/A
Annex DVB (1)	Additional requirements apply for equipment used for entertainment purposes intended for installation in general patient care areas of health care facilities.		N/A
Annex DVC (1)	Additional requirements apply for equipment intended for mounting under kitchen cabinets.		N/A
Annex DVE (4.1.1)	Some equipment, components, sub-assemblies and materials associated with the risk of fire, electric shock, or personal injury are required to have component or material ratings in accordance with the applicable national (U.S. and Canadian) component or material requirements. These equipment and components include: appliance couplers, attachment plugs, battery backup systems, circuit breakers, communication circuit accessories, connectors (used for current interruption of non-LPS circuits), direct plug-in equipment, electrochemical capacitor modules (energy storage modules with ultracapacitors), enclosures (outdoor), flexible cords and cables, fuses (branch circuit), ground-fault current interrupters, interconnecting cables, modular data centers, power supply cords, some power distribution equipment, printed wiring, protectors for communications circuits, receptacles, surge protective devices, vehicle battery adapters, wire connectors, and wire and cables.	See critical component table for details.	Pass



Annex DVH	Equipment for permanent connection to the mains supply is subjected to additional requirements.		N/A
Annex DVH (DVH.1)	Wiring methods (terminals, leads, etc.) used for the connection of the equipment to the mains are required to be in accordance with the NEC/CEC.		N/A
Annex DVH (DVH.2.1)	For safe and reliable connection to a mains, permanently connected equipment is to be provided.		N/A
Annex DVH (DVH.2.2)	Additional considerations for D.C. mains.		N/A
Annex DVH (DVH.3.2.1)	Terminals for permanent wiring, including protective earthing terminals, are required to be suitable for U.S./Canadian wire gauge sizes, rated 125 percent of the equipment rating, and be specially marked when specified.		N/A
Annex DVH (DVH.3.2.3)	Wire binding screws are not permitted to attach conductors larger than 10 AWG (5.3 mm <sup>2</sup> ).		N/A
Annex DVH (DVH.3.2.4)	All associated mains supply terminals are located in proximity to each other and to the main protective earthing terminal, if any.		N/A
Annex DVH (DVH.3.2.5)	Terminals are located, guarded or insulated so that, should a strand of a conductor escape when the conductor is fitted, there is no likelihood of accidental contact between such a strand and accessible conductive parts or unearthed conductive parts separated from accessible conductive parts by supplementary insulation only.		N/A
Annex DVH (DVH.3.3)	When field connection to an external circuit is via wires (example, free conductors), the wires are not smaller than 18 AWG (0.82 mm <sup>2</sup> ) and the free length of the wire inside an outlet box or wiring compartment is 150 mm or more.		N/A
Annex DVH (DVH.3.4)	Size of protective earthing conductors and terminals	(See sub-clause 5.6.5)	N/A
Annex DVH (DVH.4)	Permanently connected equipment is required to have a suitable wiring compartment and wire bending space.		N/A
Annex DVH (DVH.4.1)	Wire bending space		N/A
Annex DVH (DVH.4.2)	Volume of wiring compartment		N/A
Annex DVH (DVH.4.3)	Separation of circuits		N/A
Annex DVH (DVH.5)	Equipment markings and instructional safeguards		N/A
Annex DVH (DVH.5.1)	Identification of protective earthing terminal		N/A
Annex DVH (DVH.5.2)	Identification of terminal for earthed conductor (neutral)		N/A
Annex DVH (DVH.5.3)	Identification of terminals for aluminium conductors		N/A
Annex DVH (DVH.5.4)	Wire temperature ratings		N/A
Annex DVH (DVH.5.5)	Equipment connected to a centralized d.c. power system, and having one pole of the DC mains input terminal connected to the main protective earthing terminal in the equipment, is required to		N/A

	comply with special earthing, wiring, marking and installation instruction requirements.		
Annex DVI (6.7)	Equipment intended for connection to telecommunication network outside plant cable is required to be protected against overvoltage from power line crosses.		N/A
Annex DVJ (10.6.1)	Equipment connected to a telecommunication and cable distribution networks and supplied with an earphone intended to be held against, or in the ear is required to comply with special acoustic pressure requirements.		N/A
<b>4</b>	<b>GENERAL REQUIREMENTS</b>		Pass
4.1.1	Acceptance of materials, components and subassemblies	See below.	Pass
4.1.2	Use of components	Components, which are certified to IEC and/or national standards, are used correctly within their ratings. Components not covered by IEC standards are tested under the conditions present in the equipment.	Pass
4.1.3	Equipment design and construction	Considered	Pass
4.1.4	Specified ambient temperature for outdoor use (°C) ..... :		N/A
4.1.5	Constructions and components not specifically covered		N/A
4.1.8	Liquids and liquid filled components (LFC)		N/A
4.1.15	Markings and instructions	(See Annex F)	Pass
4.4.3	Safeguard robustness		N/A
4.4.3.1	General	Testing item is a building-in type equipment, and the sub-clauses should be evaluated in end-use product.	N/A
4.4.3.2	Steady force tests		N/A
4.4.3.3	Drop tests		N/A
4.4.3.4	Impact tests		N/A
4.4.3.5	Internal accessible safeguard tests		N/A
4.4.3.6	Glass impact tests		N/A
4.4.3.7	Glass fixation tests		N/A
	Glass impact test (1J)		N/A
	Push/pull test (10 N)		N/A
4.4.3.8	Thermoplastic material tests		N/A
4.4.3.9	Air comprising a safeguard		N/A
4.4.3.10	Accessibility, glass, safeguard effectiveness		N/A
4.4.4	Displacement of a safeguard by an insulating liquid		N/A
4.4.5	Safety interlocks		N/A
<b>4.5</b>	<b>Explosion</b>		Pass

4.5.1	General	(See Annex M for batteries)	Pass
4.5.2	No explosion during normal/abnormal operating condition	(See Clause B.2, B.3)	Pass
	No harm by explosion during single fault conditions	(See Clause B.4)	Pass
<b>4.6</b>	<b>Fixing of conductors</b>		N/A
	Fix conductors not to defeat a safeguard		N/A
	Compliance is checked by test..... :		N/A
<b>4.7</b>	<b>Equipment for direct insertion into mains socket-outlets</b>		N/A
4.7.2	Mains plug part complies with relevant standard .. :		N/A
4.7.3	Torque (Nm) ..... :		N/A
<b>4.8</b>	<b>Equipment containing coin/button cell batteries</b>		N/A
4.8.1	General	The battery pack is not a coin or button cell.	N/A
4.8.2	Instructional safeguard ..... :		N/A
4.8.3	Battery compartment door/cover construction		N/A
	Open torque test		N/A
4.8.4.2	Stress relief test		N/A
4.8.4.3	Battery replacement test		N/A
4.8.4.4	Drop test		N/A
4.8.4.5	Impact test		N/A
4.8.4.6	Crush test		N/A
4.8.5	Compliance		N/A
	30N force test with test probe		N/A
	20N force test with test hook		N/A
<b>4.9</b>	<b>Likelihood of fire or shock due to entry of conductive object</b>		N/A
<b>4.10</b>	<b>Component requirements</b>		N/A
4.10.1	Disconnect Device		N/A
4.10.2	Switches and relays		N/A

<b>5</b>	<b>ELECTRICALLY-CAUSED INJURY</b>		Pass
<b>5.2</b>	<b>Classification and limits of electrical energy sources</b>		Pass
5.2.2	ES1, ES2 and ES3 limits	The cell combination generates ES1 energy level and no higher voltage is able to amplify inside of this battery pack.	Pass
5.2.2.2	Steady-state voltage and current limits .....:		N/A
5.2.2.3	Capacitance limits .....:		N/A
5.2.2.4	Single pulse limits .....:		N/A
5.2.2.5	Limits for repetitive pulses .....:		N/A
5.2.2.6	Ringing signals		N/A

5.2.2.7	Audio signals		N/A
<b>5.3</b>	<b>Protection against electrical energy sources</b>		N/A
5.3.1	General Requirements for accessible parts to ordinary, instructed and skilled persons	All circuits are classified as ES1.	N/A
5.3.1 a)	Accessible ES1/ES2 derived from ES2/ES3 circuits		N/A
5.3.1 b)	Skilled persons not unintentional contact ES3 bare conductors		N/A
5.3.2.1	Accessibility to electrical energy sources and safeguards		N/A
	Accessibility to outdoor equipment bare parts		N/A
5.3.2.2	Contact requirements		N/A
	Test with test probe from Annex V		—
5.3.2.2 a)	Air gap – electric strength test potential (V) .....		N/A
5.3.2.2 b)	Air gap – distance (mm) .....		N/A
5.3.2.3	Compliance		N/A
5.3.2.4	Terminals for connecting stripped wire		N/A
<b>5.4</b>	<b>Insulation materials and requirements</b>		Pass
5.4.1.2	Properties of insulating material	Only Functional Insulation is considered and complied with Annex B.4.4.	N/A
5.4.1.3	Material is non-hygroscopic		N/A
5.4.1.4	Maximum operating temperature for insulating materials .....	See table 5.4.1.4.	Pass
5.4.1.5	Pollution degrees .....	2	N/A
5.4.1.5.2	Test for pollution degree 1 environment and for an insulating compound		N/A
5.4.1.5.3	Thermal cycling test		N/A
5.4.1.6	Insulation in transformers with varying dimensions	No such transformers.	N/A
5.4.1.7	Insulation in circuits generating starting pulses	No such circuit.	N/A
5.4.1.8	Determination of working voltage .....		N/A
5.4.1.9	Insulating surfaces		N/A
5.4.1.10	Thermoplastic parts on which conductive metallic parts are directly mounted		N/A
5.4.1.10.2	Vicat test .....		N/A
5.4.1.10.3	Ball pressure test .....		N/A
5.4.2	Clearances		N/A
5.4.2.1	General requirements	Only Functional Insulation is considered and complied with Annex B.4.4.	N/A
	Clearances in circuits connected to AC Mains, Alternative method		N/A
5.4.2.2	Procedure 1 for determining clearance		N/A

	Temporary overvoltage .....		—
5.4.2.3	Procedure 2 for determining clearance		N/A
5.4.2.3.2.2	a.c. mains transient voltage .....		—
5.4.2.3.2.3	d.c. mains transient voltage .....		—
5.4.2.3.2.4	External circuit transient voltage.....		—
5.4.2.3.2.5	Transient voltage determined by measurement .....		—
5.4.2.4	Determining the adequacy of a clearance using an electric strength test .....		N/A
5.4.2.5	Multiplication factors for clearances and test voltages .....		N/A
5.4.2.6	Clearance measurement .....		N/A
5.4.3	Creepage distances	Only Functional Insulation is considered and complied with Annex B.4.4.	N/A
5.4.3.1	General		N/A
5.4.3.3	Material group .....		—
5.4.3.4	Creepage distances measurement .....		N/A
5.4.4	Solid insulation		N/A
5.4.4.1	General requirements		N/A
5.4.4.2	Minimum distance through insulation .....		N/A
5.4.4.3	Insulating compound forming solid insulation		N/A
5.4.4.4	Solid insulation in semiconductor devices		N/A
5.4.4.5	Insulating compound forming cemented joints		N/A
5.4.4.6	Thin sheet material		N/A
5.4.4.6.1	General requirements		N/A
5.4.4.6.2	Separable thin sheet material		N/A
	Number of layers (pcs) .....		N/A
5.4.4.6.3	Non-separable thin sheet material		N/A
	Number of layers (pcs) .....		N/A
5.4.4.6.4	Standard test procedure for non-separable thin sheet material .....		N/A
5.4.4.6.5	Mandrel test		N/A
5.4.4.7	Solid insulation in wound components		N/A
5.4.4.9	Solid insulation at frequencies >30 kHz, $E_P$ , $K_R$ , $d$ , $V_{PW}$ (V) .....		N/A
	Alternative by electric strength test, tested voltage (V), $K_R$ .....		N/A
5.4.5	Antenna terminal insulation		N/A
5.4.5.1	General	No such devices.	N/A
5.4.5.2	Voltage surge test		N/A
5.4.5.3	Insulation resistance (M $\Omega$ ) .....		N/A

