ZTT ENERGRID M261

Certification, Technical Evidence & NFPA 855 Compliance Dossier

Πλήρης τεχνικός φάκελος πιστοποιήσεων και αποδεικτικών στοιχείων

ENERGRID M261 | 261 kWh | 130 kW | LFP 314 Ah | 400 Vac | Liquid Cooling

Έκδοση v7 - 14 Οκτωβρίου 2026

Περιεχόμενα

- 1. Εκτελεστική σύνοψη

ΝΕΟ ΚΡΙΣΙΜΟ ΤΕΚΜΗΡΙΟ - IEC 62933-5-2:2020: Η TÜV SÜD Product Service GmbH έχει εκδώσει Compliance Document ειδικά για το ENERGRID M261. Το έγγραφο αναφέρει το μοντέλο ονομαστικά, test report 704082443305-00 και δοκιμή κατά IEC 62933-5-2:2020. Αποτελεί το ισχυρότερο διαθέσιμο άμεσο complete-ESS safety evidence του φακέλου.

- 2. Τεχνικά χαρακτηριστικά ENERGRID M261
- 2.1 Εσωτερική αρχιτεκτονική και λειτουργία
- 2.2 Ροή ενέργειας - φόρτιση/εκφόρτιση
- 2.3 BMS / PCS / EMS / Liquid Cooling
- 2.4 Startup, shutdown και emergency isolation
- 3. Certification architecture και ιχνηλασιμότητα
- 4. Συγκεντρωτικός πίνακας πιστοποιήσεων + IEC 62933-5-2 system-level evidence

4.1 IEC 62933-5-2:2020 - άμεση πιστοποίηση complete ESS

Πεδίο	Τεκμηριωμένο στοιχείο
Model	ENERGRID M261
Standard	IEC 62933-5-2:2020
Certification body	TÜV SÜD Product Service GmbH
Compliance Document	D 003115 0019 Rev. 00
Test report	704082443305-00
Date	14 May 2025
Nominal DC voltage	832 V
DC operating range	676-936 V
Rated capacity	314 Ah
Maximum charging power	130 kW
Maximum discharging power	130 kW
Auxiliary supply	3/N/PE AC 230/400 V, 50/60 Hz, max 5 kW
Ingress protection	IP54
Protective class	Class I
Operating ambient	-20 °C to +55 °C

Τεχνική σημασία: το IEC 62933-5-2 είναι standard safety requirements για grid-integrated electrochemical energy storage systems. Στο dossier το έγγραφο ταξινομείται ως DIRECT evidence για το complete M261.

- 5. NFPA 855:2023 - τεχνική αντιστοίχιση

- 6. Πυρασφάλεια, αέρια και explosion control
- 6.1 Fire-fighting architecture
- 6.2 First-degree / Level-1 fire alarm
- 6.3 Second-degree / Level-2 fire alarm
- 6.4 Combustible-gas early warning
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- 6.6 Fire-system components
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- 6.8 NFPA 855 interpretation
- 6.9 D70 explosion-proof / pressure-relief valve - M261 cabinet
- 7. Περιβαλλοντική αντοχή, IP και αντιδιαβρωτική προστασία
- 8. Μεταφορά, MSDS και χημική συμμόρφωση
- 9. Απαιτήσεις φακέλου έργου / commissioning
- Παράρτημα A - Evidence Sheets με φωτογραφικό reference ανά πιστοποίηση

Παράρτημα B - Φωτογραφική τεκμηρίωση UL 9540A δοκιμών

Τελικό Συμπέρασμα - Συμμόρφωση με NFPA 855:2023

1. Εκτελεστική σύνοψη

Ο διαθέσιμος τεχνικός φάκελος του ZTT ENERGRID M261 περιλαμβάνει τεκμηρίωση σε επίπεδο πλήρους ESS, battery system, cell, PCS, EMC/grid interface, μεταφοράς και πυρασφάλειας. Η τεκμηρίωση είναι ουσιωδώς ισχυρότερη από ένα απλό datasheet, επειδή περιλαμβάνει πιστοποιητικά και test reports από TÜV SÜD, TÜV Rheinland, Intertek, CSA Group, Bureau Veritas και άλλα εργαστήρια/φορείς.

Για το ίδιο το M261 υπάρχει άμεσο system-level Compliance Document της TÜV SÜD Product Service GmbH κατά IEC 62933-5-2:2020 (No. D 003115 0019 Rev. 00, test report 704082443305-00, 14/05/2025), το οποίο ταυτοποιεί ρητά το μοντέλο ENERGRID M261 και τις βασικές ηλεκτρικές/περιβαλλοντικές παραμέτρους του. Παράλληλα υπάρχουν άμεσα τεκμήρια EMC (EN IEC 61000-6-2/-6-4), UN 38.3 και MSDS. Για το battery system ZTT260S1P υπάρχουν TÜV SÜD certificate και test reports κατά IEC 62619:2022 και IEC 63056:2020. Για το cell ZTT71173204 υπάρχουν IEC 62619 CB evidence, UL 1973 certification και UL 9540A cell-level testing. Για τον PCS family PWS1-135M-EX υπάρχουν safety, EMC και grid-interface πιστοποιήσεις/δηλώσεις κατά EN IEC 62477-1, IEC/EN 62109-1/-2, EN IEC 61000-6-2/-6-4 και EN 50549-1/-2/-10.

2. Τεχνικά χαρακτηριστικά ENERGRID M261

Τύπος	Outdoor integrated C&I battery energy storage system
Χημεία	LFP / 314 Ah
Διαμόρφωση	260S / nominal 832 Vdc
Ονομαστική ενέργεια	261 kWh
Εύρος DC τάσης	676-936 Vdc (datasheet V2.0)
Ονομαστική ισχύς AC	130 kW
Ονομαστική τάση AC	400 Vac (-15% / +15%)
Συχνότητα	50 Hz
Power factor	-1 έως +1
Μέγιστο AC ρεύμα	195 A (datasheet V2.0)
Θερμική διαχείριση	Intelligent liquid cooling
Θερμοκρασία λειτουργίας	-20°C έως +55°C, με derating εκτός καθορισμένου εύρους

Πυρασφάλεια	Cabinet aerosol + relief valve + active alert
Protection rating	IP54 - δηλωμένο στο M261 datasheet
Anti-corrosion	C5 - δηλωμένο στο M261 datasheet
Υψόμετρο	≤3000 m, derating >3000 m
Θόρυβος	≤75 dB
Βάρος	≤2.6 t
Διαστάσεις	1000 × 1350 × 2350 mm, χωρίς rings/fixings
Επικοινωνίες	Modbus / IEC 104 / MQTT; Modbus / CAN / RS485 / dry contacts
Κύρια standards που δηλώνονται	IEC 62477 / IEC 61000 / IEC 62619 / IEC 63056 / IEC 60730 / UN 38.3 / UN 3480

Reference: ENERGRID_M261_Series_Data Sheet_2026_V2.0.pdf. To photographic evidence παρατίθεται στο Evidence Sheet E01.

2.1 Εσωτερική αρχιτεκτονική και λειτουργία

Το ENERGRID M261 είναι ένα πλήρως ολοκληρωμένο AC-coupled C&I BESS. Σύμφωνα με το Installation and User Manual V4, το cabinet αποτελείται από πέντε liquid-cooled battery packs, integrated PCS 135 kW που συνεργάζεται με το PDU, ηλεκτρικό distribution box, liquid-cooling host 5 kW και σωληνώσεις, fire-protection system και τοπικό EMS. Το cabinet χωρίζει λειτουργικά το battery compartment από τον electrical compartment και παραδίδεται με τις βασικές εσωτερικές διασυνδέσεις εργοστασιακά ολοκληρωμένες.

Η ηλεκτροχημική διάταξη είναι 1P260S. Κάθε pack έχει 52 cells σε σειρά (1P52S), και τα πέντε packs σχηματίζουν συνολικά 260 cells σε σειρά. Με cell 3.2 V / 314 Ah, η nominal DC voltage είναι 832 V και η nominal stored energy περίπου 261 kWh. Η σειρά των cells αυξάνει την τάση, ενώ η χωρητικότητα σε Ah παραμένει 314 Ah, γι' αυτό 832 V × 314 Ah ≈ 261 kWh.

Λειτουργικό επίπεδο	Ρόλος στο M261
Electrochemical layer	260 × LFP cells ZTT71173204, 3.2 V / 314 Ah -> 5 packs × 52S -> 1P260S, 832 V nominal.
Battery management	BMS/BMU sampling of cell voltage and temperature, pack/string values, SOC/SOH, alarms and protective shutdown logic.
DC/AC conversion	Bidirectional PCS converts battery DC to 400 Vac during discharge and 400 Vac to regulated DC during charging.
Power distribution / protection	PDU + electrical distribution box provide breakers, isolation and electrical safety protection between internal subsystems and external AC connection.
Supervisory control	Local EMS/HMI issues operating commands, displays power direction, expected active power, protection state and alarms, and interfaces to external dispatch/SCADA.
Thermal management	5 kW liquid-cooling host and piping remove/add heat to keep battery temperature within operating limits.
Independent fire-safety layer	Smoke, heat and combustible-gas detection, audible/visual alarm, BMS signaling and automatic aerosol extinguishing linkage.

3 Product Description

3.1 Introduction of the Energy Storage Cabinet

The M261 liquid-cooling energy storage cabinet consists of 5 liquid cooling battery packs, a 135kW integrated PCS(working in synergy with PDU), an power distribution box, a 5kW liquid-cooling host and piping, and a fire protection system. Each pack consists of 52 battery cells connected in series, with a cell rated capacity of 314Ah. The electrical safety protection devices are included in the power distribution box.

The batteries and electrics have separate containers, equipped with advanced BMS and energy conversion systems, featuring high energy density, long life, high safety and wide temperature range. It is an ideal green energy storage power product for application areas such as Photovoltaic-Energy Storage-Charging Integrated System, park micro-grid, etc.

3.2 Layout of the Energy Storage Cabinet

3.2.1 Layout

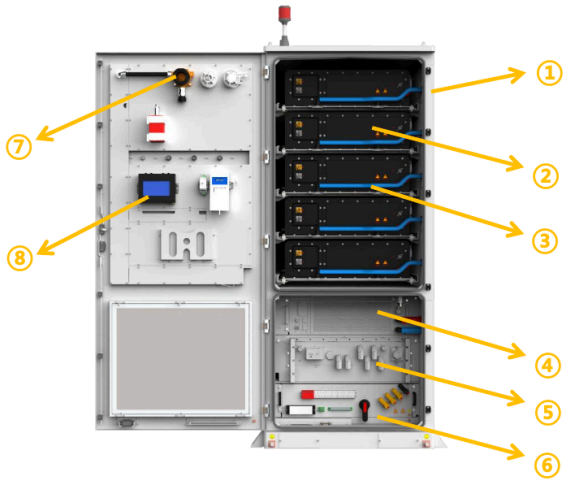


Figure 3-1 Internal layout (Picture for reference only, subject to the available products.)

Table 3-1 Components of the liquid-cooling energy storage cabinet

Figure 2-1. M261 internal architecture - source: M261_User_Manual_V4.pdf, Product Description / internal layout.

2.2 Ροή ενέργειας - φόρτιση και εκφόρτιση

2.2.1 Φόρτιση

Κατά τη φόρτιση, το EMS ζητά αρνητική/charging active power από το PCS σύμφωνα με τη στρατηγική λειτουργίας. Η AC ενέργεια στο 400 V bus μετατρέπεται από το bidirectional PCS σε ελεγχόμενο DC ρεύμα/τάση προς το battery string. Το BMS παρακολουθεί συνεχώς cell/pack/string voltage, temperature και SOC και επιτρέπει τη φόρτιση μόνο μέσα στα καθορισμένα όρια. Το liquid-cooling system απομακρύνει θερμότητα ώστε να περιορίζονται οι θερμικές αποκλίσεις μεταξύ cells/packs.

Στην πράξη, η πηγή της AC ενέργειας μπορεί να είναι το δίκτυο ή AC-coupled PV/άλλη πηγή του site. Το datasheet δηλώνει on/off-grid modes, zero-feed-in και microgrid use cases με PV και EV charging. Το M261 δεν “γνωρίζει” από μόνο του αν η ενέργεια προέρχεται από PV ή grid· η dispatch logic καθορίζεται από το EMS, τα external meters/setpoints και τη συνολική αρχιτεκτονική του έργου.