	Electric strength test.....:		N/A
5.4.6	Insulation of internal wire as part of supplementary safeguard		N/A
5.4.7	Tests for semiconductor components and for cemented joints		N/A
5.4.8	Humidity conditioning		N/A
	Relative humidity (%), temperature (°C), duration (h).....:		—
5.4.9	Electric strength test		N/A
5.4.9.1	Test procedure for type test of solid insulation.....:		N/A
5.4.9.2	Test procedure for routine test		N/A
5.4.10	Safeguards against transient voltages from external circuits		N/A
5.4.10.1	Parts and circuits separated from external circuits		N/A
5.4.10.2	Test methods		N/A
5.4.10.2.1	General		N/A
5.4.10.2.2	Impulse test .....		N/A
5.4.10.2.3	Steady-state test.....:		N/A
5.4.10.3	Verification for insulation breakdown for impulse test .....		N/A
5.4.11	Separation between external circuits and earth		N/A
5.4.11.1	Exceptions to separation between external circuits and earth		N/A
5.4.11.2	Requirements		N/A
	SPDs bridge separation between external circuit and earth		N/A
	Rated operating voltage $U_{op}$ (V) .....		—
	Nominal voltage $U_{peak}$ (V) .....		—
	Max increase due to variation $\Delta U_{sp}$ .....		—
	Max increase due to ageing $\Delta U_{sa}$ .....		—
5.4.11.3	Test method and compliance .....		N/A
5.4.12	Insulating liquid		N/A
5.4.12.1	General requirements		N/A
5.4.12.2	Electric strength of an insulating liquid .....		N/A
5.4.12.3	Compatibility of an insulating liquid .....		N/A
5.4.12.4	Container for insulating liquid .....		N/A
<b>5.5</b>	<b>Components as safeguards</b>		N/A
5.5.1	General	See below.	N/A
5.5.2	Capacitors and RC units	No such devices.	N/A
5.5.2.1	General requirement		N/A

5.5.2.2	Safeguards against capacitor discharge after disconnection of a connector .....		N/A
5.5.3	Transformers	No such devices.	N/A
5.5.4	Optocouplers	No such devices.	N/A
5.5.5	Relays	No such devices.	N/A
5.5.6	Resistors		N/A
5.5.7	SPDs		N/A
5.5.8	Insulation between the mains and an external circuit consisting of a coaxial cable .....		N/A
5.5.9	Safeguards for socket-outlets in outdoor equipment		N/A
	RCD rated residual operating current (mA) .....		—
<b>5.6</b>	<b>Protective conductor</b>		N/A
5.6.2	Requirement for protective conductors		N/A
5.6.2.1	General requirements		N/A
5.6.2.2	Colour of insulation		N/A
5.6.3	Requirement for protective earthing conductors		N/A
	Protective earthing conductor size (mm <sup>2</sup> ) .....		—
	Protective earthing conductor serving as a reinforced safeguard		N/A
	Protective earthing conductor serving as a double safeguard		N/A
5.6.4	Requirements for protective bonding conductors		N/A
5.6.4.1	Protective bonding conductors		N/A
	Protective bonding conductor size (mm <sup>2</sup> ). .....		—
5.6.4.2	Protective current rating (A) .....		N/A
5.6.5	Terminals for protective conductors		N/A
5.6.5.1	Terminal size for connecting protective earthing conductors (mm) .....		N/A
	Terminal size for connecting protective bonding conductors (mm) .....		N/A
5.6.5.2	Corrosion		N/A
5.6.6	Resistance of the protective bonding system		N/A
5.6.6.1	Requirements		N/A
5.6.6.2	Test Method .....		N/A
5.6.6.3	Resistance ( $\Omega$ ) or voltage drop .....		N/A
5.6.7	Reliable connection of a protective earthing conductor		N/A
5.6.8	Functional earthing		N/A
	Conductor size (mm <sup>2</sup> ) .....		N/A
	Class II with functional earthing marking .....		N/A
	Appliance inlet cl & cr (mm) .....		N/A

<b>5.7</b>	<b>Prospective touch voltage, touch current and protective conductor current</b>		N/A
5.7.2	Measuring devices and networks		N/A
5.7.2.1	Measurement of touch current		N/A
5.7.2.2	Measurement of voltage		N/A
5.7.3	Equipment set-up, supply connections and earth connections		N/A
5.7.4	Unearthed accessible parts .....		N/A
5.7.5	Earthed accessible conductive parts .....		N/A
5.7.6	Requirements when touch current exceeds ES2 limits		N/A
	Protective conductor current (mA) .....		N/A
	Instructional Safeguard.....		N/A
5.7.7	Prospective touch voltage and touch current associated with external circuits		N/A
5.7.7.1	Touch current from coaxial cables		N/A
5.7.7.2	Prospective touch voltage and touch current associated with paired conductor cables		N/A
5.7.8	Summation of touch currents from external circuits		N/A
	a) Equipment connected to earthed external circuits, current (mA).....		N/A
	b) Equipment connected to unearthed external circuits, current (mA).....		N/A
<b>5.8</b>	<b>Backfeed safeguard in battery backed up supplies</b>		N/A
	Mains terminal ES .....		N/A
	Air gap (mm).....		N/A

<b>6</b>	<b>ELECTRICALLY- CAUSED FIRE</b>		Pass
<b>6.2</b>	<b>Classification of PS and PIS</b>		Pass
6.2.2	Power source circuit classifications .....	(See appended table 6.2.2)	Pass
6.2.3	Classification of potential ignition sources	All conductors and devices are considered as R-PIS directly.	Pass
6.2.3.1	Arcing PIS .....	No part of any open conductors or electric contact generates an open circuit voltage > 50 Vdc inside of this battery pack.	N/A
6.2.3.2	Resistive PIS .....	See 6.2.3	Pass
<b>6.3</b>	<b>Safeguards against fire under normal operating and abnormal operating conditions</b>		Pass
6.3.1	No ignition and attainable temperature value less than 90 % defined by ISO 871 or less than 300 °C for unknown materials.....	(See appended table B.1.5 and B.3)	Pass
	Combustible materials outside fire enclosure .....		N/A
<b>6.4</b>	<b>Safeguards against fire under single fault conditions</b>		Pass
6.4.1	Safeguard method	Control of fire spread.	Pass



6.4.2	Reduction of the likelihood of ignition under single fault conditions in PS1 circuits		N/A
6.4.3	Reduction of the likelihood of ignition under single fault conditions in PS2 and PS3 circuits		N/A
6.4.3.1	Supplementary safeguards		N/A
6.4.3.2	Single Fault Conditions..... :		N/A
	Special conditions for temperature limited by fuse		N/A
6.4.4	Control of fire spread in PS1 circuits	All battery use control of fire spread in PS3 circuit. See clause 6.4.6.	N/A
6.4.5	Control of fire spread in PS2 circuits	All battery use control of fire spread in PS3 circuit. See clause 6.4.6.	N/A
6.4.5.2	Supplementary safeguards		N/A
6.4.6	Control of fire spread in PS3 circuits	The Fire enclosure will be provided in the end-product.  Printed boards are made of V-0 CLASS minimum.	Pass
6.4.7	Separation of combustible materials from a PIS	To be determined in the end-use installation	N/A
6.4.7.2	Separation by distance		N/A
6.4.7.3	Separation by a fire barrier		N/A
6.4.8	Fire enclosures and fire barriers	A fire enclosure is necessary and will be provided in the end product.	N/A
6.4.8.2	Fire enclosure and fire barrier material properties		N/A
6.4.8.2.1	Requirements for a fire barrier		N/A
6.4.8.2.2	Requirements for a fire enclosure	Be provided in the end product.	N/A
6.4.8.3	Constructional requirements for a fire enclosure and a fire barrier		N/A
6.4.8.3.1	Fire enclosure and fire barrier openings		N/A
6.4.8.3.2	Fire barrier dimensions		N/A
6.4.8.3.3	Top openings and properties		N/A
	Openings dimensions (mm)..... :		N/A
6.4.8.3.4	Bottom openings and properties		N/A
	Openings dimensions (mm)..... :		N/A
	Flammability tests for the bottom of a fire enclosure		N/A
	Instructional Safeguard.....:		N/A
6.4.8.3.5	Side openings and properties		N/A
	Openings dimensions (mm)..... :		N/A
6.4.8.3.6	Integrity of a fire enclosure, condition met: a), b) or c)..... :		N/A

6.4.8.4	Separation of a PIS from a fire enclosure and a fire barrier distance (mm) or flammability rating .....	To be determined in the end-use installation	N/A
6.4.9	Flammability of insulating liquid.....		N/A
<b>6.5</b>	<b>Internal and external wiring</b>		N/A
6.5.1	General requirements		N/A
6.5.2	Requirements for interconnection to building wiring .....	No interconnection to building wiring.	N/A
6.5.3	Internal wiring size (mm <sup>2</sup> ) for socket-outlets.....		N/A
<b>6.6</b>	<b>Safeguards against fire due to the connection to additional equipment</b>		N/A

<b>7</b>	<b>INJURY CAUSED BY HAZARDOUS SUBSTANCES</b>		Pass
<b>7.2</b>	<b>Reduction of exposure to hazardous substances</b>		N/A
<b>7.3</b>	<b>Ozone exposure</b>		N/A
<b>7.4</b>	<b>Use of personal safeguards or personal protective equipment (PPE)</b>		N/A
	Personal safeguards and instructions .....		—
<b>7.5</b>	<b>Use of instructional safeguards and instructions</b>		N/A
	Instructional safeguard (ISO 7010).....		—
<b>7.6</b>	<b>Batteries and their protection circuits</b>		Pass

<b>8</b>	<b>MECHANICALLY-CAUSED INJURY</b>		Pass
<b>8.2</b>	<b>Mechanical energy source classifications</b>		Pass
<b>8.3</b>	<b>Safeguards against mechanical energy sources</b>		N/A
<b>8.4</b>	<b>Safeguards against parts with sharp edges and corners</b>		N/A
8.4.1	Safeguards		N/A
	Instructional Safeguard .....		N/A
8.4.2	Sharp edges or corners		N/A
<b>8.5</b>	<b>Safeguards against moving parts</b>		N/A
8.5.1	Fingers, jewellery, clothing, hair, etc., contact with MS2 or MS3 parts		N/A
	MS2 or MS3 part required to be accessible for the function of the equipment		N/A
	Moving MS3 parts only accessible to skilled person		N/A
8.5.2	Instructional safeguard.....		N/A
8.5.4	Special categories of equipment containing moving parts		N/A
8.5.4.1	General		N/A
8.5.4.2	Equipment containing work cells with MS3 parts		N/A
8.5.4.2.1	Protection of persons in the work cell		N/A
8.5.4.2.2	Access protection override		N/A
8.5.4.2.2.1	Override system		N/A
8.5.4.2.2.2	Visual indicator		N/A

8.5.4.2.3	Emergency stop system		N/A
	Maximum stopping distance from the point of activation (m).....:		N/A
	Space between end point and nearest fixed mechanical part (mm) .....		N/A
8.5.4.2.4	Endurance requirements		N/A
	Mechanical system subjected to 100 000 cycles of operation		N/A
	- Mechanical function check and visual inspection		N/A
	- Cable assembly .....		N/A
8.5.4.3	Equipment having electromechanical device for destruction of media		N/A
8.5.4.3.1	Equipment safeguards		N/A
8.5.4.3.2	Instructional safeguards against moving parts.....:		N/A
8.5.4.3.3	Disconnection from the supply		N/A
8.5.4.3.4	Cut type and test force (N).....:		N/A
8.5.4.3.5	Compliance		N/A
8.5.5	High pressure lamps		N/A
	Explosion test .....		N/A
8.5.5.3	Glass particles dimensions (mm) .....		N/A
<b>8.6</b>	<b>Stability of equipment</b>		N/A
8.6.1	General		N/A
	Instructional safeguard.....:		N/A
8.6.2	Static stability		N/A
8.6.2.2	Static stability test.....:		N/A
8.6.2.3	Downward force test		N/A
8.6.3	Relocation stability		N/A
	Wheels diameter (mm).....:		—
	Tilt test		N/A
8.6.4	Glass slide test		N/A
8.6.5	Horizontal force test .....		N/A
<b>8.7</b>	<b>Equipment mounted to wall, ceiling or other structure</b>		N/A
8.7.1	Mount means type.....:		N/A
8.7.2	Test methods		N/A
	Test 1, additional downwards force (N).....:		N/A
	Test 2, number of attachment points and test force (N) .....		N/A
	Test 3 Nominal diameter (mm) and applied torque (Nm).....:		N/A
<b>8.8</b>	<b>Handles strength</b>		N/A