2.2.2 Εκφόρτιση

Κατά την εκφόρτιση, η ροή αντιστρέφεται: το DC battery string τροφοδοτεί το PCS, το οποίο συνθέτει τριφασική AC έξοδο 400 V και ακολουθεί το commanded active/reactive power. Το BMS παρακολουθεί minimum cell voltage, temperatures, current και SOC και μπορεί να μειώσει ή να διακόψει την ισχύ όταν ενεργοποιηθεί protection. Το EMS χρησιμοποιεί real-time measurements για να συντονίζει την επιθυμητή λειτουργία - π.χ. self-consumption, peak shaving, time shifting ή zero feed-in, όταν το έργο έχει διαμορφωθεί για τις αντίστοιχες λειτουργίες.

2.2.3 Ενεργειακή αλυσίδα

Charging	AC bus 400 V -> PCS (AC/DC) -> DC link -> PDU/protection -> 832 V battery string -> electrochemical storage
Discharging	Battery string -> PDU/protection -> PCS (DC/AC) -> 400 V AC bus -> local loads / permitted grid interface
Control	EMS setpoint -> PCS power command; BMS permissives/limits -> PCS; meters/SCADA -> EMS
Safety override	BMS/PCS alarms, emergency stop and fire-protection linkage override normal dispatch when protection thresholds are reached.

8 Software Operation

8.1 System Interface

8.1.1 System Home Page

When the energy storage system is powered on, the SMU energy management screen control system starts automatically and displays the home page interface.

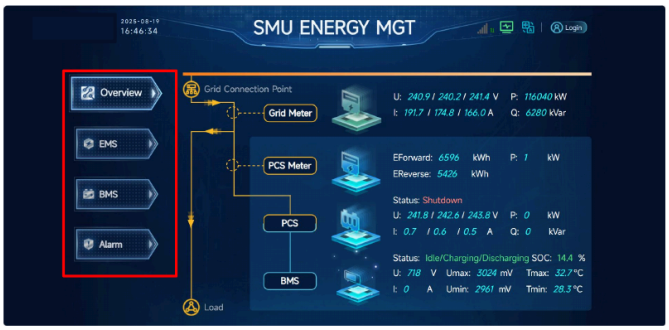


Figure 8-1 Home page of the screen control system

Table 8-1 Introduction to the Home Page

Section	Feature Description
Overall overview	Real-time display of voltage, current, power, converter and battery data, including current direction, for easy access to system status.
EMS system	Monitor key parameters such as the number of alerts, charging and discharging protection status, expected active power, and system operation status.
BMS system	Provide detailed information such as battery cluster SOC/SOH, total voltage/current, cell temperature/voltage and corresponding number.
Alarm system	Monitor and alert system anomalies in real time to ensure prompt handling of faults.

8.1.2 Description on the Icons of Home Page



Figure 8-2 Examples of the icons of the home page

Figure 2-2. EMS/HMI monitoring functions - source: M261_User_Manual_V4.pdf, Software Operation.

2.3 BMS / PCS / EMS / Liquid Cooling - διακριτοί ρόλοι

BMS	Η κύρια battery-safety layer. Παρακολουθεί cluster SOC/SOH, total voltage/current, individual cell voltage και temperature. Διαχειρίζεται alarms/protective shutdowns και παρέχει permissives/limits προς τα λοιπά συστήματα.
PCS	Ο bidirectional power converter. Εκτελεί την πραγματική μετατροπή AC↔DC και την commanded active/reactive power. Η

	PCS family διαθέτει ξεχωριστή safety/EMC/grid-interface τεκμηρίωση στο certification package.
EMS	Η supervisory logic. Το HMI εμφανίζει power flow, alarms, protection state και expected active power. Δίνει power-on/shutdown commands και μπορεί να διασυνδέεται με remote dispatch/SCADA.
PDU / distribution box	Περιλαμβάνει την ηλεκτρική διανομή, breakers και safety protections. Είναι το φυσικό interface για isolation των υποσυστημάτων.
Liquid cooling	5 kW cooling host με piping. Η θερμοκρασία αποτελεί κρίσιμη protection variable· το maintenance manual προβλέπει shutdown protection για over-/under-temperature και έλεγχο της λειτουργίας του cooling system.
Fire protection	Ανεξάρτητη detection/suppression chain που στέλνει signals στο BMS και, στο Level-2 condition, ενεργοποιεί extinguishing linkage σύμφωνα με τα M261 fire documents.

2.4 Startup, normal shutdown και emergency isolation

2.4.1 Startup sequence

1. Pre-start inspection: cabinet condition, QF switches OFF, DC/AC wiring, grounding, battery voltage, phase sequence and grid voltage.
2. QF1 main circuit breaker -> ON.
3. QF2 έως QF7 -> ON διαδοχικά.
4. Integrated PCS DC disconnector -> Auto, οπότε ενεργοποιείται το DC port/PCS control.
5. EMS -> power-on command. Το cabinet συνδέεται στο grid και αρχίζει να λειτουργεί.
6. Door closure και lock-out/tag-out σύμφωνα με το manual.

7 Startup and Shutdown

7.1 Inspection for Startup

- Before powering on, the equipment should be inspected in the following steps:
- Visually check that there are no signs of damage on the exterior of the equipment, and confirm that both the integrated PCS and the distribution box circuit breaker are in the "OFF" position;
- Check whether the DC input wiring and AC output wiring of the energy storage equipment are normal and whether the grounding is good;
- Check if the battery voltage inside the cabinet is normal;
- Verify the correct phase sequence of the power cable. Check whether the phase voltage and line voltage on the power grid side are within the normal range and record the voltage values. Phase-to-phase voltage shall be within 380V ± 10%, and single-phase voltage shall be within 220V ± 10%.

7.2 Startup Steps

a. Close the QF1 main circuit breaker to the "ON" position; (For the switch positions described in the steps, please refer to Figures 6-2 and 6-4)
b. Close the QF2 to QF7 circuit breaker switches in sequence to the "ON" position;
c. Close the DC disconnector of the integrated PCS to the "Auto" position, power on the DC port of the equipment, at which point you will see the power indicator light on the PCS panel lit up;

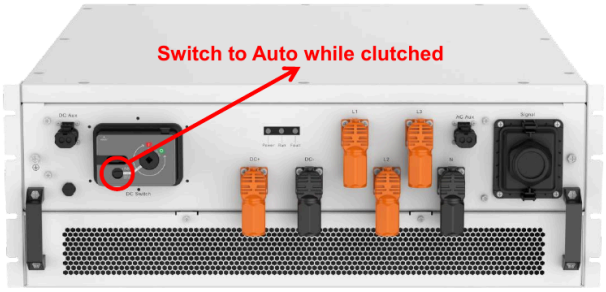


Figure 7-1 Integrated PCS panel

Figure 2-3. Startup sequence - source: M261_User_Manual_V4.pdf, Section 7.1-7.2.

2.4.2 Normal shutdown

7. EMS shutdown command.
8. Επιβεβαίωση ότι το PCS έχει σταματήσει και το running indication έχει σβήσει.
9. QF1 AC breaker -> OFF.
10. QF2-QF7 -> OFF.
11. PCS DC disconnector -> OFF.

2.4.3 Emergency shutdown - τι κάνει και τι ΔΕΝ κάνει

Το User Manual είναι σαφές ότι emergency shutdown απομονώνει ηλεκτρικά το battery container από external circuits και σταματά charging/discharging. Με το local emergency-stop button αποσυνδέονται οι battery-cluster BMS power-supply/load switches στην primary system bus και, εφόσον το PCS είναι σωστά configured, σταματά και το PCS.

Κρίσιμη safety διευκρίνιση: Emergency shutdown δεν αφαιρεί την αποθηκευμένη ηλεκτροχημική ενέργεια από τα battery packs και δεν εγγυάται ότι έχει σταματήσει fault ή thermal-runaway event. Αν υπάρχει smoke ή fire alarm, το manual συστήνει άμεση εκκένωση και ασφαλή απόσταση. Αυτό είναι ουσιώδες για Emergency Response Plan και firefighter procedures.

7.4.1 Local Emergency Shutdown

If an authorized person determines that it is safe to approach the energy storage cabinet, the system emergency stop button located on the cabinet door can be pressed. When the emergency stop button is pressed, all battery cluster BMS power supply and load switches on the primary system bus will be disconnected, thus stopping all charging and discharging operations. At the same time, if the PCS is configured correctly, it will shut down simultaneously.

Pressing the emergency stop button during charging and discharging can cause considerable shock to the system and may cause damage to the internal components. The emergency stop button can only be used to stop the system in an emergency. After an emergency shutdown, if you want to restart the system, you must reset the emergency stop button.

If there are signs of fire inside the energy storage cabinet, such as smoke coming out of the cabinet or the fire alarm is triggered, it is recommended to evacuate the area immediately and keep a safe distance.

7.4.2 Remote Emergency Shutdown

During normal operation, the system will be controlled by the on-site EMS. At the same time, the EMS can communicate with off-site dispatch controllers, SCADA operation centers, or other third-party dispatch and monitoring equipment and be controlled by them. In-cabinet alerts can be notified to the remote operator, who may attempt to shut down the energy storage cabinet if it is determined to be necessary.



On-site personnel who witness an emergency should not assume that the automatic alarm has reached EMS or has been transmitted to the remote operator. It is recommended that these personnel should first immediately call the fire alarm number and also contact the remote operator as soon as possible!

Figure 2-4. Emergency shutdown behavior and limitations - source: M261_User_Manual_V4.pdf, Section 7.4.

3. Certification architecture και ιχνηλασιμότητα

Επίπεδο	Διαθέσιμο evidence	Αξιολόγηση
Complete ESS - ENERGRID M261 / IEC 62933-5-2	TÜV SÜD Compliance Document D 003115 0019 Rev. 00; test report 704082443305-00; IEC 62933-5-2:2020	DIRECT system-level evidence: certificate explicitly identifies ENERGRID M261 and its rated parameters.
Complete ESS - ENERGRID M261	IEC 62933-5-2:2020 TÜV SÜD Compliance Document; EMC Attestation + EMC Test Report; UN 38.3; MSDS; datasheet; fire solution; drawings/BOM	Άμεση ταυτοποίηση M261. Το IEC 62933-5-2 document είναι system-level evidence και όχι component-only certificate.
Battery system - ZTT260S1P	IEC 62619:2022 + IEC 63056:2020 TÜV SÜD certificate/test reports	Άμεση τεκμηρίωση battery system 832 V / 314 Ah
Cell - ZTT71173204	IEC 62619 CB; UL 1973 CSA; UL 9540A cell-level; RoHS; REACH	Ισχυρή component-level τεκμηρίωση
PCS family - PWS1-135M-EX	EN IEC 62477-1; IEC/EN 62109-1/-2; EN IEC 61000-6-2/-6-4; EN 50549-1/-2/-10; DoC	PCS safety, converter-safety, EMC και grid-interface evidence ευθυγραμμίζονται με την integrated 135 kW PCS architecture του M261.
UL 9540A chain	Cell ZTT71173204 -> Module ZTT Li-Module-EES 332.8 V / 104.4 kWh -> Unit ENERGRID N3	Cell/module/unit UL 9540A evidence παρέχει πολυεπίπεδη τεκμηρίωση fire/thermal-runaway behavior για τη NFPA 855 αξιολόγηση.
Fire subsystem	M261 Fire Protection Solution; smoke/heat/H2 detection; aerosol; backup supply; GTQ-Trax20 documentation	M261-specific engineering documentation
Enclosure / environment	IP54 report διαθέσιμο για ENERGRID N3; C5-H coating-system report	Το M261 φέρει IP54 στο TÜV SÜD IEC 62933-5-2 system-level document· το C5-H coating report συμπληρώνει την τεκμηρίωση environmental/corrosion robustness.
Explosion / pressure-relief component - M261	D70 Metal Explosion-Proof Valve; supplier specification TE-RC-2405-004 Rev.A0; ZTT email confirmation 09/10/2026 that the specification is for M261 cabinet relief valves.	DIRECT TRACEABILITY + COMPONENT SPECIFICATION. Adds defined burst pressure, vent area, permeability, IP and installation requirements.

4. Συγκεντρωτικός πίνακας πιστοποιήσεων

Αντικείμενο	Standard	Issuer	No.	Status	Evidence
ENERGRID M261	IEC 62933-5-2:2020	TÜV SÜD Product Service GmbH	D 003115 0019 Rev. 00 / TR 704082443305-00	DIRECT	E34
ENERGRID M261	EN IEC 61000-6-2/-6-4	TÜV SÜD	E8A 003115 0021 / 4840825376400	**DIRECT**	E02-E03

Αντικείμενο	Standard	Issuer	No.	Status	Evidence
ZTT260S1P battery system	IEC 62619:2022 / IEC 63056:2020	TÜV SÜD	B 003115 0022 / 5061925001375-00	DIRECT	E04-E06
ZTT71173204 cell	IEC 62619:2022	TÜV SÜD / IECEE CB	SG PSB-BT-05507M1 / 085-282460235-100	COMPONENT	E07-E08
ZTT71173204 cell	UL 1973	CSA Group	80202415	COMPONENT	E09-E10
ZTT71173204 cell	UL 9540A:2019	CSA Group	80202416	COMPONENT	E11
ZTT Li-Module-EES 332.8V-104.4kWh	UL 9540A:2019	CSA Group	80202418	SUPPORTING	E12
ENERGRID N3	UL 9540A:2019 unit level	CSA Group	80252443	SUPPORTING	E13
PWS1-135M-EX family PCS	IEC/EN 62109-1/-2	Intertek	250626018GZU-VOC001	COMPONENT	E14
PWS1-135M-EX family PCS	EN IEC 62477-1:2023	Intertek	250626018GZU-VOC002	COMPONENT	E15
PWS1-135M-EX family PCS	EN IEC 61000-6-2/-6-4	Intertek	250626017GZU-VOC001	COMPONENT	E16
PWS1-135M-EX family PCS	EN 50549-1 + EN 50549-10	TÜV Rheinland	AK 50695019 0001	COMPONENT	E17
PWS1-135M-EX family PCS	EN 50549-2 + EN 50549-10	TÜV Rheinland	AK 50695020 0001	COMPONENT	E18
PWS1-135M-H-EX PCS	EU Declaration of Conformity	Sinexcel	Manufacturer DoC 2025-09-30	COMPONENT	E19
PWS1-135M-EX PCS	EU Declaration / DoC	Sinexcel	Manufacturer DoC 2025-11-04	COMPONENT	E20
ENERGRID M261	UN Manual of Tests and Criteria 38.3	KSIGN	KD2507S3672B01	DIRECT	E21
ENERGRID M261	MSDS	KSIGN / technical service	KD2507S3672B04	DIRECT	E22
ZTT71173204 cell	RoHS chemical testing	Bureau Veritas	(9325)224-0739-R1	COMPONENT	E23
ZTT71173204 cell	REACH chemical testing	Bureau Veritas	(9325)224-0738	COMPONENT	E24
ENERGRID M261 fire system	EN 54 / EN 12094-1 / EN 15276-2 / EN 14797 / EN 14994 / NFPA 72 / NFPA 855	ZTT/ZEST engineering	ZEST-PG-PDD-25031 V1.0	DIRECT	E25
GTQ-Trax20 gas detector	CE / gas detection evidence	Component supplier	CE compliance document	COMPONENT	E26
ENERGRID N3 enclosure	IP54 test evidence	Third-party test report	12--IP54-ENERGRID N3 EN	SUPPORTING	E27
Coating system	ISO 12944-6:2018 C5-H	Marine Coatings Quality Supervision and Test Center	TW 231124	SUPPORTING	E28
ENERGRID M261 operation	Installation and User Manual V4	ZTT / ZEST	V4	DIRECT	E31

Αντικείμενο	Standard	Issuer	No.	Status	Evidence
ENERGRID M261 fire O&M	Maintenance Manual - fire alarm/linkage tests	ZTT / ZEST	Maintenance Manual	DIRECT	E32-E33
ENERGRID M261 relief valve	D70 Metal Explosion-Proof Valve specification	Shanghai Found Automation Equipment Co., Ltd.	TE-RC-2405-004 Rev.A0	DIRECT / COMPONENT	E35

5. NFPA 855:2023 - τεχνική αντιστοίχιση

NFPA 855	Απαίτηση (σύνοψη)	Evidence / M261 position	Κατάσταση
1.3 / Table 1.3	Li-ion ESS άνω των 20 kWh εμπίπτει στο πεδίο εφαρμογής.	M261 = 261 kWh.	APPLICABLE
4.2	Construction documents, manufacturer specifications, ratings/listings, ESMS, signage, detection/suppression/ventilation/deflagration details.	Datasheet, drawing, BOM, fire solution και manuals καλύπτουν το product dossier. Τα project drawings εντάσσονται κανονικά στον φάκελο εγκατάστασης.	COMPLIANT
4.4 & 9.5.2.1	Hazard Mitigation Analysis σε καθορισμένες περιπτώσεις, ιδίως outdoor Li-ion κατά 9.5.2.1.	Fire architecture, gas detection, pressure relief, UL 9540A evidence και commissioning logic παρέχουν τα απαιτούμενα τεχνικά inputs για HMA όπου ενεργοποιείται από τη συγκεκριμένη εγκατάσταση.	COMPLIANT / PROJECT
9.1.5.1	Fire and explosion testing σε representative ESS κατά UL 9540A ή equivalent όπου απαιτείται.	CSA UL 9540A: cell 80202416, module 80202418, unit ENERGRID N3 80252443.	SUPPORTED
9.1.5.1.2	Testing conducted/witnessed/reported by approved testing laboratory, characterization of gases and propagation.	CSA Group reports provide third-party UL 9540A evidence.	SUPPORTED
9.4.2	Size/separation requirements, with possible AHJ approval based on testing.	M261 cabinet footprint και unit rating είναι πλήρως τεκμηριωμένα· η εφαρμογή των απαιτούμενων αποστάσεων γίνεται στο site layout του έργου.	COMPLIANT / PROJECT
9.6.5.6	Explosion control / deflagration mitigation / gas detection.	M261: GTQ-Trax20 combustible/H2 detection + D70 pressure-relief/explosion-vent valve + aerosol + active alert. ZTT confirmed on 09/10/2026 that D70 specification applies to M261 cabinet relief valves. D70: burst pressure 4±1 kPa, vent area 1788 mm², ≥3100 L/min @10 kPa, IP68. Fire design references EN 14797/14994. Component evidence strengthens pressure-relief traceability	SUPPORTED

NFPA 855	Απαίτηση (σύνοψη)	Evidence / M261 position	Κατάσταση
4.8 / 4.9 / 9.6	Detection and fire control/suppression requirements.	Smoke + heat + H2 detection, audible/visual alarm, backup power, aerosol system HFX-200 documented.	SUPPORTED
6 / 7 / 8	Commissioning, O&M, testing and decommissioning.	User/Maintenance manuals, functional test procedures και fire-control linkage commissioning είναι διαθέσιμα. SAT, training και decommissioning records ολοκληρώνουν τον κανονικό project handover φάκελο.	COMPLIANT / PROJECT

Σημείωση NFPA 855: το πρότυπο διαχωρίζει το product listing (UL 9540) από το fire/explosion test method (UL 9540A). Τα component IEC/EN/UL certificates είναι σημαντικό safety evidence, αλλά δεν υποκαθιστούν αυτομάτως το UL 9540 listing όταν αυτό απαιτείται από τη συγκεκριμένη εφαρμογή του NFPA 855.

6. Πυρασφάλεια, αέρια και explosion control

6.1 Fire-fighting architecture του M261

Το M261 έχει dedicated fire-protection subsystem που λειτουργεί παράλληλα με το electrical protection system. Το Fire Protection Solution Special Topic for ENERGRID M261 (ZEST-PG-PDD-25031 V1.0) χωρίζει τη λειτουργία σε δύο βασικά μέρη: (a) gas fire-extinguishing control system και (b) combustible-gas detection system. Η αρχιτεκτονική περιλαμβάνει smoke detector, heat detector, H2/combustible-gas detector, audible/visual alarm, relays, backup power supply και HFX-200 condensed-aerosol extinguishing device.

Το ίδιο engineering document αναφέρει ως design specifications τα EN 54, EN 12094-1, EN 15276-2, EN 14797, EN 14994, NFPA 72 και NFPA 855.

accidents, the thermal decomposition of electrolytes triggers violent chemical reactions, releasing toxic gases (CO, HF, SO2, HCl, etc.), combustible gases (CO, H2, CH4, C2H4, C3H6, alkanes, etc.) and heat.

(4) The energy storage station stores large amounts of electrical energy, containing numerous batteries and modules with high current/voltage levels and massive capacity. A single fault highly likely to cause thermal runaway in battery cells, triggering chain reactions, massive concentrated energy release, and consequently leading to large-scale violent combustion and explosive incidents. Additionally, all modules in the energy storage station operate at high voltage. After an accident, residual charge may remain in other components, posing risks of electric leakage and secondary explosions. Firefighters face risks such as electric shock during emergency response.

2. Design Specifications

EN 54	Fire Detection and Fire Alarm Systems
EN 12094-1	Components for gas extinguishing systems. Requirements and test methods for electrical automatic control and delay devices
EN 15276-2	Fixed firefighting systems. Condensed aerosol extinguishing systems. Design,installation and maintenance
EN 14797	Explosion venting devices
EN 14994	Gas explosion venting protective systems
NFPA 72	National Fire Alarm and Signaling Code
NFPA 855	Standard for the installation of stationary energy storage systems

3. Fire Protection Design Scheme

The energy storage fire protection linkage system can be divided into a fire extinguishing system and a combustible gas detection system. When a battery undergoes thermal runaway and causes combustible gas leakage, the gas detector activates. In case of fire, the fire extinguishing system promptly intervenes to perform detection, alarm, and fire suppression operations.

3.1 Linkage Control of Fire Protection System

Gas Fire Extinguishing Control System:

(1) Automatic control strategy: When the system is in automatic control mode and any detector acts, the activation of any detector will trigger the linkage start of audible and visual alarms, while simultaneously outputting a level 1 fire alarm signal to the battery management system. When a smoke detector and a heat detector in the battery compartment operate simultaneously, a level 2 fire alarm signal is output to the battery management system. And output the fire extinguishing activation command to initiate the aerosol extinguishing device, which discharges extinguishing agent into the protected area to execute fire suppression.

Combustible Gas Detection System：

(1) Automatic control strategy: When the combustible gas detector detects that the gas concentration reaches the first alarm threshold, it immediately outputs a signal to the battery management system.

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Figure 6-1. M261 fire-protection linkage and design basis - source: 03 Fire Fighting System for ENERGRID M261 V1.0.pdf, Sections 2-3.1.

Detection 1	Smoke detector VC-6623, EN 54-7, 24 Vdc.
Detection 2	Heat detector VC-6633, EN 54-5, 24 Vdc.
Gas early warning	GTQ-Trax20 combustible/H2 gas detector, 24 V, 4-20 mA / NO contact, IP66, Ex-rated.
Local warning	TB70ST audible/visual alarm, >85 dB.

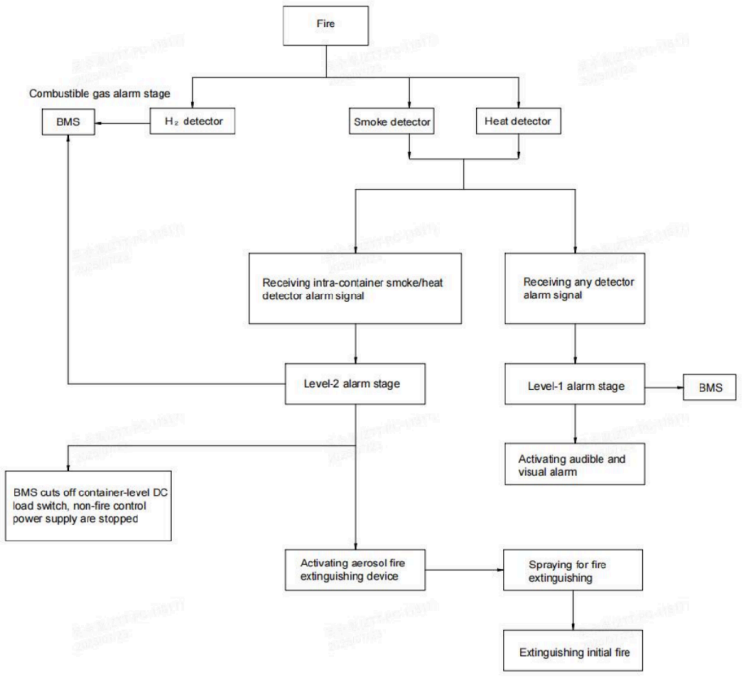
Control / linkage	Relay logic and feedback to BMS; backup supply keeps fire control available during loss of normal auxiliary power.
Suppression	HFX-200 electrically activated condensed aerosol unit, one set for the battery compartment.
Pressure / explosion mitigation	D70 Metal Explosion-Proof Valve confirmed by ZTT for M261 cabinet relief valves: normal pressure balancing plus rapid directional vent opening under rapid internal pressure rise. Key supplier parameters: burst pressure 4±1 kPa, vent area 1788 mm², membrane permeability ≥3100 L/min @10 kPa, IP68, -40…+125°C, 720 h salt spray. Fire design also references EN 14797 / EN 14994.