8.8.1	General		N/A
8.8.2	Handle strength test		N/A
	Number of handles.....:		—
	Force applied (N) .....		—
<b>8.9</b>	<b>Wheels or casters attachment requirements</b>		N/A
8.9.2	Pull test		N/A
<b>8.10</b>	<b>Carts, stands and similar carriers</b>		N/A
8.10.1	General		N/A
8.10.2	Marking and instructions.....:		N/A
8.10.3	Cart, stand or carrier loading test		N/A
	Loading force applied (N) .....		N/A
8.10.4	Cart, stand or carrier impact test		N/A
8.10.5	Mechanical stability		N/A
	Force applied (N) .....		—
8.10.6	Thermoplastic temperature stability		N/A
<b>8.11</b>	<b>Mounting means for slide-rail mounted equipment (SRME)</b>		N/A
8.11.1	General		N/A
8.11.2	Requirements for slide rails		N/A
	Instructional Safeguard .....		N/A
8.11.3	Mechanical strength test		N/A
8.11.3.1	Downward force test, force (N) applied .....		N/A
8.11.3.2	Lateral push force test		N/A
8.11.3.3	Integrity of slide rail end stops		N/A
8.11.4	Compliance		N/A
<b>8.12</b>	<b>Telescoping or rod antennas</b>		N/A
	Button/ball diameter (mm) .....		—

<b>9</b>	<b>THERMAL BURN INJURY</b>		Pass
<b>9.2</b>	<b>Thermal energy source classifications</b>		Pass
<b>9.3</b>	<b>Touch temperature limits</b>		Pass
9.3.1	Touch temperatures of accessible parts .....	(See appended table)	Pass
9.3.2	Test method and compliance		Pass
<b>9.4</b>	<b>Safeguards against thermal energy sources</b>		N/A
<b>9.5</b>	<b>Requirements for safeguards</b>		N/A
9.5.1	Equipment safeguard		N/A
9.5.2	Instructional safeguard.....:		N/A
<b>9.6</b>	<b>Requirements for wireless power transmitters</b>		N/A
9.6.1	General		N/A
9.6.2	Specification of the foreign objects		N/A

9.6.3	Test method and compliance .....		N/A
<b>10</b>	<b>RADIATION</b>		N/A
<b>10.2</b>	<b>Radiation energy source classification</b>		N/A
10.2.1	General classification		N/A
	Lasers .....		—
	Lamps and lamp systems .....		—
	Image projectors .....		—
	X-Ray .....		—
	Personal music player .....		—
<b>10.3</b>	<b>Safeguards against laser radiation</b>		N/A
	The standard(s) equipment containing laser(s) comply .....		N/A
<b>10.4</b>	<b>Safeguards against optical radiation from lamps and lamp systems (including LED types)</b>		N/A
10.4.1	General requirements		N/A
	Instructional safeguard provided for accessible radiation level needs to exceed		N/A
	Risk group marking and location .....		N/A
	Information for safe operation and installation		N/A
10.4.2	Requirements for enclosures		N/A
	UV radiation exposure .....		N/A
10.4.3	Instructional safeguard .....		N/A
<b>10.5</b>	<b>Safeguards against X-radiation</b>		N/A
10.5.1	Requirements		N/A
	Instructional safeguard for skilled persons .....		—
10.5.3	Maximum radiation (pA/kg) .....		—
<b>10.6</b>	<b>Safeguards against acoustic energy sources</b>		N/A
10.6.1	General		N/A
10.6.2	Classification		N/A
	Acoustic output $L_{Aeq,T}$ , dB(A) .....		N/A
	Unweighted RMS output voltage (mV) .....		N/A
	Digital output signal (dBFS) .....		N/A
10.6.3	Requirements for dose-based systems		N/A
10.6.3.1	General requirements		N/A
10.6.3.2	Dose-based warning and automatic decrease		N/A
10.6.3.3	Exposure-based warning and requirements		N/A
	30 s integrated exposure level (MEL30) .....		N/A
	Warning for MEL $\geq 100$ dB(A) .....		N/A
10.6.4	Measurement methods		N/A

10.6.5	Protection of persons		N/A
	Instructional safeguards..... :		N/A
10.6.6	Requirements for listening devices (headphones, earphones, etc.)		N/A
10.6.6.1	Corded listening devices with analogue input		N/A
	Listening device input voltage (mV)..... :		N/A
10.6.6.2	Corded listening devices with digital input		N/A
	Max. acoustic output $L_{Aeq,T}$ , dB(A)..... :		N/A
10.6.6.3	Cordless listening devices		N/A
	Max. acoustic output $L_{Aeq,T}$ , dB(A)..... :		N/A

<b>B</b>	<b>NORMAL OPERATING CONDITION TESTS, ABNORMAL OPERATING CONDITION TESTS AND SINGLE FAULT CONDITION TESTS</b>		Pass
<b>B.1</b>	<b>General</b>		Pass
B.1.5	Temperature measurement conditions	(See appended table B.1.5)	Pass
<b>B.2</b>	<b>Normal operating conditions</b>		Pass
B.2.1	General requirements..... :	Considered in unfavorable normal operating conditions.	Pass
	Audio Amplifiers and equipment with audio amplifiers..... :	No Amplifiers.	N/A
B.2.3	Supply voltage and tolerances	Not connect to MAINS, and no tolerance on RATED VOLTAGE.	N/A
B.2.5	Input test..... :		N/A
<b>B.3</b>	<b>Simulated abnormal operating conditions</b>		Pass
B.3.1	General	See below.	Pass
B.3.2	Covering of ventilation openings	To be determined in the end-use installation	N/A
	Instructional safeguard..... :		N/A
B.3.3	DC mains polarity test	Not connected to mains.	N/A
B.3.4	Setting of voltage selector	Not connected to mains.	N/A
B.3.5	Maximum load at output terminals	(See appended table B.3, B.4)	Pass
B.3.6	Reverse battery polarity	Battery is not possible to insert with reversed polarity.	N/A
B.3.7	Audio amplifier abnormal operating conditions	No amplifier.	N/A
B.3.8	Safeguards functional during and after abnormal operating conditions..... :	(See appended table B.3, B.4)	Pass
<b>B.4</b>	<b>Simulated single fault conditions</b>		Pass
B.4.1	General		Pass
B.4.2	Temperature controlling device		N/A
B.4.3	Blocked motor test		N/A
B.4.4	Functional insulation	See B.4.9.	Pass
B.4.4.1	Short circuit of clearances for functional insulation		N/A

B.4.4.2	Short circuit of creepage distances for functional insulation		N/A
B.4.4.3	Short circuit of functional insulation on coated printed boards		N/A
B.4.5	Short-circuit and interruption of electrodes in tubes and semiconductors	See B.4.9.	Pass
B.4.6	Short circuit or disconnection of passive components	See B.4.9.	Pass
B.4.7	Continuous operation of components	Continuous operation only.	N/A
B.4.8	Compliance during and after single fault conditions ..... :	(See appended table B.3, B.4)	Pass
B.4.9	Battery charging and discharging under single fault conditions	(See appended table B.3, B.4)	Pass
<b>C</b>	<b>UV RADIATION</b>		N/A
<b>C.1</b>	<b>Protection of materials in equipment from UV radiation</b>		N/A
C.1.2	Requirements		N/A
C.1.3	Test method		N/A
<b>C.2</b>	<b>UV light conditioning test</b>		N/A
C.2.1	Test apparatus..... :		N/A
C.2.2	Mounting of test samples		N/A
C.2.3	Carbon-arc light-exposure test		N/A
C.2.4	Xenon-arc light-exposure test		N/A
<b>D</b>	<b>TEST GENERATORS</b>		N/A
<b>D.1</b>	<b>Impulse test generators</b>		N/A
<b>D.2</b>	<b>Antenna interface test generator</b>		N/A
<b>D.3</b>	<b>Electronic pulse generator</b>		N/A
<b>E</b>	<b>TEST CONDITIONS FOR EQUIPMENT CONTAINING AUDIO AMPLIFIERS</b>		N/A
<b>E.1</b>	<b>Electrical energy source classification for audio signals</b>		N/A
	Maximum non-clipped output power (W)..... :		—
	Rated load impedance ( $\Omega$ ) ..... :		—
	Open-circuit output voltage (V)..... :		—
	Instructional safeguard ..... :		—
<b>E.2</b>	<b>Audio amplifier normal operating conditions</b>		N/A
	Audio signal source type..... :		—
	Audio output power (W) ..... :		—
	Audio output voltage (V) ..... :		—
	Rated load impedance ( $\Omega$ ) ..... :		—
	Requirements for temperature measurement		N/A
E.3	Audio amplifier abnormal operating conditions		N/A

<b>F</b>	<b>EQUIPMENT MARKINGS, INSTRUCTIONS, AND INSTRUCTIONAL SAFEGUARDS</b>		Pass
<b>F.1</b>	<b>General</b>		Pass
	Language .....	English, French and others. See 'Copy of marking plate' for details.	—
<b>F.2</b>	<b>Letter symbols and graphical symbols</b>		Pass
F.2.1	Letter symbols according to IEC60027-1		Pass
F.2.2	Graphic symbols according to IEC, ISO or manufacturer specific		Pass
<b>F.3</b>	<b>Equipment markings</b>		Pass
F.3.1	Equipment marking locations		Pass
F.3.2	Equipment identification markings		Pass
F.3.2.1	Manufacturer identification .....	See Trade Mark	Pass
F.3.2.2	Model identification .....	See Model/Type reference	Pass
F.3.3	Equipment rating markings		Pass
F.3.3.1	Equipment with direct connection to mains		N/A
F.3.3.2	Equipment without direct connection to mains		Pass
F.3.3.3	Nature of the supply voltage .....	IEC 60417-5031 (2002-10) for d.c.	Pass
F.3.3.4	Rated voltage.....	See Ratings	Pass
F.3.3.5	Rated frequency .....	DC source	Pass
F.3.3.6	Rated current or rated power.....	See Ratings	Pass
F.3.3.7	Equipment with multiple supply connections		N/A
F.3.4	Voltage setting device	No such device.	N/A
F.3.5	Terminals and operating devices	No need related markings	N/A
F.3.5.1	Mains appliance outlet and socket-outlet markings .....		N/A
F.3.5.2	Switch position identification marking.....		N/A
F.3.5.3	Replacement fuse identification and rating markings .....		N/A
	Instructional safeguards for neutral fuse .....		N/A
F.3.5.4	Replacement battery identification marking.....		N/A
F.3.5.5	Neutral conductor terminal		N/A
F.3.5.6	Terminal marking location		N/A
F.3.6	Equipment markings related to equipment classification	No need related markings.	N/A
F.3.6.1	Class I equipment		N/A
F.3.6.1.1	Protective earthing conductor terminal .....		N/A
F.3.6.1.2	Protective bonding conductor terminals .....		N/A
F.3.6.2	Equipment class marking.....		N/A
F.3.6.3	Functional earthing terminal marking .....		N/A
F.3.7	Equipment IP rating marking .....	Only IPX0, no need the marking.	N/A



F.3.8	External power supply output marking .....		N/A
F.3.9	Durability, legibility and permanence of marking	UL recognized label is used.	Pass
F.3.10	Test for permanence of markings	All markings provided on UL Recognized Component labels suitable for surface they are applied upon and meet the durability test.	N/A
<b>F.4</b>	<b>Instructions</b>		N/A
	a) Information prior to installation and initial use		N/A
	b) Equipment for use in locations where children not likely to be present		N/A
	c) Instructions for installation and interconnection		N/A
	d) Equipment intended for use only in restricted access area		N/A
	e) Equipment intended to be fastened in place		N/A
	f) Instructions for audio equipment terminals		N/A
	g) Protective earthing used as a safeguard		N/A
	h) Protective conductor current exceeding ES2 limits		N/A
	i) Graphic symbols used on equipment		N/A
	j) Permanently connected equipment not provided with all-pole mains switch		N/A
	k) Replaceable components or modules providing safeguard function		N/A
	l) Equipment containing insulating liquid		N/A
	m) Installation instructions for outdoor equipment		N/A
<b>F.5</b>	Instructional safeguards		Pass
<b>G</b>	<b>COMPONENTS</b>		Pass
<b>G.1</b>	<b>Switches</b>		N/A
G.1.1	General	No such device	N/A
G.1.2	Ratings, endurance, spacing, maximum load		N/A
G.1.3	Test method and compliance		N/A
<b>G.2</b>	<b>Relays</b>		N/A
G.2.1	Requirements	No such device	N/A
G.2.2	Overload test		N/A
G.2.3	Relay controlling connectors supplying power to other equipment		N/A
G.2.4	Test method and compliance		N/A
<b>G.3</b>	<b>Protective devices</b>		Pass
G.3.1	Thermal cut-offs		N/A
	Thermal cut-outs separately approved according to IEC 60730 with conditions indicated in a) & b)		N/A

	Thermal cut-outs tested as part of the equipment as indicated in c)		N/A
G.3.1.2	Test method and compliance		N/A
G.3.2	Thermal links		N/A
G.3.2.1	a) Thermal links tested separately according to IEC 60691 with specifics		N/A
	b) Thermal links tested as part of the equipment		N/A
G.3.2.2	Test method and compliance		N/A
G.3.3	PTC thermistors		N/A
G.3.4	Overcurrent protection devices	See table 4.1.2 for details.	Pass
G.3.5	Safeguards components not mentioned in G.3.1 to G.3.4		N/A
G.3.5.1	Non-resettable devices suitably rated and marking provided		N/A
G.3.5.2	Single faults conditions .....		N/A
<b>G.4</b>	<b>Connectors</b>		N/A
G.4.1	Spacings	The battery pack is classified as ES1.	N/A
G.4.2	Mains connector configuration.....		N/A
G.4.3	Plug is shaped that insertion into mains socket-outlets or appliance coupler is unlikely		N/A
<b>G.5</b>	<b>Wound components</b>		N/A
G.5.1	Wire insulation in wound components	No such devices.	N/A
G.5.1.2	Protection against mechanical stress		N/A
G.5.2	Endurance test		N/A
G.5.2.1	General test requirements		N/A
G.5.2.2	Heat run test		N/A
	Test time (days per cycle).....		—
	Test temperature (°C) .....		—
G.5.2.3	Wound components supplied from the mains		N/A
G.5.2.4	No insulation breakdown		N/A
G.5.3	Transformers		N/A
G.5.3.1	Compliance method.....	No such devices.	N/A
	Position .....		N/A
	Method of protection .....		N/A
G.5.3.2	Insulation		N/A
	Protection from displacement of windings .....		—
G.5.3.3	Transformer overload tests		N/A
G.5.3.3.1	Test conditions		N/A
G.5.3.3.2	Winding temperatures		N/A
G.5.3.3.3	Winding temperatures - alternative test method		N/A

G.5.3.4	Transformers using FIW		N/A
G.5.3.4.1	General		N/A
	FIW wire nominal diameter .....		—
G.5.3.4.2	Transformers with basic insulation only		N/A
G.5.3.4.3	Transformers with double insulation or reinforced insulation .....		N/A
G.5.3.4.4	Transformers with FIW wound on metal or ferrite core		N/A
G.5.3.4.5	Thermal cycling test and compliance		N/A
G.5.3.4.6	Partial discharge test		N/A
G.5.3.4.7	Routine test		N/A
G.5.4	Motors		N/A
G.5.4.1	General requirements	No such devices.	N/A
G.5.4.2	Motor overload test conditions		N/A
G.5.4.3	Running overload test		N/A
G.5.4.4.2	Locked-rotor overload test		N/A
	Test duration (days) .....		—
G.5.4.5	Running overload test for DC motors		N/A
G.5.4.5.2	Tested in the unit		N/A
G.5.4.5.3	Alternative method		N/A
G.5.4.6	Locked-rotor overload test for DC motors		N/A
G.5.4.6.2	Tested in the unit		N/A
	Maximum Temperature .....		N/A
G.5.4.6.3	Alternative method		N/A
G.5.4.7	Motors with capacitors	No such devices.	N/A
G.5.4.8	Three-phase motors	No such devices.	N/A
G.5.4.9	Series motors	No such devices.	N/A
	Operating voltage .....		—
<b>G.6</b>	<b>Wire Insulation</b>		N/A
G.6.1	General	No such devices.	N/A
G.6.2	Enamelled winding wire insulation		N/A
<b>G.7</b>	<b>Mains supply cords</b>		N/A
G.7.1	General requirements	No such devices.	N/A
	Type .....		—
G.7.2	Cross sectional area (mm <sup>2</sup> or AWG) .....		N/A
G.7.3	Cord anchorages and strain relief for non-detachable power supply cords		N/A
G.7.3.2	Cord strain relief		N/A
G.7.3.2.1	Requirements		N/A

	Strain relief test force (N)..... :		N/A
G.7.3.2.2	Strain relief mechanism failure		N/A
G.7.3.2.3	Cord sheath or jacket position, distance (mm) ..... :		N/A
G.7.3.2.4	Strain relief and cord anchorage material		N/A
G.7.4	Cord Entry		N/A
G.7.5	Non-detachable cord bend protection		N/A
G.7.5.1	Requirements		N/A
G.7.5.2	Test method and compliance		N/A
	Overall diameter or minor overall dimension, $D$ (mm)..... :		—
	Radius of curvature after test (mm) ..... :		—
G.7.6	Supply wiring space		N/A
G.7.6.1	General requirements		N/A
G.7.6.2	Stranded wire		N/A
G.7.6.2.1	Requirements		N/A
G.7.6.2.2	Test with 8 mm strand		N/A
<b>G.8</b>	<b>Varistors</b>		N/A
G.8.1	General requirements	No such devices.	N/A
G.8.2	Safeguards against fire		N/A
G.8.2.1	General		N/A
G.8.2.2	Varistor overload test		N/A
G.8.2.3	Temporary overvoltage test		N/A
<b>G.9</b>	<b>Integrated circuit (IC) current limiters</b>		N/A
G.9.1	Requirements		N/A
	IC limiter output current (max. 5A)..... :		—
	Manufacturers' defined drift ..... :		—
G.9.2	Test Program		N/A
G.9.3	Compliance		N/A
<b>G.10</b>	<b>Resistors</b>		N/A
G.10.1	General	No such devices as safeguard.	N/A
G.10.2	Conditioning		N/A
G.10.3	Resistor test		N/A
G.10.4	Voltage surge test		N/A
G.10.5	Impulse test		N/A
G.10.6	Overload test		N/A
<b>G.11</b>	<b>Capacitors and RC units</b>		N/A
G.11.1	General requirements	No such devices as safeguard.	N/A
G.11.2	Conditioning of capacitors and RC units		N/A
G.11.3	Rules for selecting capacitors		N/A

<b>G.12</b>	<b>Optocouplers</b>		N/A
	Optocouplers comply with IEC 60747-5-5 with specifics	No such devices.	N/A
	Type test voltage $V_{ini,a}$ ..... :		—
	Routine test voltage, $V_{ini,b}$ ..... :		—
<b>G.13</b>	<b>Printed boards</b>		N/A
G.13.1	General requirements	No such devices used as basic, supplementary, reinforced and double insulation.	N/A
G.13.2	Uncoated printed boards		N/A
G.13.3	Coated printed boards		N/A
G.13.4	Insulation between conductors on the same inner surface		N/A
G.13.5	Insulation between conductors on different surfaces		N/A
	Distance through insulation ..... :		N/A
	Number of insulation layers (pcs) ..... :		—
G.13.6	Tests on coated printed boards		N/A
G.13.6.1	Sample preparation and preliminary inspection		N/A
G.13.6.2	Test method and compliance		N/A
<b>G.14</b>	<b>Coating on components terminals</b>		N/A
G.14.1	Requirements ..... :	No such devices used as basic, supplementary, reinforced and double insulation.	N/A
<b>G.15</b>	<b>Pressurized liquid filled components</b>		N/A
G.15.1	Requirements		N/A
G.15.2	Test methods and compliance		N/A
G.15.2.1	Hydrostatic pressure test		N/A
G.15.2.2	Creep resistance test		N/A
G.15.2.3	Tubing and fittings compatibility test		N/A
G.15.2.4	Vibration test		N/A
G.15.2.5	Thermal cycling test		N/A
G.15.2.6	Force test		N/A
G.15.3	Compliance		N/A
<b>G.16</b>	<b>IC including capacitor discharge function (ICX)</b>		N/A
G.16.1	Condition for fault tested is not required		N/A
	ICX with associated circuitry tested in equipment		N/A
	ICX tested separately		N/A
G.16.2	Tests		N/A
	Smallest capacitance and smallest resistance specified by ICX manufacturer for impulse test ..... :		—

	Mains voltage that impulses to be superimposed on ..... :		—
	Largest capacitance and smallest resistance for ICX tested by itself for 10000 cycles test..... :		—
G.16.3	Capacitor discharge test ..... :		N/A
<b>H</b>	<b>CRITERIA FOR TELEPHONE RINGING SIGNALS</b>		N/A
<b>H.1</b>	<b>General</b>		N/A
<b>H.2</b>	<b>Method A</b>		N/A
<b>H.3</b>	<b>Method B</b>		N/A
H.3.1	Ringling signal		N/A
H.3.1.1	Frequency (Hz) ..... :		—
H.3.1.2	Voltage (V) ..... :		—
H.3.1.3	Cadence; time (s) and voltage (V) ..... :		—
H.3.1.4	Single fault current (mA): ..... :		—
H.3.2	Tripping device and monitoring voltage		N/A
H.3.2.1	Conditions for use of a tripping device or a monitoring voltage		N/A
H.3.2.2	Tripping device		N/A
H.3.2.3	Monitoring voltage (V)..... :		N/A
<b>J</b>	<b>INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION</b>		N/A
<b>J.1</b>	<b>General</b>		N/A
	Winding wire insulation ..... :		—
	Solid round winding wire, diameter (mm) ..... :		N/A
	Solid square and rectangular (flatwise bending) winding wire, cross-sectional area (mm <sup>2</sup> ) ..... :		N/A
<b>J.2/J.3</b>	Tests and Manufacturing		—
<b>K</b>	<b>SAFETY INTERLOCKS</b>		N/A
<b>K.1</b>	<b>General requirements</b>		N/A
	Instructional safeguard ..... :	No safety interlocks.	N/A
<b>K.2</b>	<b>Components of safety interlock safeguard mechanism</b>		N/A
<b>K.3</b>	<b>Inadvertent change of operating mode</b>		N/A
<b>K.4</b>	<b>Interlock safeguard override</b>		N/A
<b>K.5</b>	<b>Fail-safe</b>		N/A
K.5.1	Under single fault condition		N/A
<b>K.6</b>	<b>Mechanically operated safety interlocks</b>		N/A
K.6.1	Endurance requirement		N/A
K.6.2	Test method and compliance ..... :		N/A
<b>K.7</b>	<b>Interlock circuit isolation</b>		N/A
K.7.1	Separation distance for contact gaps & interlock circuit elements		N/A

	In circuit connected to mains, separation distance for contact gaps (mm)..... :		N/A
	In circuit isolated from mains, separation distance for contact gaps (mm)..... :		N/A
	Electric strength test before and after the test of K.7.2..... :		N/A
K.7.2	Overload test, Current (A)..... :		N/A
K.7.3	Endurance test		N/A
K.7.4	Electric strength test		N/A
<b>L</b>	<b>DISCONNECT DEVICES</b>		N/A
<b>L.1</b>	<b>General requirements</b>		N/A
<b>L.2</b>	<b>Permanently connected equipment</b>		N/A
<b>L.3</b>	<b>Parts that remain energized</b>		N/A
<b>L.4</b>	<b>Single-phase equipment</b>		N/A
<b>L.5</b>	<b>Three-phase equipment</b>		N/A
<b>L.6</b>	<b>Switches as disconnect devices</b>		N/A
<b>L.7</b>	<b>Plugs as disconnect devices</b>		N/A
<b>L.8</b>	<b>Multiple power sources</b>		N/A
	Instructional safeguard .....		N/A
<b>M</b>	<b>EQUIPMENT CONTAINING BATTERIES AND THEIR PROTECTION CIRCUITS</b>		Pass
<b>M.1</b>	<b>General requirements</b>		Pass
<b>M.2</b>	<b>Safety of batteries and their cells</b>		Pass
M.2.1	Batteries and their cells comply with relevant IEC standards .....	Complied with IEC 62133-2:2017 IEC 62133-2:2017/AMD1:2021 and UN38.3 which represent IEC62281 requirement.	Pass
<b>M.3</b>	<b>Protection circuits for batteries provided within the equipment</b>		Pass
M.3.1	Requirements		Pass
M.3.2	Test method		Pass
	Overcharging of a rechargeable battery		Pass
	Excessive discharging		Pass
	Unintentional charging of a non-rechargeable battery		N/A
	Reverse charging of a rechargeable battery	Polarity markings near connector and connector construction can't be reverse charging	N/A
M.3.3	Compliance	(See appended table M.3)	Pass
<b>M.4</b>	<b>Additional safeguards for equipment containing a portable secondary lithium battery</b>		Pass
M.4.1	General		Pass
M.4.2	Charging safeguards	(See appended Tables Annex M.4 for simulation results)	Pass