6.2 First-degree / Level-1 fire alarm

Η τεκμηρίωση της ZTT περιγράφει το Level-1 ως το πρώτο στάδιο fire detection / warning. Στο Fire Protection Solution, όταν το σύστημα είναι σε automatic mode και ενεργοποιηθεί οποιοσδήποτε fire detector, ξεκινά το audible/visual alarm και αποστέλλεται Level-1 fire-alarm signal προς το BMS. Το Maintenance Manual το περιγράφει πρακτικά ως ενεργοποίηση είτε του temperature sensor είτε του smoke sensor: με trigger σε έναν από τους δύο αισθητήρες, ενεργοποιείται Level-1 fire alarm και sound/light alarm.

Trigger	Smoke OR heat/temperature detector event, σύμφωνα με Maintenance Manual 5.3.1. Το Fire Protection Solution χρησιμοποιεί γενικότερα τον όρο “any detector” εντός του fire-extinguishing control system.
Local action	Audible and visual alarm ενεργοποιείται.
Control signal	Level-1 fire-alarm signal προς BMS.
Suppression	Δεν τεκμηριώνεται automatic aerosol discharge μόνο από ένα smoke ή heat detector στο βασικό Level-1 logic.
Operational meaning	Early fire warning / escalation state. Απαιτεί immediate operator awareness και προετοιμασία για shutdown/evacuation σύμφωνα με το site Emergency Response Plan.

5.3 Maintenance of the Fire Alarm System



5.3.1 Level-1 Fire Alarm detection (temperature alarm, smoke alarm, power on)

Use a smoke temperature gun to trigger the temperature or smoke sensor, the system will trigger a level-1fire alarm and start the sound and light alarm.

5.3.2 Level-2 Fire Alarm (temperature alarm, smoke alarm, power on)

Use a smoke temperature gun to trigger the temperature and smoke sensors, the system will trigger a level-2 fire alarm, start the sound and light alarm, activating the linkage mechanism to spray the inert gases, synchronously sending the feedback of fault information to the BMS system, and the system will be powered off .

5.4 Container Inspection

5.4.1 Enclosure Inspection (power off)

Figure 6-2. Level-1 and Level-2 fire alarm maintenance logic - source: M261_Maintenance_Manual.pdf, Section 5.3.

6.3 Second-degree / Level-2 fire alarm

Το Level-2 είναι το επιβεβαιωμένο/κλιμακωμένο fire condition. Το Fire Protection Solution ορίζει ότι όταν smoke detector KAI heat detector στο battery compartment λειτουργήσουν ταυτόχρονα, το σύστημα στέλνει Level-2 fire-alarm signal προς το BMS και παράλληλα εκδίδει fire-extinguishing activation command για εκκίνηση του aerosol device. Το Maintenance Manual 5.3.2 προσθέτει ότι στο Level-2 ενεργοποιείται sound/light alarm, η linkage mechanism εκτελεί suppression, αποστέλλεται fault feedback προς BMS και το system is powered off.

Trigger	Smoke AND heat/temperature

	detection simultaneously.
Alarm	Audible + visual alarm.
BMS interface	Level-2 / fault feedback προς BMS.
System action	Maintenance Manual: system powered off. Αυτό αφορά ηλεκτρικό operational shutdown, όχι αφαίρεση ενέργειας από τα cells.
Extinguishing action	Fire-extinguishing command -> HFX-200 condensed aerosol discharge στο protected battery compartment.
Post-event condition	Η μονάδα θεωρείται hazardous until assessed. Shutdown δεν αποκλείει continued thermal runaway, residual voltage ή combustible/toxic gas generation.

First vs Second degree - πρακτικά: Level-1 = ένας fire detector / early warning + alarm + BMS signal. Level-2 = επιβεβαίωση με smoke + heat μαζί, BMS feedback, electrical shutdown και automatic extinguishing linkage. Η διάκριση αυτή προκύπτει από τα M261 Fire Protection Solution και Maintenance Manual και πρέπει να αποτυπωθεί αυτούσια στο project Cause & Effect Matrix.

State	Trigger	Alarm / signal	Electrical action	Suppression action
Normal	No detector / no gas alarm	Normal monitoring	Normal operation	Standby
Gas warning	Combustible gas detector reaches first alarm threshold	Signal to BMS	BMS-controlled protective logic / early-warning response	No aerosol action explicitly stated by Fire Protection Solution

Level-1	Smoke OR heat detector	Level-1 signal to BMS + audible/visual	Early-warning state	No automatic discharge documented for single detector
Level-2	Smoke AND heat detector	Level-2/fault signal to BMS + audible/visual	Maintenance Manual states system powered off	Automatic HFX-200 aerosol activation command
Manual emergency	Emergency-stop / fire emergency start depending scenario	Local/EMS indication	Electrical isolation / charging-discharge stop	Manual fire-system initiation can be tested via signal-processing unit

6.4 Combustible-gas / H2 early-warning channel

Το Fire Protection Solution αντιμετωπίζει το combustible-gas detection ως χωριστό protection channel. Όταν ο GTQ-Trax20 ανιχνεύσει συγκέντρωση αερίου στο first alarm threshold, στέλνει άμεσα signal προς το BMS. Το έγγραφο δεν δίνει στο συγκεκριμένο σημείο αριθμητική τιμή threshold ούτε δηλώνει ότι το first gas threshold προκαλεί αυτόματα aerosol discharge. Συνεπώς το final project Cause & Effect πρέπει να κρατήσει τη gas-warning logic διακριτή από το smoke+heat Level-2 extinguishing logic, εκτός αν serial-specific firmware/settings document της ZTT ορίζει κάτι επιπλέον.

Ο GTQ-Trax20 που περιλαμβάνεται στο fire equipment list δηλώνεται με 24 V supply, 4-20 mA current, NO contact output, response time 20-25 s, operating range -40°C έως +70°C, IP66 και explosion-proof marking Ex d II C T6 Gb / Ex tD A21 IP66 T80°C.

6.5 Aerosol suppression - sizing και HFX-200

Η προστατευόμενη battery compartment στο M261 Fire Protection Solution δίνεται ως περίπου 860 × 1200 × 1780 mm και το design calculation χρησιμοποιεί net protected volume 1.6 m³. Για electrical fire λαμβάνεται application density qe = 47.7 g/m³, δηλαδή η υψηλότερη τιμή που χρησιμοποιείται για Class A/B στο συγκεκριμένο design table. Για HFX-200, efficiency coefficient f = 62% και safety factor S = 1.3 κατά τη μεθοδολογία EN 15276. Από W = (V × qe / f) × S προκύπτει required aerosol-forming compound περίπου 160 g. Το design επιλέγει μία μονάδα HFX-200.

Protected volume V	1.6 m³
Design density qe	47.7 g/m³
HFX-200 efficiency f	62%
Safety factor S	1.3
Calculated required compound W	~160 g
Selected extinguisher	1 × HFX-200
HFX-200 compound mass	200 g
Protected space rating	2 m³
Activation	Electrical starting
Feedback	Passive switching signal, NO -> NC
Discharge time	4-6 s
Validity period	15 years
Operating environment	-40°C to +60°C

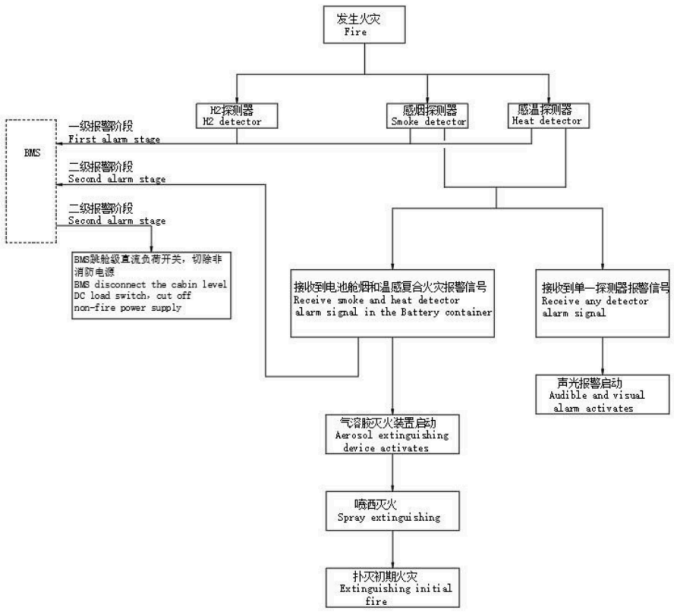


Figure 3-1 Linkage Control of Fire Protection System

3.2 Aerosol Fire Extinguishing System

The fire extinguishing device in the compartment is designed with HFX-200K non-pressure storage maintenance-free clean aerosol extinguishing device, featuring compact size, rapid discharge, high-efficiency fire extinguishing, safety and reliability, non-toxicity, harmlessness, and environmental friendliness. The interior of the cylinder contains sufficient cooling agent to ensure the nozzle temperature remains within safe limits.

3.3 Design Calculations

The required amount of solid aerosol-generating compound for the protected space should be calculated at the minimum expected ambient temperature using the design application density based on the net volume of the protected space.

The calculation formula for required amount of the solid aerosol-generating compound is as follows:

$$W = \frac{V \times q_e}{f} \times S$$

W: Total mass of the solid aerosol-generating compound required for the protected volume (g);
V: Net volume of the protected space (m^3);
q_e: Extinguishing application density as effective mass (g/m^3)-Table 3.1;
f: Efficiency coefficient of the aerosol generator (%)-Table 3.2;
S: Safety factor (is considered 1.3 according to EN 15276 unless otherwise specified).

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Figure 6-3. Aerosol sizing methodology and HFX-200 selection - source: 03 Fire Fighting System for ENERGRID M261 V1.0.pdf, Sections 3.2-3.3.

6.6 Fire-system components - detailed description

VC-6623 smoke detector	24 Vdc; -10°C to +55°C; RH ≤95%; EN 54-7; 1 piece.
VC-6633 heat detector	24 Vdc; -10°C to +55°C; RH ≤95%; EN 54-5; 1 piece.
GTQ-Trax20 H2/combustible gas detector	24 V (18-30 V); 4-20 mA; NO contact; 20-25 s response; IP66; Ex d IIC T6 Gb / Ex tD A21; 1 piece.

TB70ST audible/visual alarm	24 V; 1.5-2 W; audible output >85 dB; -20°C to +45°C; 1 piece.
Relay bases / relays	2 × VB-6611K-1 relay base + 4 × RXM4AB2BD relay, used in linkage/control interface.
Backup power supply	1 piece, supports fire-alarm/control availability.
HFX-200 aerosol device	1 set, automatic condensed-aerosol suppression in battery compartment.
Fire-resistant wiring	Approx. 72 m fire-resistant cable/wiring harness listed in the engineering equipment list.

For this project, the selected HFX-200 aerosol has an efficiency coefficient of f = 62% (as per Table 3.2);

Based on the formula:

$$W = \frac{V \times q_e}{f} \times S$$

The required mass of solid aerosol-forming compounds is: W = 160 g

Therefore, one HFX-200 aerosol is deployed for this project.

4. Equipment Selection

4.1 HFX-200 Aerosol Extinguishing Device

The HFX fire extinguishing device is a new K-type condensed aerosol extinguishing device, representing a breakthrough in fire protection with superior extinguishing efficiency and reliability. This product has the characteristics of compact size, pressure-free storage, rapid discharge, high-efficiency fire suppression, safety and reliability, non-toxic and harmless, green and environmentally friendly, etc. It is particularly suitable for relatively enclosed spaces such as electrical cabinets, communication rooms, battery boxes, energy storage cabinets and engine compartments.

Technical Parameters Table:

Content	Technical parameters	HFX-200
Activation method	Electrical starting	
Feedback signal	Passive switching signal (NO to NC)	
Protected space	2m³	
Validity period	15 years	
Dimensions	80*80*147mm	
Environment for use	-40℃~+60℃	
Discharge time	4-6s	

4.2 Smoke Detector VC-6623

Technical Parameters Table：

Content	Technical parameters	VC-6623
Working voltage	DC24V	
Operating temperature	-10℃~+55℃	
Ambient humidity	≤95%	
Executive standard	EN54-7	
Dimensions	Φ100 × Height 43 (excluding base)	
Weight	Approx. 120g	

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Figure 6-4. Detector/alarm technical parameters - source: 03 Fire Fighting System for ENERGRID M261 V1.0.pdf, Section 4.

Operating humidity	Combustible: ≤ 95% RH (no condensation)	
Explosion proof certification	Ex d Ⅱ C T6 Gb/Ex tD A21 IP66 T80℃	
Protection level	IP 66	

5. Equipment List

S/N	Equipment Name	Product Name	Specification and Model	Unit	Quantity	Remarks
1	Fire alarm control system	Smoke detector	VC-6623	Piece	1	
2		Heat detector	VC-6633	Piece	1	
3		Relay base	VB-6611K-1	Piece	2	
4		H_2 detector	GTQ-Trax20	Piece	1	
5		Audible and visual alarm	TB70ST	Piece	1	
6		Relay	RXM4AB2BD	Piece	4	
7		Backup power supply		Piece	1	
8	Aerosol system	Aerosol device	HFX-200	Set	1	
9	Auxiliary materials	Fire-resistant cable, wiring harness, etc.		Meters	72	
10		Auxiliary materials		Batch	1	

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Figure 6-5. Fire protection equipment list - source: 03 Fire Fighting System for ENERGRID M261 V1.0.pdf, Section 5.

6.7 Commissioning, simulated fire tests και maintenance

Το Maintenance Manual περιγράφει functional tests της fire-control linkage. Για automatic linkage test, το σύστημα τίθεται σε normal powered state, οι detectors αφήνονται να warm up για 10 minutes, ελέγχεται signal-processing unit, fire emergency start button και sound/light alarm. Το actual aerosol αντικαθίσταται με relay για ασφαλή simulation. Smoke/combustion products χρησιμοποιούνται ώστε να ενεργοποιηθεί ο detector και ελέγχεται αν ενεργοποιούνται alarm και relay/spray command. Μετά το test απαιτείται reset.

Το manual περιγράφει επίσης manual-start simulation: με relay αντί του aerosol, ανοίγει το protective cover του manual start button, πατιέται ο switch, ενεργοποιείται sound/light alarm και ελέγχεται το relay activation. Μετά το commissioning γίνεται power-off/reset.

Preconditions	Fire system powered; detectors warmed for ~10 min; controller normal; emergency-start button not operated; audible/visual alarm healthy.
Automatic simulation	Use smoke / incompletely burned paper or suitable test stimulus; verify detector alarm, sound/light and linkage relay.
Suppression simulation	Replace actual aerosol firing circuit with relay so the command can be verified without discharging the extinguisher.
Manual-start simulation	Operate protected manual-start button; verify sound/light and relay activation.
Reset	Reset / power cycle after test as required by manual.
Project SAT requirement	Record detector IDs, time stamps, BMS alarm code, PCS/system shutdown status, relay outputs and restored-normal state in commissioning report.

		refrigerant.
Fan overloading	The fan motor is stuck, causing a locked-rotor	Check whether the fan blades and motor bearings are stuck by foreign objects.
Thermostat abnormality of electric heating	1. Thermostat abnormality 2. Lack of liquid in water circuit	1. Check if the thermostat circuit is normal. 2. Check if the water flow and filter are dirty or blocked.

6.5 Simulated Fire Control Linkage Spraying Test

6.5.1 Test Item 1

The fire protection system is in a normal power on state, confirm the following:

A. The detector is powered on and maintained for 10 minutes to warm up and reach the monitoring state;

B. Observe the indicator light of the signal processing unit and keep it in normal state;

C. The fire emergency start button is in an unoperated state;

D. The sound and light alarm is in normal state;

E. The aerosol device is replaced by a relay to simulate aerosol spraying;

Confirm the protection zone and confirm the position of the detection system in the protection zone. After the detector is commissioned, the fire control system needs to be reset.

Simulated linkage system spraying test:

Use cigarettes or incompletely burned paper (which will produce smoke, CO and other flammable gases) to act on the composite detector until the alarm indicator light on the detector lights up and lasts for a period of time; At the same time, the sound and light alarm is activated, and then observe whether the relay is activated and whether the light on the relay is on. If the light is on, it means that the spraying of PERFLUORO is completed.

6.5.2 Test Item 2

Figure 6-6. Simulated fire-control linkage test - source: M261_Maintenance_Manual.pdf, Section 6.5.

6.8 Σύνδεση με NFPA 855: τι αποδεικνύει το fire package και τι όχι

Το M261 fire package είναι ουσιαστικό direct engineering evidence επειδή δείχνει detector types, suppression agent/device, control logic, BMS linkage και commissioning method. Σε συνδυασμό με UL 9540A cell/module/unit evidence, αποτελεί πλήρες και συμμορφώνεται με τις προδιαγραφές του NFPA 855.

Detection	Το M261 διαθέτει documented smoke + heat detection, local audible/visual alarm και BMS signaling, σε συμφωνία με τη layered detection philosophy του NFPA 855.

Gas / explosion	Το M261 διαθέτει combustible-gas detection, D70 relief/explosion-vent valve και documented fire design. Η ZTT έχει συνδέσει ρητά το D70 specification με τα relief valves του M261 cabinet. Τα burst/flow/venting δεδομένα, μαζί με gas detection, shutdown και suppression, συγκροτούν τεκμηριωμένο explosion-control concept για NFPA 855 §9.6.5.6.
Suppression	Το HFX-200 aerosol είναι documented και sized για το battery compartment και λειτουργεί σε συνδυασμό με smoke/heat detection, Level-2 logic, BMS feedback και electrical shutdown.
UL 9540A	CSA UL 9540A evidence υπάρχει σε cell, module και unit level. Σε συνδυασμό με το M261-specific IEC 62933-5-2 certificate και την 1P260S system architecture παρέχει ισχυρή fire/thermal-runaway τεκμηρίωση για NFPA 855 §9.1.5.
Emergency response	Level-1/Level-2 cause-and-effect, emergency isolation, residual-energy awareness, gas hazards και post-fire response είναι documented και μεταφέρονται στο project Emergency Operations Plan.
Commissioning	Functional testing of detection, alarms, BMS signaling, shutdown και simulated suppression linkage είναι documented στο Maintenance Manual και εφαρμόζεται στο SAT/commissioning του έργου.

6.9 D70 explosion-proof / pressure-relief valve - M261 cabinet

Ο D70 είναι μεταλλική βαλβίδα pressure balancing / explosion venting της Shanghai Found Automation Equipment Co., Ltd., specification TE-RC-2405-004, Rev. A0, ημερομηνίας 05/01/2024. Υπό κανονική λειτουργία εξισορροπεί τη διαφορά πίεσης μεταξύ εσωτερικού και εξωτερικού του sealed battery/equipment enclosure, ώστε μεταβολές θερμοκρασίας ή υψομέτρου να μη δημιουργούν υπερβολική καταπόνηση των seals. Σε rapid pressure rise, το vent port ανοίγει και αποδεσμεύει γρήγορα και κατευθυνόμενα τα εσωτερικά αέρια, με σκοπό να μειώσει την πιθανότητα μηχανικής αστοχίας/έκρηξης του enclosure.

Παράμετρος	D70 specification	Τεχνική σημασία για M261
Protection rating	IP68 - 1 m water depth / 24 h	Υψηλή στεγανότητα του component υπό normal service.
Membrane air permeability	≥3100 L/min @ 10.0 kPa	Δυνατότητα υψηλής ροής όταν απαιτείται pressure equalization / venting.
Burst pressure	4 ± 1 kPa	Ονομαστικό threshold ανοίγματος/εκτόνωσης και βασικό quantitative input του cabinet pressure-relief design.
Effective air-flow area	1788 mm²	Χρήσιμο input για vent-flow / transient pressure modelling.
Installation torque	1.5 ± 0.3 N·m	Κρίσιμη απαίτηση σωστής εγκατάστασης.
Ultimate failure torque	≥2.5 N·m	Μηχανικό installation limit.
Neutral salt spray	720 h	Υποστηρίζει environmental/corrosion robustness του component.
Temperature resistance	-40°C έως +125°C	Ευρύτερο component range από το cabinet operating environment.
Product life	10 years	Δηλωμένη component lifetime.
Environmental / flame rating	RoHS 2.0 / UL94 V-0	Material/environmental and flame-retardancy attributes.

Υλικά/κατασκευή: body και top cap από AL 6063, silicone-rubber seal ring και protective sleeve από AL 6063. Η supplier specification περιλαμβάνει mounting interface requirements και airtightness test procedure. Για airtightness προτείνεται test pressure <7 kPa και δεν επιτρέπεται air leakage.

Σχέση με fire scenario: η βαλβίδα δεν αποτελεί extinguishing device και δεν αντικαθιστά smoke/heat/H_2 detection ή HFX-200 aerosol suppression. Λειτουργεί ως παθητικό pressure-management layer. Σε thermal runaway, όπου η παραγωγή αερίων μπορεί να αυξήσει γρήγορα την εσωτερική πίεση, το D70 παρέχει ελεγχόμενη οδό εκτόνωσης.

NFPA 855 / explosion-control engineering interpretation
Το D70 αποτελεί M261-specific pressure-relief evidence με burst pressure 4±1 kPa, vent area 1788 mm² και υψηλή flow capability. Σε συνδυασμό με combustible-gas detection, smoke/heat detection, Level-2 shutdown logic και HFX-200 aerosol suppression, τεκμηριώνει layered explosion-control / deflagration-mitigation architecture. Η συνολική αυτή αρχιτεκτονική, μαζί με το M261-specific IEC 62933-5-2 Compliance Document και τα UL 9540A fire-test evidence, υποστηρίζει θετική τεχνική αξιολόγηση έναντι των εφαρμοστέων απαιτήσεων του NFPA 855:2023.

7. Περιβαλλοντική αντοχή, IP και αντιδιαβρωτική προστασία

Το M261 datasheet δηλώνει IP54 και anti-corrosion C5. Ο φάκελος περιλαμβάνει third-party IP54 report για ENERGRID N3 και ISO 12944-6:2018 C5-H testing report για συγκεκριμένο Jotun coating system. Η τεκμηρίωση αυτή, σε συνδυασμό με τις δηλωμένες προδιαγραφές του M261, τεκμηριώνει στο παρόν dossier την περιβαλλοντική προστασία IP54 και την αντιδιαβρωτική κατηγορία C5 του συστήματος.

Το C5-H report No. TW 231124 καταγράφει coating system Jotamastic 80 125 μm + Jotamastic 80 125 μm + Futura Classic RAL 7035 50 μm και conclusion PASS έναντι ISO 12944-6:2018 C5-H.

8. Μεταφορά, MSDS και χημική συμμόρφωση

Για το complete ENERGRID M261 υπάρχει UN 38.3 test report No. KD2507S3672B01 με δηλωμένο model ENERGRID M261 και conclusion ότι τα samples πέρασαν τα απαιτούμενα tests T.1-T.8 σύμφωνα με το UN Manual of Tests and Criteria, Rev.8, Subsection 38.3. Υπάρχει επίσης MSDS No. KD2507S3672B04 για Rechargeable Li-ion Battery System, model ENERGRID M261.

Σε cell level υπάρχουν Bureau Veritas RoHS και REACH test reports για το ZTT71173204. Αυτά αφορούν χημική/material compliance του cell και όχι installation-level fire compliance.