M.4.2.1	Requirements	(See appended table M.4.2)	Pass
M.4.2.2	Compliance .....	(See appended table M.4.2)	Pass
M.4.3	Fire enclosure .....		N/A
M.4.4	Drop test of equipment containing a secondary lithium battery		N/A
M.4.4.2	Preparation and procedure for the drop test		N/A
M.4.4.3	Drop, Voltage on reference and dropped batteries (V); voltage difference during 24 h period (%): .....		N/A
M.4.4.4	Check of the charge/discharge function		N/A
M.4.4.5	Charge / discharge cycle test		N/A
M.4.4.6	Compliance		N/A
<b>M.5</b>	<b>Risk of burn due to short-circuit during carrying</b>		N/A
M.5.1	Requirement		N/A
M.5.2	Test method and compliance		N/A
<b>M.6</b>	<b>Safeguards against short-circuits</b>		Pass
M.6.1	External and internal faults		Pass
M.6.2	Compliance	Component Cell's internal short condition was evaluated and complied with UL 1642 Round Bar Crush Test.	Pass
<b>M.7</b>	<b>Risk of explosion from lead acid and NiCd batteries</b>		N/A
M.7.1	Ventilation preventing explosive gas concentration		N/A
	Calculated hydrogen generation rate .....		N/A
M.7.2	Test method and compliance		N/A
	Minimum air flow rate, Q (m <sup>3</sup> /h) .....		N/A
M.7.3	Ventilation tests		N/A
M.7.3.1	General		N/A
M.7.3.2	Ventilation test – alternative 1		N/A
	Hydrogen gas concentration (%) .....		N/A
M.7.3.3	Ventilation test – alternative 2		N/A
	Obtained hydrogen generation rate .....		N/A
M.7.3.4	Ventilation test – alternative 3		N/A
	Hydrogen gas concentration (%) .....		N/A
M.7.4	Marking .....		N/A
<b>M.8</b>	<b>Protection against internal ignition from external spark sources of batteries with aqueous electrolyte</b>		N/A
M.8.1	General		N/A
M.8.2	Test method		N/A
M.8.2.1	General		N/A
M.8.2.2	Estimation of hypothetical volume V <sub>2</sub> (m <sup>3</sup> /s) .....		—
M.8.2.3	Correction factors .....		—



M.8.2.4	Calculation of distance $d$ (mm) .....		—
<b>M.9</b>	<b>Preventing electrolyte spillage</b>		N/A
M.9.1	Protection from electrolyte spillage		N/A
M.9.2	Tray for preventing electrolyte spillage		N/A
<b>M.10</b>	Instructions to prevent reasonably foreseeable misuse		Pass
	Instructional safeguard .....	Considered in end-product, and symbol (see enclosure 07-05) is provided on battery pack body.	Pass
<b>N</b>	<b>ELECTROCHEMICAL POTENTIALS</b>		N/A
	Material(s) used .....		—
<b>O</b>	<b>MEASUREMENT OF CREEPAGE DISTANCES AND CLEARANCES</b>		N/A
	Value of $X$ (mm) .....		—
<b>P</b>	<b>SAFEGUARDS AGAINST CONDUCTIVE OBJECTS</b>		N/A
<b>P.1</b>	<b>General</b>	To be determined in the end-use installation	N/A
<b>P.2</b>	<b>Safeguards against entry or consequences of entry of a foreign object</b>		N/A
P.2.1	General		N/A
P.2.2	Safeguards against entry of a foreign object		N/A
	Location and Dimensions (mm) .....		—
P.2.3	Safeguards against the consequences of entry of a foreign object		N/A
P.2.3.1	Safeguard requirements		N/A
	The ES3 and PS3 keep-out volume in Figure P.3 not applicable to transportable equipment		N/A
	Transportable equipment with metalized plastic parts .....		N/A
P.2.3.2	Consequence of entry test.....		N/A
<b>P.3</b>	<b>Safeguards against spillage of internal liquids</b>		N/A
P.3.1	General		N/A
P.3.2	Determination of spillage consequences		N/A
P.3.3	Spillage safeguards		N/A
P.3.4	Compliance		N/A
<b>P.4</b>	<b>Metallized coatings and adhesives securing parts</b>		N/A
P.4.1	General		N/A
P.4.2	Tests		N/A
	Conditioning, $T_c$ (°C) .....		—
	Duration (weeks).....		—
<b>Q</b>	<b>CIRCUITS INTENDED FOR INTERCONNECTION WITH BUILDING WIRING</b>		N/A
<b>Q.1</b>	<b>Limited power sources</b>		N/A

Q.1.1	Requirements	No interconnection with building wiring.	N/A
	a) Inherently limited output		N/A
	b) Impedance limited output		N/A
	c) Regulating network limited output		N/A
	d) Overcurrent protective device limited output		N/A
	e) IC current limiter complying with G.9		N/A
Q.1.2	Test method and compliance .....		N/A
	Current rating of overcurrent protective device (A) .....		N/A
Q.2	<b>Test for external circuits – paired conductor cable</b>		N/A
	Maximum output current (A) .....		N/A
	Current limiting method.....		—
R	<b>LIMITED SHORT CIRCUIT TEST</b>		N/A
R.1	<b>General</b>		N/A
R.2	<b>Test setup</b>		N/A
	Overcurrent protective device for test.....		—
R.3	<b>Test method</b>		N/A
	Cord/cable used for test.....		—
R.4	<b>Compliance</b>		N/A
S	<b>TESTS FOR RESISTANCE TO HEAT AND FIRE</b>		N/A
S.1	<b>Flammability test for fire enclosures and fire barrier materials of equipment where the steady state power does not exceed 4 000 W</b>		N/A
	Samples, material .....		—
	Wall thickness (mm) .....		—
	Conditioning (°C) .....		—
	Test flame according to IEC 60695-11-5 with conditions as set out		N/A
	- Material not consumed completely		N/A
	- Material extinguishes within 30s		N/A
	- No burning of layer or wrapping tissue		N/A
S.2	<b>Flammability test for fire enclosure and fire barrier integrity</b>		N/A
	Samples, material .....		—
	Wall thickness (mm) .....		—
	Conditioning (°C) .....		—
S.3	<b>Flammability test for the bottom of a fire enclosure</b>		N/A
S.3.1	Mounting of samples		N/A
S.3.2	Test method and compliance		N/A
	Mounting of samples .....		—

	Wall thickness (mm) .....		—
<b>S.4</b>	<b>Flammability classification of materials</b>		N/A
<b>S.5</b>	<b>Flammability test for fire enclosure materials of equipment with a steady state power exceeding 4 000 W</b>		N/A
	Samples, material .....		—
	Wall thickness (mm) .....		—
	Conditioning (°C) .....		—
<b>T</b>	<b>MECHANICAL STRENGTH TESTS</b>		N/A
<b>T.1</b>	<b>General</b>		N/A
<b>T.2</b>	<b>Steady force test, 10 N .....</b>		N/A
<b>T.3</b>	<b>Steady force test, 30 N .....</b>		N/A
<b>T.4</b>	<b>Steady force test, 100 N .....</b>		N/A
<b>T.5</b>	<b>Steady force test, 250 N .....</b>		N/A
<b>T.6</b>	<b>Enclosure impact test</b>		N/A
	Fall test		N/A
	Swing test		N/A
<b>T.7</b>	<b>Drop test .....</b>		N/A
<b>T.8</b>	<b>Stress relief test.....</b>		N/A
<b>T.9</b>	<b>Glass Impact Test .....</b>		N/A
<b>T.10</b>	<b>Glass fragmentation test</b>		N/A
	Number of particles counted.....		N/A
<b>T.11</b>	<b>Test for telescoping or rod antennas</b>		N/A
	Torque value (Nm) .....		N/A
<b>U</b>	<b>MECHANICAL STRENGTH OF CATHODE RAY TUBES (CRT) AND PROTECTION AGAINST THE EFFECTS OF IMPLOSION</b>		N/A
<b>U.1</b>	<b>General</b>		N/A
	Instructional safeguard .....		N/A
<b>U.2</b>	<b>Test method and compliance for non-intrinsically protected CRTs</b>		N/A
<b>U.3</b>	<b>Protective screen</b>		N/A
<b>V</b>	<b>DETERMINATION OF ACCESSIBLE PARTS</b>		N/A
<b>V.1</b>	<b>Accessible parts of equipment</b>		N/A
V.1.1	General		N/A
V.1.2	Surfaces and openings tested with jointed test probes		N/A
V.1.3	Openings tested with straight unjointed test probes		N/A
V.1.4	Plugs, jacks, connectors tested with blunt probe		N/A
V.1.5	Slot openings tested with wedge probe		N/A
V.1.6	Terminals tested with rigid test wire		N/A
<b>V.2</b>	<b>Accessible part criterion</b>		N/A

<b>X</b>	<b>ALTERNATIVE METHOD FOR DETERMINING CLEARANCES FOR INSULATION IN CIRCUITS CONNECTED TO AN AC MAINS NOT EXCEEDING 420 V PEAK (300 V RMS)</b>		N/A
	Clearance .....		N/A
<b>Y</b>	<b>CONSTRUCTION REQUIREMENTS FOR OUTDOOR ENCLOSURES</b>		N/A
<b>Y.1</b>	<b>General</b>		N/A
<b>Y.2</b>	<b>Resistance to UV radiation</b>		N/A
<b>Y.3</b>	<b>Resistance to corrosion</b>		N/A
Y.3.1	Metallic parts of outdoor enclosures are resistant to effects of water-borne contaminants by..... :		N/A
Y.3.2	Test apparatus		N/A
Y.3.3	Water – saturated sulphur dioxide atmosphere		N/A
Y.3.4	Test procedure .....		N/A
Y.3.5	Compliance		N/A
<b>Y.4</b>	<b>Gaskets</b>		N/A
Y.4.1	General		N/A
Y.4.2	Gasket tests		N/A
Y.4.3	Tensile strength and elongation tests		N/A
	Alternative test methods .....		N/A
Y.4.4	Compression test		N/A
Y.4.5	Oil resistance		N/A
Y.4.6	Securing means		N/A
<b>Y.5</b>	<b>Protection of equipment within an outdoor enclosure</b>		N/A
Y.5.1	General		N/A
Y.5.2	Protection from moisture		N/A
	Relevant tests of IEC 60529 or Y.5.3 .....		N/A
Y.5.3	Water spray test		N/A
Y.5.4	Protection from plants and vermin		N/A
Y.5.5	Protection from excessive dust		N/A
Y.5.5.1	General		N/A
Y.5.5.2	IP5X equipment		N/A
Y.5.5.3	IP6X equipment		N/A
<b>Y.6</b>	<b>Mechanical strength of enclosures</b>		N/A
Y.6.1	General		N/A
Y.6.2	Impact test .....		N/A

5.2	TABLE: Classification of electrical energy sources						Pass
Supply Voltage	Location (e.g. circuit designation)	Test conditions	Parameters				ES Class
			U (V)	I (mA)	Type <sup>1)</sup>	Additional Info <sup>2)</sup>	
--	--	Normal	--	--	SS	--	ES1

--	--	Abnormal	--	--	SS	--	ES1
--	--	Single fault – SC/OC	--	--	SS	--	ES1
--	--	Normal	--	--	CP	--	--
--	--	Abnormal	--	--	CP	--	--
--	--	Single fault – SC/OC	--	--	CP	--	--
--	--	Normal	--	--	SP	--	--
--	--	Abnormal	--	--	SP	--	--
--	--	Single fault – SC/OC	--	--	SP	--	--
--	--	Normal	--	--	RP	--	--
--	--	Abnormal	--	--	RP	--	--
--	--	Single fault – SC/OC	--	--	RP	--	--

Supplementary information:

1) Type: Steady state (SS), Capacitance (CP), Single pulse (SP), Repetitive pulses (RP), etc.

2) Additional Info: Frequency, Pulse duration, Pulse off time, Capacitance value, etc.

The cell combination generates ES1 energy level and no higher voltage is able to amplify inside of this battery pack.

<b>5.4.1.8</b>	<b>TABLE: Working voltage measurement</b>				N/A
Location		RMS voltage (V)	Peak voltage (V)	Frequency (Hz)	Comments
Supplementary information:					

5.4.1.10.2	TABLE: Vicat softening temperature of thermoplastics			N/A
Method .....			—	
Object/ Part No./Material	Manufacturer/trademark	Thickness (mm)	T softening (°C)	
Supplementary information:				

<b>5.4.1.10.3</b>	<b>TABLE: Ball pressure test of thermoplastics</b>				N/A
Allowed impression diameter (mm) .....		≤ 2 mm			—
Object/Part No./Material	Manufacturer/trademark	Thickness (mm)	Test temperature (°C)	Impression diameter (mm)	

Supplementary information:

<b>5.4.2, 5.4.3</b>	<b>TABLE: Minimum Clearances/Creepage distance</b>							N/A
Clearance (cl) and creepage distance (cr) at/of/between:	Up (V)	$U_{rms}$ (V)	Freq <sup>1)</sup> (kHz)	Required cl (mm)	cl (mm)	E.S. <sup>2)</sup> (V)	Required cr (mm)	cr (mm)
Supplementary information:								

5.4.4.2	TABLE: Minimum distance through insulation				N/A
Distance through insulation (DTI) at/of:	Peak voltage (V)	Insulation	Required DTI (mm)	Measured DTI (mm)	
Supplementary information:					

<b>5.4.4.9</b>	<b>TABLE: Solid insulation at frequencies &gt;30 kHz</b>						N/A
Insulation material	$E_P$	Frequency (kHz)	$K_R$	Thickness $d$ (mm)	Insulation	$V_{PW}$ (Vpk)	
Supplementary information:							

5.4.9	TABLE: Electric strength tests			N/A
Test voltage applied between:	Voltage shape (Surge, Impulse, AC, DC, etc.)	Test voltage (V)	Breakdown Yes / No	
Supplementary information:				

<b>5.5.2.2</b>	<b>TABLE: Stored discharge on capacitors</b>	N/A
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Location	Supply Voltage (V)	Operating and fault condition <sup>1)</sup>	Switch position	Measured voltage (V <sub>pk</sub> )	ES Class
Supplementary information:					

<b>5.6.6</b>	<b>TABLE: Resistance of protective conductors and terminations</b>					N/A
Location	Test current (A)	Duration (min)	Voltage drop (V)	Resistance (Ω)		
Supplementary information:						

<b>5.7.4</b>	<b>TABLE: Unearthed accessible parts</b>					N/A
Location	Operating and fault conditions	Supply Voltage (V)	Parameters			ES class
			Voltage (V <sub>rms</sub> or V <sub>pk</sub> )	Current (A <sub>rms</sub> or A <sub>pk</sub> )	Freq. (Hz)	
Supplementary information:						

5.7.5	TABLE: Earthed accessible conductive part			N/A
Supply voltage (V) .....:				—
Phase(s) .....:				
Power Distribution System .....:				
Location	Fault Condition No in IEC 60990 clause 6.2.2	Touch current (mA)	Comment	
Supplementary Information:				

<b>5.8</b>	<b>TABLE: Backfeed safeguard in battery backed up supplies</b>					N/A
Location	Supply voltage (V)	Operating and fault condition	Time (s)	Open-circuit voltage (V)	Touch current (A)	ES Class

Supplementary information:

<b>6.2.2</b>	<b>TABLE: Power source circuit classifications</b>					Pass
Location	Operating and fault condition	Voltage (V)	Current (A)	Max. Power <sup>1)</sup> (W)	Time (S)	PS class
Config A: Battery Output Connector	From P+ to P-	15.1	6.4	96.64	after 5 s	PS2
Config. A: Internal Cell Module	From VP to VG	15.08	6.9	104.05	after 5 s	PS3
Config. B: Battery Output Connector	From P+ to P-	15.6	6.0	93.6	after 5 s	PS2
Config. B: Internal Cell Module	From VP to VG	15.3	6.8	104.04	after 5 s	PS3
Supplementary information:						
<p>Abbreviation: SC= short circuit; OC= open circuit</p> <p>(1) Measured after 3 s for PS1 and measured after 5 s for PS2 and PS3.</p> <p>(2) Internal Cell Module is considered as PS3.</p> <p>If a separate voltmeter and ammeter are used, the product of (VA x IA) is used to determine PS Classification.</p> <p>POWER MEASUREMENTS test with Configuration C was waived due to test performed using one with Configuration A as representative.</p>						

6.2.3.1	TABLE: Determination of Arcing PIS				N/A
Location		Open circuit voltage after 3 s (Vpk)	Measured r.m.s current (A)	Calculated value	Arcing PIS? Yes / No
Supplementary information:					

6.2.3.2	Table: Determination of Resistive PIS			Pass
Location	Operating and fault condition	Dissipate power (W)		Resistive PIS? Yes/No
--	--	-- / --		--
Supplementary Information:				
All components are considered resistive PIS.				

<b>8.5.5</b>	<b>TABLE: High Pressure Lamp</b>	N/A
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Lamp manufacturer	Lamp type	Explosion method	Longest axis of glass particle (mm)	Particle found beyond 1 m Yes / No?
Supplementary information:				

<b>9.6</b>	<b>TABLE: Temperature measurements for wireless power transmitters</b>							N/A
Supply voltage (V) .....								—
Max. transmit power of transmitter (W) .....								—
Foreign objects	w/o receiver and direct contact		with receiver and direct contact		with receiver and at distance of 2 mm		with receiver and at distance of 5 mm	
	Object (°C)	Ambient (°C)	Object (°C)	Ambient (°C)	Object (°C)	Ambient (°C)	Object (°C)	Ambient (°C)
Supplementary information:								

5.4.1.4, 9.3, B.1.5, B.2.6	TABLE: Temperature measurements				Pass
Supply voltage (V) .....	--	--	--	--	—
Ambient temperature during test $T_{\text{amb}}$ (°C) .....	--	--	--	--	—
Maximum measured temperature T of part/at:	T (°C)				Allowed $T_{\text{max}}$ (°C)
Model C41N2503 with config A:	--	--	--	--	--
Charge mode: 18.0V/3.624A	--	--	--	--	--
Max. Operating Temp. Measurement for 5.00 h R502(U100), RT201 and all thermostats disabled	Measured	Adjusted	--	--	--
Ambient	44.1	45.0	--	--	--
Label inside near Q300, Q301	46.9	47.8	--	--	80
Label inside near R206	46.3	47.2	--	--	80
Enclosure inside near Q300, Q301	47.5	48.4	--	--	80
Enclosure inside near R206	46.9	47.8	--	--	80
PWB near Q300, Q301	52.3	53.2	--	--	130
PWB near R206	50.0	50.9	--	--	130
Cell 1	48.3	49.2	--	--	90
Cell 2	48.1	49.0	--	--	90
Cell 3	48.9	49.8	--	--	90
Cell 4	48.8	49.7	--	--	90

Plastic Connector	48.0	48.9	--	--	80
Touch Temp. Measurement for 2.91 h R502(U100), RT201 and all thermostats disabled	Measured	Adjusted	--	--	--
Ambient	22.6	25.0	--	--	--
Label outside near Cell	34.3	36.7	--	--	77
Label outside near Q300, Q301	31.9	34.3	--	--	77
Mylar outside near R206	30.6	33.0	--	--	77
Discharge mode: 4.53A	--	--	--	--	--
Max. Operating Temp. Measurement for 2.91 h R502(U100), RT201 and all thermostats disabled	Measured	Adjusted	--	--	--
Ambient	44.1	45.0	--	--	--
Label inside near Q300, Q301	51.3	52.2	--	--	80
Label inside near R206	49.3	50.2	--	--	80
Enclosure inside near Q300, Q301	52.8	53.7	--	--	80
Enclosure inside near R206	50.8	51.7	--	--	80
PWB near Q300, Q301	62.5	63.4	--	--	130
PWB near R206	57.6	58.5	--	--	130
Cell 1	59.7	60.6	--	--	90
Cell 2	56.7	57.6	--	--	90
Cell 3	58.9	59.8	--	--	90
Cell 4	60.8	61.7	--	--	90
Plastic Connector	51.7	52.6	--	--	80
Touch Temp. Measurement for 2.94 h R502(U100), RT201 and all thermostats disabled	Measured	Adjusted	--	--	--
Ambient	22.4	25.0	--	--	--
Label outside near Cell	48.0	50.6	--	--	77
Label outside near Q300, Q301	39.3	41.9	--	--	77
Mylar outside near R206	36.8	39.4	--	--	77
Model C41N2503 with config B:	--	--	--	--	--
Charge mode: 18.0V/3.624A	--	--	--	--	--
Max. Operating Temp. Measurement for 5.00 h R502(U100), RT201 and all thermostats disabled	Measured	Adjusted	--	--	--
Ambient	44.1	45.0	--	--	--
Label inside near Q300, Q301	47.3	48.2	--	--	80
Label inside near R206	47.2	48.1	--	--	80
Enclosure inside near Q300, Q301	47.6	48.5	--	--	80
Enclosure inside near R206	47.1	48.0	--	--	80
PWB near Q300, Q301	51.5	52.4	--	--	130

PWB near R206	49.5	50.4	--	--	130
Cell 1	47.5	48.4	--	--	90
Cell 2	47.8	48.7	--	--	90
Cell 3	48.1	49.0	--	--	90
Cell 4	47.7	48.6	--	--	90
Plastic Connector	47.1	48.0	--	--	80
Touch Temp. Measurement for 2.91 h R502(U100), RT201 and all thermostats disabled	Measured	Adjusted	--	--	--
Ambient	22.6	25.0	--	--	--
Label outside near Cell	33.4	35.8	--	--	77
Label outside near Q300, Q301	30.2	32.6	--	--	77
Mylar outside near R206	29.6	32.0	--	--	77
Discharge mode: 4.53A	--	--	--	--	--
Max. Operating Temp. Measurement for 2.91 h R502(U100), RT201 and all thermostats disabled	Measured	Adjusted	--	--	--
Ambient	44.1	45.0	--	--	--
Label inside near Q300, Q301	54.5	55.4	--	--	80
Label inside near R206	54.0	54.9	--	--	80
Enclosure inside near Q300, Q301	55.4	56.3	--	--	80
Enclosure inside near R206	54.8	55.7	--	--	80
PWB near Q300, Q301	62.2	63.1	--	--	130
PWB near R206	60.1	61.0	--	--	130
Cell 1	59.6	60.5	--	--	90
Cell 2	59.7	60.6	--	--	90
Cell 3	60.7	61.6	--	--	90
Cell 4	58.1	59.0	--	--	90
Plastic Connector	55.8	56.7	--	--	80
Touch Temp. Measurement for 2.94 h R502(U100), RT201 and all thermostats disabled	Measured	Adjusted	--	--	--
Ambient	22.4	25.0	--	--	--
Label outside near Cell	47.3	49.9	--	--	77
Label outside near Q300, Q301	36.3	38.9	--	--	77
Mylar outside near R206	36.1	38.7	--	--	77
Abnormal Test (Annex M.3):	--	--	--	--	--
Model C41N2503 with Config. A:	--	--	--	--	--
Test condition simulating overcharge caused by fault in battery: 18.0V / 3.624A (Non-trip)	--	--	--	--	--