9. Απαιτήσεις φακέλου έργου / commissioning

Παραδοτέο έργου	Περιεχόμενο / σκοπός
Serial-specific BOM / nameplate cross-reference	Να συνδέει το delivered M261 με cell ZTT71173204, battery system ZTT260S1P, PCS model και fire components.
Project layout / distances	Θέση cabinet, clearances, egress, vehicle impact, fire access, exposure distances.
HMA / fire engineering note	Αξιολόγηση thermal runaway, gas release, propagation, explosion/deflagration, firefighting strategy.
UL 9540 / alternative acceptance route	Όπου ο NFPA 855 εφαρμόζεται αυστηρά, να προσκομιστεί UL 9540 listing ή τεκμηριωμένη accepted-equivalency/approval route.
UL 9540A configuration statement	Να εξηγεί τη σχέση cell/module/unit test reports με την ακριβή M261 configuration.
Commissioning plan/report	Functional tests BMS/EMS/PCS, E-stop, alarms, detection, fire linkage, communications, shutdown/isolation.
Emergency operations plan	Shutdown/isolation, alarm response, fire/explosion response, damaged battery handling, responder information.

O&M / training records	Maintenance schedule, logs, qualified personnel, annual refresher training όπου εφαρμόζεται.
Decommissioning plan	Safe isolation, removal, transport/recycling, damaged battery pathway.

Παράρτημα A - Evidence Sheets

Κάθε evidence sheet περιλαμβάνει το ακριβές source filename, issuer, πρότυπο, certificate/report number, μοντέλο και φωτογραφικό απόσπασμα της αντίστοιχης τεκμηρίωσης. Η κατηγορία DIRECT σημαίνει άμεση αναφορά στο ENERGRID M261 ή στο battery system που ταυτοποιείται ως ZTT260S1P. COMPONENT σημαίνει component-level evidence. SUPPORTING σημαίνει σχετικό αλλά όχι M261-specific evidence.

E01. M261 Product Datasheet V2.0

Επίπεδο / αντικείμενο	Complete ESS
Φορέας / εκδότης	Zhongtian Energy Storage Technology (ZTT)
Πρότυπο / κανονιστική βάση	Declared standards: IEC 62477 / IEC 61000 / IEC 62619 / IEC 63056 / IEC 60730 / UN 38.3 / UN 3480
Certificate / Report No.	Datasheet V2.0
Μοντέλο / ταυτοποίηση	ENERGRID M261
Κατάσταση τεκμηρίωσης	DIRECT
Αρχείο πηγής	ENERGRID_M261_Series_Data Sheet_2026_V2.0.pdf

Αξιολόγηση: Βασική πηγή ονομαστικών χαρακτηριστικών, fire suppression architecture, IP54/C5 declarations και standards list.

Σύνδεση με NFPA 855: Input για NFPA 855 4.2 construction documents και equipment data.

Product Parameters

Model	M261	DM261
DC Side		
Battery Type	LFP / 314Ah	
Rated Voltage	832V (260S)	
DC Operating Voltage Range	676V ~ 936V	
Rated Capacity	261 KWh	
AC Side		
AC Voltage	400V AC (-15% ~ +15%)	-
Rated Power	130kW	-
Rated Grid Frequency	50Hz	-
Power Factor	-1 ~ 1	-
Max AC Current	195A	-
System Parameters		
Thermal Management	Intelligent Liquid Cooling	
Operating Temperature	-20℃ ~ 55℃ [1]	
Fire Suppresion	Cabinet Aerosol + Relief Valve + Active Alert	
Protection Rating	IP 54	
Anti-corrosion	C5	
Operating Altitude	≤3000m (>3000m derating)	
Noise Level	≤ 75dB	
Weight	≤ 2.6T	
Dimension (W×D×H)	1000×1350×2350mm (Without rings and fixings)	
Connection Type	AC Grid On/Off (Seamless Switch with ACC Cabinet)	DC connection
Communication	Modbus / IEC104 / MQTT	Modbus / CAN / RS485 / Dry Contact
Standards&Certificates	IEC62477 / IEC61000 / IEC62619 / IEC63056 / IEC60730 / UN38.3 / UN3480	

Note：[1]: Power derates when the ambient temperature is below -15℃ or above 45℃.

DM261 Selection Guide				
Capacity	Rated Power	Configration	Rated Voltage	Voltage Range
261kWh	130kW	1P260S	832Vdc	650 - 949Vdc
208kWh	104kW	1P208S	665Vdc	520 - 759Vdc
156kWh	78kW	1P156S	499Vdc	390 - 569Vdc

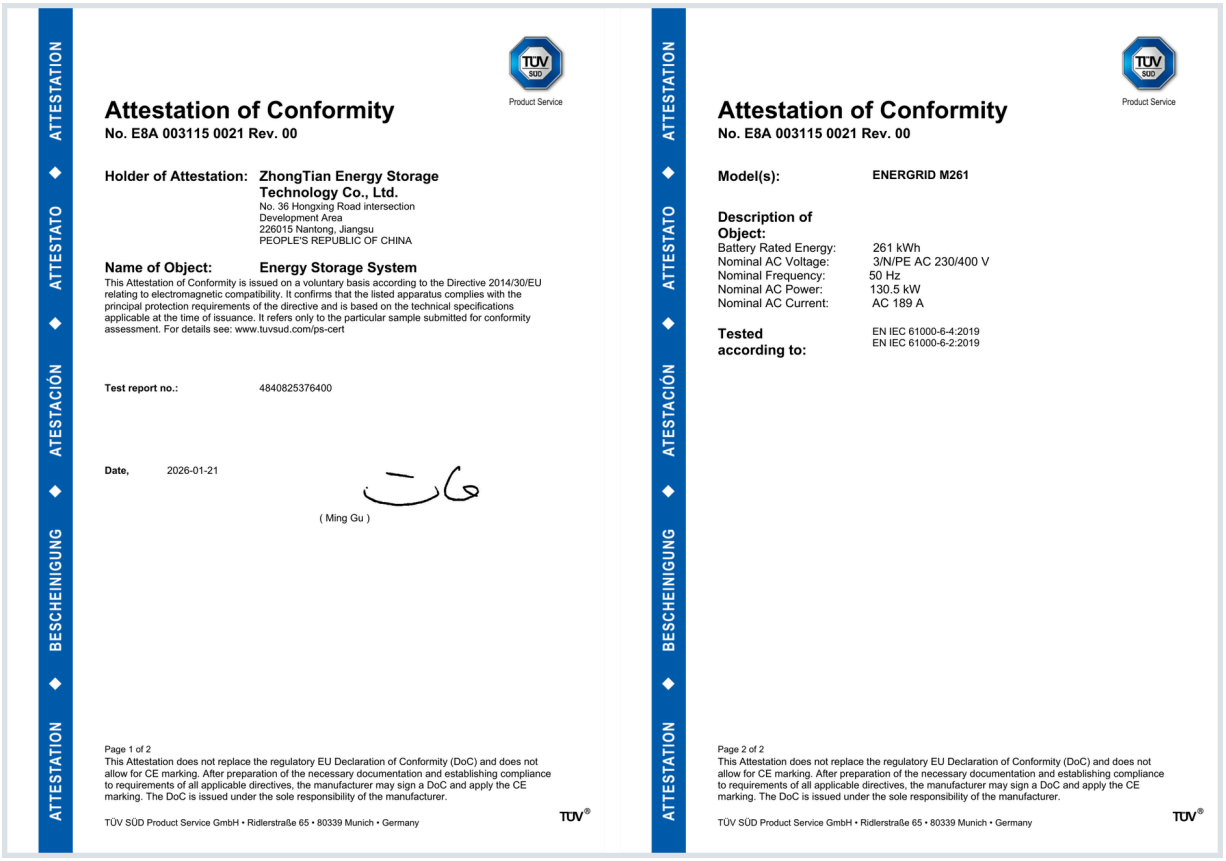
© 2026 Zhongtian Energy Storage Technology, Co., LTD. ZTT Group. All rights reserved. V2.0

E02. M261 EMC Attestation

Επίπεδο / αντικείμενο	Complete ESS
Φορέας / εκδότης	TÜV SÜD Product Service GmbH
Πρότυπο / κανονιστική βάση	EN IEC 61000-6-4:2019; EN IEC 61000-6-2:2019
Certificate / Report No.	E8A 003115 0021 Rev.00
Μοντέλο / ταυτοποίηση	ENERGRID M261 - 261 kWh, 130.5 kW, 230/400 V
Κατάσταση τεκμηρίωσης	DIRECT
Αρχείο πηγής	M261 EN IEC 61000-6-4 & 2 Certificate.pdf

Αξιολόγηση: Άμεση third-party attestation για το πλήρες ENERGRID M261. Η δεύτερη σελίδα ταυτοποιεί ρητά το model και τα ratings.

Σύνδεση με NFPA 855: Υποστηρίζει equipment/electrical documentation· δεν αποτελεί UL 9540 listing.



ATTESTATION ◆ ATTESTATO ◆ ATTESTACIÓN ◆ BESCHEINIGUNG ◆ ATTESTATION

TÜV SÜD Product Service

Attestation of Conformity

No. E8A 003115 0021 Rev. 00

Holder of Attestation: **ZhongTian Energy Storage Technology Co., Ltd.**
No. 36 Hongxing Road intersection
Development Area
226015 Nantong, Jiangsu
PEOPLE'S REPUBLIC OF CHINA

Name of Object: **Energy Storage System**

This Attestation of Conformity is issued on a voluntary basis according to the Directive 2014/30/EU relating to electromagnetic compatibility. It confirms that the listed apparatus complies with the principal protection requirements of the directive and is based on the technical specifications applicable at the time of issuance. It refers only to the particular sample submitted for conformity assessment. For details see: www.tuvsud.com/ps-cert

Test report no.: 4840825376400

Date, 2026-01-21

(Ming Gu)

Page 1 of 2

This Attestation does not replace the regulatory EU Declaration of Conformity (DoC) and does not allow for CE marking. After preparation of the necessary documentation and establishing compliance to requirements of all applicable directives, the manufacturer may sign a DoC and apply the CE marking. The DoC is issued under the sole responsibility of the manufacturer.

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ATTESTATION ◆ ATTESTATO ◆ ATTESTACIÓN ◆ BESCHEINIGUNG ◆ ATTESTATION

TÜV SÜD Product Service

Attestation of Conformity

No. E8A 003115 0021 Rev. 00

Model(s): **ENERGRID M261**

Description of Object:
Battery Rated Energy: 261 kWh
Nominal AC Voltage: 3/N/PE AC 230/400 V
Nominal Frequency: 50 Hz
Nominal AC Power: 130.5 kW
Nominal AC Current: AC 189 A

Tested according to: EN IEC 61000-6-4:2019
EN IEC 61000-6-2:2019

Page 2 of 2

This Attestation does not replace the regulatory EU Declaration of Conformity (DoC) and does not allow for CE marking. After preparation of the necessary documentation and establishing compliance to requirements of all applicable directives, the manufacturer may sign a DoC and apply the CE marking. The DoC is issued under the sole responsibility of the manufacturer.