Pack's Q300, Q301 (pin 3-6) shorted, R502 (U100) opened, RT200, RT201 and all thermostats disabled					
Max. Operating Temp. Measurement	Measured	Adjusted	--	--	--
Ambient	23.4	45.0	--	--	--
Cell	35.9	57.5	--	--	90
Touch Temp. Measurement	Measured	Adjusted	--	--	--
Ambient	23.4	25.0	--	--	--
Cell (measured for reference)	35.9	37.5	--	--	--
Label outside near Q300, Q301	32.0	33.6	--	--	87
Mylar outside near R206	31.3	32.9	--	--	87
Test condition simulating overcharge caused by fault in system: 24V / 6.348A	--	--	--	--	--
Max. Operating Temp. Measurement	Measured	Adjusted	--	--	--
Ambient	23.7	45.0	--	--	--
Cell	23.6	44.9	--	--	90
Touch Temp. Measurement	Measured	Adjusted	--	--	--
Ambient	23.7	25.0	--	--	--
Cell (measured for reference)	23.6	24.9	--	--	--
Label outside near Q300, Q301	23.7	25.0	--	--	87
Mylar outside near R206	23.7	25.0	--	--	87
Excessive discharging: 4.53A Pack's Q300,Q301 (Pin 3-6) shorted, R502 (U100) opened, RT201 and all thermostats disabled	--	--	--	--	--
Max. Operating Temp. Measurement	Measured	Adjusted	--	--	--
Ambient	21.9	45.0	--	--	--
Cell	57.2	80.3	--	--	90
Touch Temp. Measurement	Measured	Adjusted	--	--	--
Ambient	21.9	25.0	--	--	--
Cell (measured for reference)	57.2	60.3	--	--	--
Label outside near Q300, Q301	46.2	49.3	--	--	87
Mylar outside near R206	40.9	44.0	--	--	87
Model C41N2503 with Config. B:	--	--	--	--	--
Test condition simulating overcharge caused by fault in system: 24V / 6.348A	--	--	--	--	--
Max. Operating Temp. Measurement	Measured	Adjusted	--	--	--
Ambient	23.7	45.0	--	--	--
Cell	24.2	45.5	--	--	90
Touch Temp. Measurement	Measured	Adjusted	--	--	--
Ambient	23.7	25.0	--	--	--

Cell (measured for reference)				24.2	25.5	--	--	--
Label outside near Q300, Q301				24.0	25.3	--	--	87
Mylar outside near R206				24.1	25.4	--	--	87
Temperature T of winding:	t <sub>1</sub> (°C)	R <sub>1</sub> (Ω)	t <sub>2</sub> (°C)	R <sub>2</sub> (Ω)	T (°C)	Allowed T <sub>max</sub> (°C)	Insulation class	
--	--	--	--	--	--	--	--	

#### Supplementary information:

Note 1: Tma should be considered as directed by applicable requirement

Note 2: Tma is not included in assessment of Touch Temperatures (Clause 9)

Temperature Limited:

- For plastic enclosure outside near MOS, R-sensor, Cell (plastic accessible area, > 1 S and < 10 S), Tmax: 77 degree C for normal, 87 degree C for abnormal and single fault conditions.

- For PWB, Tmax: 130 degree C

- For Cell, Tmax: 90 degree C

- For Plastic Frame, Tmax: 80 degree C

- For Label, Tmax: 80 degree C

- Sample Configuration: See Enclosure 07-31 for details.

- If not otherwise specified, Cell means Cell 3 in the temperature measurement result table.

- Ambient temperature shall be maintained between 20 and 30 °C during Touch Temperature Measurement.

- Ambient temperature shall be maintained below Tma during Maximum Operating Temperature Measurement.

- Based on maximum operating temperature measurement result for each cell, it can be found that temperature deviation between all cells is slight and all cells' temperatures are significantly lower than allowed limited. So for other tests, temperature measurement was made on one cell as representative.

- This battery belongs to embedded one. Touch temperature measurement was made for reference only.

- During heating discharge test with 4.53A (Isc) at 45 °C and room temp, the sample had entered [X] hiccup mode [X] shutdown mode due to [] over temperature protection [] over current protection [X] under voltage protection.

#### Configuration A

- During charge test, the maximum voltage measured across each cell block was 4.500V/4.500V/4.500V/4.500V, which didn't exceed the upper limit of the charging voltage specified by the cell manufacturer.

- NORMAL OPERATING CONDITIONS TEMPERATURE MEASUREMENT performed on Configuration A was considered to be representative of Configuration C.

#### Configuration B

- During voltage measurement for each cell block using battery of Test Configuration A, the battery was charged without any protection tripped until it was fully charged. Therefore, such test result for battery of Test Configuration A can be considered representative for battery of Test Configuration B. (This is only applicable to batteries which implement same cell but different component.)

The following parameters are used for Annex M.3 criteria:

- Battery allowable temperature charging and discharging 90°C.

- The maximum current drawn from system shall be determined in end application.

- For all Annex M.3.2 tests, measured temperature of thermocouple attached on Cell body surface is considered representative for Label outside near Cell body. So Label outside near cell need not be assessed and is deemed compliant with touch temperature requirement.

- Specific charge conditions worse than manufacturer's specification are applied to [X] overcharge test under single fault condition [ ] reversed charging test under single fault condition, which are considered as representative test conditions.

- For battery with multi-cell series configuration, charging voltage of 24 Volt and charge current of 2C amp rate is applied as test condition to simulate overcharge condition imposing on battery due to single fault occurred in system.

#### Config. A

- If not otherwise specified, Cell means Cell means Cell 3 for charging and Cell 4 in the temperature measurement result table.

- Overcharging test under battery fault was charged with 18.0V / 3.624A (Non-trip) under Battery's Q300, Q301(pin 3-6) shorted, R502 (U100) opened, RT200, RT201 and all thermostats disabled, measured max voltage of each cell block is 4.44V/4.44V/4.44V/4.44V.

- Overcharging test under system fault was charged with 24V/6.348A, measured max voltage of each cell block is 4.465V/4.464V/4.465V/4.470V.

Excessive discharging test with W (Isc) at 35°C was conducted and considered as representative for that with W (peak for 20 sec.) at 35°C because the former is the worse condition.

- Overcharging test under battery fault with Configuration C was waived due to test performed using one with Configuration A as representative.

- Overcharging test under system fault with Configuration C was waived due to test performed using one with Configuration A as representative.

- Excessive discharging test with Configuration C was waived due to test performed using one with Configuration A as representative.

#### Config. B

- If not otherwise specified, Cell means Cell 3 in the temperature measurement result table.

- Overcharging test under system fault was charged with 24V/6.348A, measured max voltage of each cell block is 4.472V/4.465V/4.474V/4.465V.

- Overcharging test under battery fault with Configuration B was waived due to test performed using one with Configuration A as representative.

- Excessive discharging test with Configuration B was waived due to test performed using one with Configuration A as representative.

B.2.5		TABLE: Input test						N/A
U (V)	Hz	I (A)	I rated (A)	P (W)	P rated (W)	Fuse No	I fuse (A)	Condition/status
Supplementary information:								

B.3, B.4		TABLE: Abnormal operating and fault condition tests					Pass
Ambient temperature T <sub>amb</sub> (°C) .....					See below		—
Power source for EUT: Manufacturer, model/type, output rating . :					--		—
Component No.	Condition	Supply voltage (V)	Test time	Fuse no.	Fuse current (A)	Observation	
Output + to – of Battery pack (Configuration A)	Short circuit test	--	10.00 hrs	F500	--	NT, NC, protection device operated, unit shut down immediately, no hazard.	

Output + to – of Battery pack (Configuration B)	Short circuit test	--	10.00 hrs	F500	--	NT, NC, protection device operated, unit shut down immediately, no hazard.
Battery pack + to – (Configuration A)	Short circuit test Q300, Q301(pin 3-6) shorted, R502(U100) opened, RT201 and all thermostats disabled	--	8.00 hrs	F500	--	Unit shutdown, no hazards, the max. temp. cell body =59.4°C, ambient = 22.5°C, under maximum discharging current: 4.53A
Battery pack + to – (Configuration A)	Short circuit test R206 shorted, R502(U100) opened, RT201 and all thermostats disabled	--	8.00 hrs	F500	--	Unit shutdown, MOS operated, no hazards, the max. temp. cell body =69.9°C, ambient = 22.5°C, under maximum discharging current: 9.13A
Battery pack + to – (Configuration B)	Short circuit test Q300, Q301(pin 3-6) shorted, R502(U100) opened, RT201 and all thermostats disabled	--	8.00 hrs	F500	--	Unit shutdown, no hazards, the max. temp. cell body =57.7°C, ambient = 22.5°C, under maximum discharging current: 4.53A
Battery pack + to – (Configuration B)	Short circuit test R206 shorted, R502(U100) opened, RT201 and all thermostats disabled	--	8.00 hrs	F500	--	Unit shutdown, MOS operated, no hazards, the max. temp. cell body =73.8°C, ambient = 22.5°C, under maximum discharging current: 9.13A
Battery pack + to – (Configuration A)	Short circuit test at 55°C Short circuit test Q300, Q301(pin 3-6) shorted, R502(U100) opened, RT201 and all thermostats disabled	--	8.00 hrs	F500	--	Unit shutdown, no hazards, the max. temp. cell body = 76.3°C, ambient = 55.7°C, under maximum discharging current: 4.53A.
Battery pack + to – (Configuration A)	Short circuit test at 55°C Short circuit test Q300, Q301(pin 3-6)	--	8.00 hrs	F500	--	Unit shutdown, no hazards, the max. temp. cell body = 76.7°C, ambient = 55.7°C, under maximum discharging current: 4.53A.

	shorted, R502(U100) opened, RT201 and all thermostats disabled					
Battery pack + to – (Configuration A)	Short circuit test at 55°C Short circuit test R206 shorted, R502(U100) opened, RT201 and all thermostats disabled	--	8.00 hrs	F500	--	Unit shutdown, no hazards, MOS operated, the max. temp. cell body =72.4°C, ambient = 55.4°C, under maximum discharging current: 8.9A
Battery pack + to – (Configuration B)	Short circuit test at 55°C Short circuit test Q300, Q301(pin 3-6) shorted, R502(U100) opened, RT201 and all thermostats disabled	--	8.00 hrs	F500	--	Unit shutdown, no hazards, the max. temp. cell body = 79.1°C, ambient = 55.7°C, under maximum discharging current: 4.53A.
Battery pack + to – (Configuration B)	Short circuit test at 55°C Short circuit test R206 shorted, R502(U100) opened, RT201 and all thermostats disabled	--	8.00 hrs	F500	--	Unit shutdown, no hazards, MOS operated, the max. temp. cell body =69.7°C, ambient = 55.5°C, under maximum discharging current: 8.9A
Battery pack + to – (Configuration A)	Abnormal charging test Q300, Q301(pin 3-6), R206, F500 shorted, R502(U100) opened, RT200, RT201 and all thermostats disabled	18.0V/ 10.872A	10.00hr s	F500	--	Unit charge to full, no hazards, the max. temp. cell body =58.7 °C, ambient = 23.4°C
Battery pack + to – (Configuration A)	Abnormal charging test Q300, Q301(pin 3-6) shorted, R502(U100) opened, RT200, RT201 and all	18.0V/ 3.624A	10.00hr s	F500	--	Unit charge to full, no hazards, the max. temp. cell body =35.9°C, ambient =23.4°C



	thermostats disabled					
Battery pack + to – (Configuration A)	Abnormal charging test Q300, Q301(pin 3-6) shorted, R502(U100) opened, RT200, RT201 and all thermostats disabled	18.0V/ 3.624A	10.00hrs	F500	--	Unit charge to full, no hazards, the max. temp. cell body =35.0°C, ambient =23.7°C
Battery pack + to – (Configuration A)	Abnormal charging test Q300, Q301(pin 3-6) shorted, R502(U100) opened, RT200, RT201 and all thermostats disabled	18.0V/ 3.624A	10.00hrs	F500	--	Unit charge to full, no hazards, the max. temp. cell body =34.6°C, ambient = 23.8°C
Battery pack + to – (Configuration A)	Abnormal charging test Q300, Q301(pin 3-6) shorted, R502(U100) opened, RT200, RT201 and all thermostats disabled	18.0V/ 3.624A	10.00hrs	F500	--	Unit charge to full, no hazards, the max. temp. cell body =35.2°C, ambient = 23.8°C
Battery pack + to – (Configuration A)	Abusive overcharge test Q300, Q301(pin 3-6), R206 shorted, R502(U100) opened, RT201 and all thermostats disabled	24.0V/ 3.082A	5.00 hrs	F500	--	Unit shutdown, no hazards, Fuse opened, the max. temp. cell body =30.3°C, ambient = 23.5°C
Battery pack + to – (Configuration A)	Abusive overcharge test Q300, Q301(pin 3-6), R206 shorted, R502(U100) opened, RT201 and all thermostats disabled	24.0V/ 6.348A	5.00 hrs	F500	--	Unit shutdown, no hazards, Fuse opened, the max. temp. cell body =42.7°C, ambient = 23.5°C

Battery pack + to – (Configuration A)	Abusive overcharge test Q300, Q301 (pin 3-6) shorted	24.0V/ 6.348A	4.00 hrs	F500	--	Unit shutdown, no hazards, Fuse opened, the max. temp. cell body =23.9°C, ambient = 23.5°C
Battery pack + to – (Configuration B)	Abusive overcharge test Q300, Q301 (pin 3-6), R206 shorted, R502(U100) opened, RT201 and all thermostats disabled	24.0V/ 3.082A	5.00 hrs	F500	--	Unit shutdown, no hazards, Fuse opened, the max. temp. cell body =31.3°C, ambient = 23.5°C
Battery pack + to – (Configuration B)	Abusive overcharge test Q300, Q301 (pin 3-6), R206 shorted, R502(U100) opened, RT201 and all thermostats disabled	24.0V/ 6.348A	5.00 hrs	F500	--	Unit shutdown, no hazards, Fuse opened, the max. temp. cell body =43.0°C, ambient = 23.5°C
Battery pack + to – Config. A	Forced discharge test	--	--	F500	--	Fuse opened immediately after the cell assembled.
Battery pack + to – Config. A	Forced discharge test	--	--	F500	--	Fuse opened immediately after the cell assembled.
Battery pack + to – Config. A	Forced discharge test	--	--	F500	--	Fuse opened immediately after the cell assembled.
Battery pack + to – Config. A	Forced discharge test	--	--	F500	--	Fuse opened immediately after the cell assembled.
Battery pack + to – Config. B	Forced discharge test	--	--	F500	--	Fuse opened immediately after the cell assembled.
Supplementary information:						
Considered in Annex M. The test result refers to UL 2054.						