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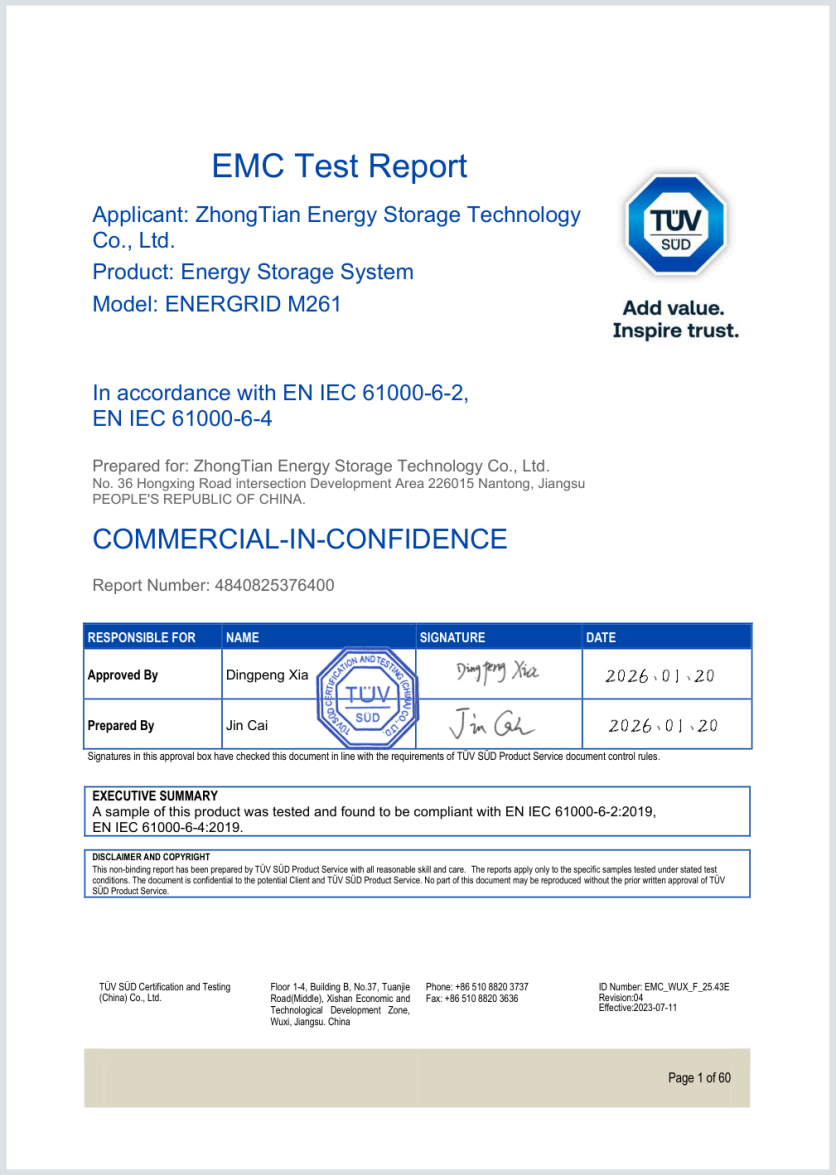
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E03. M261 EMC Test Report

Επίπεδο / αντικείμενο	Complete ESS
Φορέας / εκδότης	TÜV SÜD Product Service
Πρότυπο / κανονιστική βάση	EN IEC 61000-6-2:2019; EN IEC 61000-6-4:2019
Certificate / Report No.	4840825376400
Μοντέλο / ταυτοποίηση	ENERGRID M261
Κατάσταση τεκμηρίωσης	DIRECT
Αρχείο πηγής	M261 EN IEC 61000-6-4 & 2 Test Report.pdf

Αξιολόγηση: Πλήρες 60-page EMC test report. Executive summary δηλώνει compliance του tested sample.

Σύνδεση με NFPA 855: Supporting evidence για electrical/EMC integrity του ESS.



EMC Test Report

Applicant: ZhongTian Energy Storage Technology Co., Ltd.

Product: Energy Storage System

Model: ENERGRID M261

Add value. Inspire trust.

In accordance with EN IEC 61000-6-2, EN IEC 61000-6-4

Prepared for: ZhongTian Energy Storage Technology Co., Ltd.
No. 36 Hongxing Road intersection Development Area 226015 Nantong, Jiangsu
PEOPLE'S REPUBLIC OF CHINA.

COMMERCIAL-IN-CONFIDENCE

Report Number: 4840825376400

RESPONSIBLE FOR	NAME	SIGNATURE	DATE
Approved By	Dingpeng Xia	Dingpeng Xia	2026.01.20
Prepared By	Jin Cai	Jin Cai	2026.01.20

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

EXECUTIVE SUMMARY
A sample of this product was tested and found to be compliant with EN IEC 61000-6-2:2019, EN IEC 61000-6-4:2019.

DISCLAIMER AND COPYRIGHT
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TÜV SÜD Certification and Testing (China) Co., Ltd.
Floor 1-4, Building B, No.37, Tuanjie Road(Middle), Xishan Economic and Technological Development Zone, Wuxi, Jiangsu. China
Phone: +86 510 8820 3737
Fax: +86 510 8820 3636
ID Number: EMC_WUX_F_25.43E
Revision:04
Effective:2023-07-11

Page 1 of 60

E04. Battery System IEC 62619 + IEC 63056 Certificate

Επίπεδο / αντικείμενο	Battery system
Φορέας / εκδότης	TÜV SÜD Product Service GmbH
Πρότυπο / κανονιστική βάση	IEC 62619:2022; IEC 63056:2020
Certificate / Report No.	B 003115 0022 Rev.00 / TR 5061925001375-00
Μοντέλο / ταυτοποίηση	ZTT260S1P - 832 Vdc - 314 Ah
Κατάσταση τεκμηρίωσης	DIRECT
Αρχείο πηγής	IEC62619&IEC63056证书.pdf

Αξιολόγηση: Ισχυρό battery-system certificate. Η page 2 ταυτοποιεί model ZTT260S1P, 832 Vdc, 314 Ah και τα δύο standards. Valid until 2031-03-19.

Σύνδεση με NFPA 855: Component/system safety evidence για electrochemical ESS. Δεν αντικαθιστά από μόνο του 9.2.1.1 UL 9540 listing.



ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Product Service

CERTIFICATE

No. B 003115 0022 Rev. 00

Holder of Certificate: **ZhongTian Energy Storage Technology Co., Ltd.**
No. 36 Hongxing Road intersection Development Area
226015 Nantong, Jiangsu
PEOPLE'S REPUBLIC OF CHINA

Certification Mark:

Product: **Batteries (Rechargeable Li-ion Battery System)**

The product was tested on a voluntary basis and complies with the essential requirements. The certification mark shown above can be affixed on the product. It is not permitted to alter the certification mark in any way. In addition, the certification holder must not transfer the certificate to third parties. This certificate is valid until the listed date, unless it is cancelled earlier. All applicable requirements of the Testing, Certification, Validation and Verification Regulations of TÜV SÜD Group have to be complied. For details see: www.tuvsud.com/ps-cert

Test report no.: 5061925001375-00

Valid until: 2031-03-19

Date, 2026-03-27

(Marco Frank)

Page 1 of 2
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ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Product Service

CERTIFICATE

No. B 003115 0022 Rev. 00

Model(s): ZTT260S1P
Brand Name: ZTT

Parameters: Nominal Voltage: DC 832 V
Rated Capacity: 314 Ah

Tested according to: IEC 62619:2022
IEC 63056:2020

Page 2 of 2
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E05. Battery System IEC 62619 Test Report

Επίπεδο / αντικείμενο	Battery system
Φορέας / εκδότης	TÜV SÜD New Energy Vehicle Testing (Jiangsu)
Πρότυπο / κανονιστική βάση	IEC 62619:2022
Certificate / Report No.	5061925001375-00 part 1 of 2
Μοντέλο / ταυτοποίηση	Rechargeable Li-ion Battery System
Κατάσταση τεκμηρίωσης	DIRECT
Αρχείο πηγής	IEC62619报告.pdf

Αξιολόγηση: Detailed IEC 62619 test report supporting certificate B 003115 0022.

Σύνδεση με NFPA 855: Safety evidence for industrial lithium battery system.

TEST REPORT
IEC 62619
Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for secondary lithium cells and batteries, for use in industrial applications

Report Number. ..... :	5061925001375-00 part 1 of 2
Date of issue ..... :	2026-03-20
Total number of pages ..... :	29 pages
Name of Testing Laboratory preparing the Report ..... :	TÜV SÜD New Energy Vehicle Testing (Jiangsu) Co., Ltd.
Applicant's name ..... :	ZhongTian Energy Storage Technology Co., Ltd.
Address ..... :	No. 36 Hongxing Road intersection, Development Area, 226015 Nantong, Jiangsu, PEOPLE'S REPUBLIC OF CHINA
Test specification:	
Standard ..... :	IEC 62619:2022
Test procedure ..... :	TÜV SÜD Mark
Non-standard test method ..... :	N/A
TRF template used ..... :	IECEE OD-2020-F1:2022, Ed.1.5
Test Report Form No. ..... :	IEC62619B
Test Report Form(s) Originator .... :	UL Solutions (Demko)
Master TRF ..... :	Dated 2023-02-24

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www.tuvsud.com

TÜV SÜD New Energy Vehicle Testing (Jiangsu) Co., Ltd.

Building A, No.15 Factory, Jintong International Industrial Park, No.8, Xihu Road, Wujin National Hi-tech Industrial Development Zone, Changzhou, Jiangsu, China

E06. Battery System IEC 63056 Test Report

Επίπεδο / αντικείμενο	Battery system
Φορέας / εκδότης	TÜV SÜD New Energy Vehicle Testing (Jiangsu)
Πρότυπο / κανονιστική βάση	IEC 63056:2020
Certificate / Report No.	5061925001375-00 part 2 of 2
Μοντέλο / ταυτοποίηση	Rechargeable Li-ion Battery System
Κατάσταση τεκμηρίωσης	DIRECT
Αρχείο πηγής	IEC63056报告.pdf

Αξιολόγηση: Detailed IEC 63056 test report supporting the electrical energy storage battery-system certification.

Σύνδεση με NFPA 855: Relevant safety evidence for batteries used in EES applications.

TEST REPORT
IEC 63056
Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries, for use in electrical energy storage systems

Report Number. ..... :	5061925001375-00 part 2 of 2
Date of issue ..... :	2026-03-20
Total number of pages ..... :	28 pages
Name of Testing Laboratory preparing the Report ..... :	TÜV SÜD New Energy Vehicle Testing (Jiangsu) Co., Ltd.
Applicant's name ..... :	ZhongTian Energy Storage Technology Co., Ltd.
Address ..... :	No. 36 Hongxing Road intersection, Development Area, 226015 Nantong, Jiangsu, PEOPLE'S REPUBLIC OF CHINA
Test specification:	
Standard ..... :	IEC 63056:2020
Test procedure ..... :	TÜV SÜD Mark
Non-standard test method ..... :	N/A
TRF template used ..... :	IECEE OD-2020-F1:2020, Ed.1.4
Test Report Form No. ..... :	IEC63056A
Test Report Form(s) Originator ..... :	UL(Demko)
Master TRF ..... :	Dated 2020-10-15

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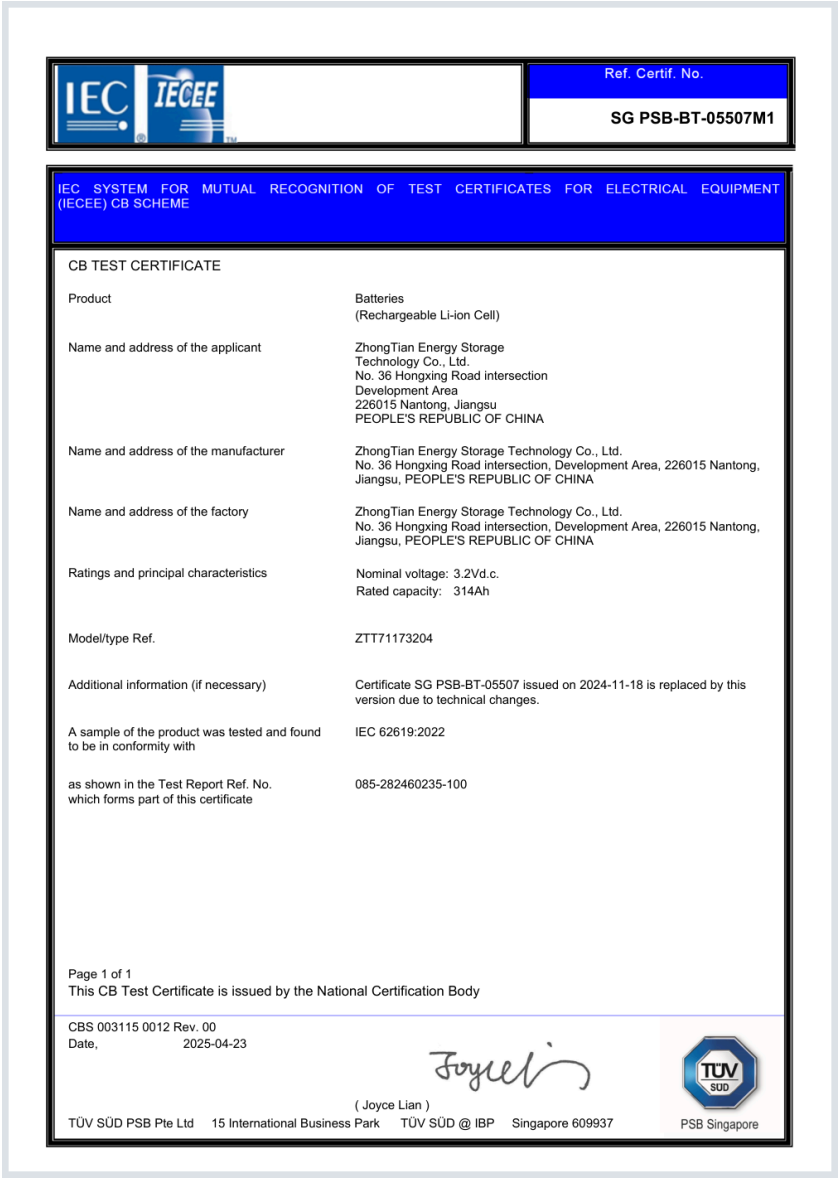
TÜV SÜD New Energy Vehicle Testing (Jiangsu) Co., Ltd.
Building A, No.15 Factory, Jintong International Industrial Park, No.8, Xihu Road, Wujin National Hi-tech Industrial Development Zone, Changzhou, Jiangsu, China