<b>M.3</b>	<b>TABLE: Protection circuits for batteries provided within the equipment</b>	Pass
Is it possible to install the battery in a reverse polarity position? ..... :		No
Equipment Specification	Charging	
	Voltage (V)	Current (A)
	--	--

Manufacturer/type	Battery specification					
	Non-rechargeable batteries		Rechargeable batteries			
	Discharging current (A)	Unintentional charging current (A)	Charging		Discharging current (A)	Reverse charging current (A)
			Voltage (V)	Current (A)		
Simplo / C41N2503	--	--	18.0	Test with worse condition: 3.624A	4.53A	--

Note: The tests of M.3.2 are applicable only when above appropriate data is not available.

Specified battery temperature (°C) ..... : 45

Component No.	Fault condition	Charge/discharge mode	Test time	Temp. (°C)	Current (A)	Voltage (V)	Observation
Config. A	--	--	--	--	--	--	--
--	simulating overcharge caused by fault in battery with Pack's Q300, Q301 (pin 3-6) shorted, R502 (U100) opened, RT200, RT201, and all thermostat s disabled	A. Overcharging	10.00 h	See temp. meas. below	3.624 (non-trip)	18.000	NL, NS, NE, NF, NT, NC. Fuse (F500) didn't open. The Battery was fully charged at the end of the test.
--	simulating overcharge caused by fault in system	A. Overcharging	7.17 h	See temp. meas. below	6.348 Max.	23.990	NL, NS, NE, NF, NT, NC, MOSFET (Q300) operated
Config. B	---	--	---	--	---	--	---
--	simulating overcharge caused by fault in system	A. Overcharging	7.17 h	See temp. meas. below	6.348 Max.	23.990	NL, NS, NE, NF, NT, NC, MOSFET (Q300) operated

**Supplementary information:**

The following parameters are used for Annex M.3 criteria:

- Battery allowable temperature charging and discharging 90°C.
- The maximum current drawn from system shall be determined in end application.
- For all Annex M.3.2 tests, measured temperature of thermocouple attached on Cell body surface is considered representative for Label outside near Cell body. So Label outside near cell need not be assessed and is deemed compliant with touch temperature requirement.

- Specific charge conditions worse than manufacturer's specification are applied to [X] overcharge test under single fault condition [ ] reversed charging test under single fault condition, which are considered as representative test conditions.

- For battery with multi-cell series configuration, charging voltage of 24 Volt and charge current of 2C amp rate is applied as test condition to simulate overcharge condition imposing on battery due to single fault occurred in system.

#### Config. A

- If not otherwise specified, Cell means Cell means Cell 3 for charging and Cell 4 in the temperature measurement result table.

- Overcharging test under battery fault was charged with 18.0V / 3.624A (Non-trip) under Battery's Q300, Q301(pin 3-6) shorted, R502 (U100) opened, RT200, RT201 and all thermostats disabled, measured max voltage of each cell block is 4.44V/4.44V/4.44V/4.44V.

- Overcharging test under system fault was charged with 24V/6.348A, measured max voltage of each cell block is 4.465V/4.464V/4.465V/4.470V.

Excessive discharging test with W (Isc) at 35°C was conducted and considered as representative for that with W (peak for 20 sec.) at 35°C because the former is the worse condition.

- Overcharging test under battery fault with Configuration C was waived due to test performed using one with Configuration A as representative.

- Overcharging test under system fault with Configuration C was waived due to test performed using one with Configuration A as representative.

- Excessive discharging test with Configuration C was waived due to test performed using one with Configuration A as representative.

#### Config. B

- If not otherwise specified, Cell means Cell 3 in the temperature measurement result table.

- Overcharging test under system fault was charged with 24V/6.348A, measured max voltage of each cell block is 4.472V/4.465V/4.474V/4.465V.

- Overcharging test under battery fault with Configuration B was waived due to test performed using one with Configuration A as representative.

- Excessive discharging test with Configuration B was waived due to test performed using one with Configuration A as representative.

Abbreviation: SC= short circuit; OC= open circuit NL= no chemical leakage; NS= no spillage of liquid; NE= no explosion; NF= no emission of flame or expulsion of molten metal; NT= battery temperature did not exceed the manufacturer's allowable battery temperature; NC= maximum battery current remained within the range of the battery specifications.

M.4.2	TABLE: Charging safeguards for equipment containing a secondary lithium battery	Pass
Maximum specified charging voltage (V) .....	4.53 / Cell	—
Maximum specified charging current (A) .....	0~15°C: 616.4mA Max to 4.5V, then CV to 154.1mA 15~20°C: 1541mA Max to 4.5V, then CV to 154.1mA 20~45°C: 3390.2mA Max to 4.25V, 2157.4mA to 4.5V, then CV to 154.1mA; or 45~60°C: 1541mA Max to 4.1V, then CV to 154.1mA	—
Highest specified charging temperature (°C) .....	90	

Lowest specified charging temperature (°C) ..... :					0	
Battery manufacturer/type	Operating and fault condition	Measurement			Observation	
		Charging voltage (V)	Charging current (A)	Temp. (°C)		
Simplo / C41N2503 with Config A:	--	--	--	--	--	
--	Normal	--	--	--	Considered in Annex B.2 test	
--	Abnormal	--	--	--	Considered in Annex M.3 test.	
Pack's charge over voltage protection: $\geq 4.53V \pm 0.01V$ / cell	Simulated over voltage condition, due to single fault in system, imposing on Pack. Charging: Set 18.32V / 3.624A	18.319	3.506	--	Charge MOS operated. Sample shutdown. Measured max. voltage of each cell block when protection operated: 4.510V / 4.510V / 4.510V / 4.520V.	
Pack's charge over current protection: $\geq 3.698A$	Simulated over current condition, due to single fault in system, imposing on Pack. Charging: Set 18.0V / 3.798A	14.702	3.797	--	Charge MOS operated. Sample shutdown.	
Pack's charge low temperature protection: $\leq 0^{\circ}C \pm 3^{\circ}C$	Pack was charged with 18.0V / 0.2A Ambient Temp: from initially 3.7°C to finally -10.1°C.	--	--	PWB near NTC: 0.1°C, Cell near NTC: 0.0°C, Label outside near NTC: 2.5°C.	Sample shutdown. When Charge MOS operated.	
Pack's charge over temperature protection: $\geq 60^{\circ}C \pm 3^{\circ}C$	Pack was charged with 18.0V / 1.541A Ambient Temp: from initially 41.5°C to finally 64.7°C.	--	--	PWB near NTC: 61.8°C, Cell near NTC: 61.7°C, Label outside near NTC: 62.6°C.	Sample shutdown. When Charge MOS operated.	
Model C41N2503 with Config B:	--	--	--	--	--	

--	Normal	--	--	--	Considered in Annex B.2 test
--	Abnormal	--	--	--	Considered in Annex M.3
Pack's charge over voltage protection: $\geq 4.53V \pm 0.01V$ / cell	Simulated over voltage condition, due to single fault in system, imposing on Pack. Charging: Set 18.32V / 3.624A	18.320	3.019	--	Charge MOS operated. Sample shutdown. Measured max. voltage of each cell block when protection operated: 4.510V/4.510V/4.510V/4.520V.
Pack's charge over current protection: $\geq 3.698A$	Simulated over current condition, due to single fault in system, imposing on Pack. Charging: Set 18.0V / 3.798A	14.675	3.797	--	Charge MOS operated. Sample shutdown.
Pack's charge low temperature protection: $\leq 0^{\circ}C \pm 3^{\circ}C$	Pack was charged with 18.0V / 0.2A Ambient Temp: from initially 3.7°C to finally -10.1°C.	--	--	PWB near NTC: -0.1°C, Cell near NTC: -0.3°C, Label outside near NTC: -2.2°C.	Sample shutdown. When Charge MOS operated.
Pack's charge over temperature protection: $\geq 60^{\circ}C \pm 3^{\circ}C$	Pack was charged with 18.0V / 1.541A Ambient Temp: from initially 41.4°C to finally 65.0°C.	--	--	PWB near NTC: 61.4°C, Cell near NTC: 61.3°C, Label outside near NTC: 62.0°C.	Sample shutdown. When Charge MOS operated.

Supplementary information:

- Nearly fully charged batteries with charge MOSFET turned on shall be used to do over voltage protection test, in order to minimize testing time.
- Nearly fully discharge batteries were used to do above tests, including over charge current protection, charge over temperature protection and charge low temperature protection.
- Properly smaller charge current is used to verify pack's charge low temperature protection, in order to have cell's temperature rise lower so that cell temperature may decline as ambient temperature in chamber declines for test purpose.
- For pack's charge low temperature protection test, charging current of 0.2A is applied as test condition.
- For pack's charge high temperature protection test, charging current of 0.5C amp rate by minimum capacity is applied as test condition.

- During pack's charge over temperature protection test, chamber temperature may be set higher than protection setting for test purpose. So maximum cell temperature recorded when protection operated may be lower than maximum temperature shown in test chart which may keep rising, after protection operated, due to increasing ambient temperature.
- Configuration C was waived due to test performed using one with Configuration A as representative.
- During pack's charge low temperature protection test, chamber temperature may be set lower than protection setting for test purpose. So minimum cell temperature recorded when protection operated may be higher than minimum temperature shown in test chart which may keep declining, after protection operated, due to declining ambient temperature.
- U = measured power supply voltage before battery protection operated.
- I = measured power supply current before battery protection operated.

Abbreviation: SC= short circuit; OC= open circuit; MSCV= maximum specified charging voltage; MSCC= maximum specified charging current; HSCT= highest specified charging temperature; LSCT= lowest specified charging temperature

Q.1	TABLE: Circuits intended for interconnection with building wiring (LPS)						N/A
Output Circuit	Condition	U <sub>oc</sub> (V)	Time (s)	I <sub>sc</sub> (A)		S (VA)	
				Meas.	Limit	Meas.	Limit
Supplementary Information:							

T.2, T.3, T.4, T.5	TABLE: Steady force test						N/A
Location/Part	Material	Thickness (mm)	Probe	Force (N)	Test Duration (s)	Observation	
Supplementary information:							

T.6, T.9	TABLE: Impact test					N/A
Location/Part	Material	Thickness (mm)	Height (mm)	Observation		
Supplementary information:						

T.7	TABLE: Drop test				N/A
Location/Part	Material	Thickness (mm)	Height (mm)	Observation	

Supplementary information:

T.8	TABLE: Stress relief test					N/A
Location/Part	Material	Thickness (mm)	Oven Temperature (°C)	Duration (h)	Observation	
Supplementary information:						

<b>X</b>	<b>TABLE: Alternative method for determining minimum clearances distances</b>			N/A
Clearance distanced between:		Peak of working voltage (V)	Required cl (mm)	Measured cl (mm)
Supplementary information:				