E07. Cell IEC 62619 CB Certificate

Επίπεδο / αντικείμενο	Cell
Φορέας / εκδότης	TÜV SÜD PSB
Πρότυπο / κανονιστική βάση	IEC 62619:2022
Certificate / Report No.	SG PSB-BT-05507M1
Μοντέλο / ταυτοποίηση	ZTT71173204 - 3.2 Vdc - 314 Ah
Κατάσταση τεκμηρίωσης	COMPONENT
Αρχείο πηγής	1--ZTT71173204 IEC62619-3.2V 314Ah 证书.pdf

Αξιολόγηση: CB Test Certificate for the exact 314 Ah LFP cell model used in the ZTT certification chain.

Σύνδεση με NFPA 855: Cell-level safety evidence; useful for configuration traceability.



Ref. Certif. No.

SG PSB-BT-05507M1

IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME

CB TEST CERTIFICATE

Product	Batteries (Rechargeable Li-ion Cell)
Name and address of the applicant	ZhongTian Energy Storage Technology Co., Ltd. No. 36 Hongxing Road intersection Development Area 226015 Nantong, Jiangsu PEOPLE'S REPUBLIC OF CHINA
Name and address of the manufacturer	ZhongTian Energy Storage Technology Co., Ltd. No. 36 Hongxing Road intersection, Development Area, 226015 Nantong, Jiangsu, PEOPLE'S REPUBLIC OF CHINA
Name and address of the factory	ZhongTian Energy Storage Technology Co., Ltd. No. 36 Hongxing Road intersection, Development Area, 226015 Nantong, Jiangsu, PEOPLE'S REPUBLIC OF CHINA
Ratings and principal characteristics	Nominal voltage: 3.2Vd.c. Rated capacity: 314Ah
Model/type Ref.	ZTT71173204
Additional information (if necessary)	Certificate SG PSB-BT-05507 issued on 2024-11-18 is replaced by this version due to technical changes.
A sample of the product was tested and found to be in conformity with	IEC 62619:2022
as shown in the Test Report Ref. No. which forms part of this certificate	085-282460235-100

Page 1 of 1

This CB Test Certificate is issued by the National Certification Body

CBS 003115 0012 Rev. 00

Date, 2025-04-23

(Joyce Lian)

TÜV SÜD PSB Pte Ltd 15 International Business Park TÜV SÜD @ IBP Singapore 609937

PSB Singapore

E08. Cell IEC 62619 CB Test Report

Επίπεδο / αντικείμενο	Cell
Φορέας / εκδότης	TÜV SÜD New Energy Testing (Guangdong)
Πρότυπο / κανονιστική βάση	IEC 62619:2022
Certificate / Report No.	085-282460235-100
Μοντέλο / ταυτοποίηση	ZTT71173204
Κατάσταση τεκμηρίωσης	COMPONENT
Αρχείο πηγής	1--ZTT71173204 IEC62619-3.2V 314Ah 报告_1.pdf

Αξιολόγηση: 21-page CB test report supporting the IEC 62619 cell certificate.

Σύνδεση με NFPA 855: Cell-level evidence.



Test Report issued under the responsibility of:

NCB TÜV SÜD PSB Pte Ltd.
15 International Business Park, TÜV SÜD@IBP
Singapore 609937
Singapore

TEST REPORT
IEC 62619
Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for secondary lithium cells and batteries, for use in industrial applications

Report Number	085-282460235-100
Date of issue	2024-11-06, Amendment No. 1: 2025-04-22
Total number of pages	21 pages
Name of Testing Laboratory preparing the Report	TÜV SÜD New Energy Testing (Guangdong) Co., Ltd.
Applicant's name	ZhongTian Energy Storage Technology Co., Ltd.
Address	No. 36 Hongxing Road intersection, Development Area, 226015 Nantong, Jiangsu, PEOPLE'S REPUBLIC OF CHINA
Test specification:	
Standard	IEC 62619:2022
Test procedure	CB Scheme
Non-standard test method	N/A
TRF template used	IECEE OD-2020-F1:2022, Ed.1.5
Test Report Form No.	IEC62619B
Test Report Form(s) Originator	UL Solutions (Demko)
Master TRF	Dated 2023-02-24

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If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

This report is not valid as a CB Test Report unless signed by an approved IECEE Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

General disclaimer:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing NCB. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

E09. Cell UL 1973 Certificate

Επίπεδο / αντικείμενο	Cell
Φορέας / εκδότης	CSA Group
Πρότυπο / κανονιστική βάση	UL 1973
Certificate / Report No.	80202415 / Master Contract 304186
Μοντέλο / ταυτοποίηση	ZTT71173204
Κατάσταση τεκμηρίωσης	COMPONENT
Αρχείο πηγής	2--ZTT71173204 UL1973-3.2V 314Ah 证书_1.pdf

Αξιολόγηση: CSA Certificate of Compliance for rechargeable prismatic Li-ion cell ZTT71173204.

Σύνδεση με NFPA 855: UL 1973 is referenced by NFPA 855 in specific battery/listing contexts; this certificate is cell-level, not complete ESS listing.



CSA GROUP™

Certificate of Compliance

Certificate: 80202415 **Master Contract:** 304186

Project: 80202415 **Date Issued:** 2025-04-28

Issued To: **Zhongtian Energy Storage Technology Co.,Ltd.**
No.36,East Hongxing Road, NETDA
Nantong, Jiangsu 226015
China

Attention: Taibing Gong

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.

Issued by: Marvin Peng
Marvin Peng

C US

PRODUCTS
CLASS - C370116 - BATT - Cell for use in Battery/Module for Stationary LER and EV Application
CLASS - C370186 - BATT - Cell for use in Battery/Module for Stationary LER and EV Application - Certified to US Standard

General: Rechargeable Prismatic Lithium-ion Cell, Model ZTT71173207.

Model Number	Chemistry	Shape/Type	Weight
ZTT71173204	LiFePO4+C6 <-> Li1-xLiFePO4+LixC6	Prismatic	5490±300g

Electrical Rating:

Note: See also Conditions of Acceptability for charge limit specifications.

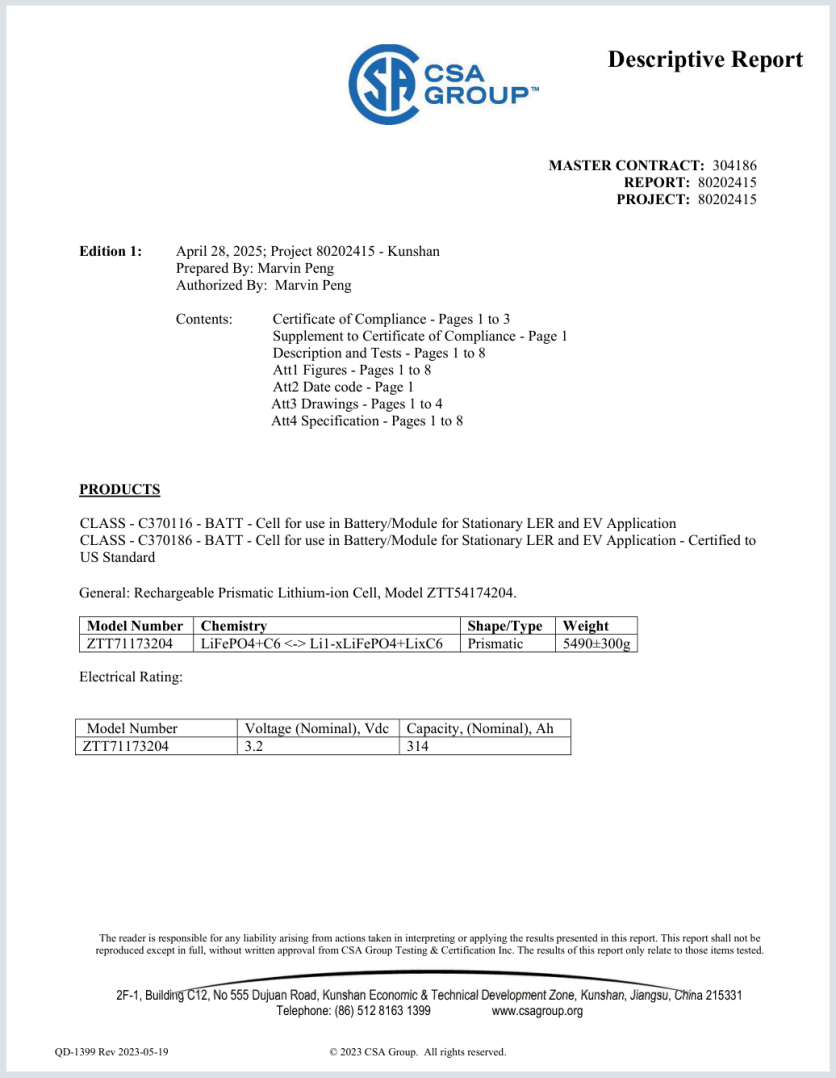
DQD 507 Rev. 2019-04-30 © 2018 CSA Group. All rights reserved. Page 1

E10. Cell UL 1973 Descriptive Report

Επίπεδο / αντικείμενο	Cell
Φορέας / εκδότης	CSA Group
Πρότυπο / κανονιστική βάση	UL 1973
Certificate / Report No.	80202415
Μοντέλο / ταυτοποίηση	ZTT71173204
Κατάσταση τεκμηρίωσης	COMPONENT
Αρχείο πηγής	2--ZTT71173204 UL1973-3.2V 314Ah 报告.pdf

Αξιολόγηση: Descriptive report underlying CSA certificate 80202415.

Σύνδεση με NFPA 855: Supports cell qualification and traceability.



CSA GROUP™

Descriptive Report

MASTER CONTRACT: 304186
REPORT: 80202415
PROJECT: 80202415

Edition 1: April 28, 2025; Project 80202415 - Kunshan
Prepared By: Marvin Peng
Authorized By: Marvin Peng

Contents:
Certificate of Compliance - Pages 1 to 3
Supplement to Certificate of Compliance - Page 1
Description and Tests - Pages 1 to 8
Att1 Figures - Pages 1 to 8
Att2 Date code - Page 1
Att3 Drawings - Pages 1 to 4
Att4 Specification - Pages 1 to 8

PRODUCTS

CLASS - C370116 - BATT - Cell for use in Battery/Module for Stationary LER and EV Application
CLASS - C370186 - BATT - Cell for use in Battery/Module for Stationary LER and EV Application - Certified to US Standard

General: Rechargeable Prismatic Lithium-ion Cell, Model ZTT54174204.

Model Number	Chemistry	Shape/Type	Weight
ZTT71173204	LiFePO4+C6 <-> Li1-xLiFePO4+LixC6	Prismatic	5490±300g

Electrical Rating:

Model Number	Voltage (Nominal), Vdc	Capacity, (Nominal), Ah
ZTT71173204	3.2	314

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2F-1, Building C12, No 555 Dujuan Road, Kunshan Economic & Technical Development Zone, Kunshan, Jiangsu, China 215331
Telephone: (86) 512 8163 1399 www.csagroup.org

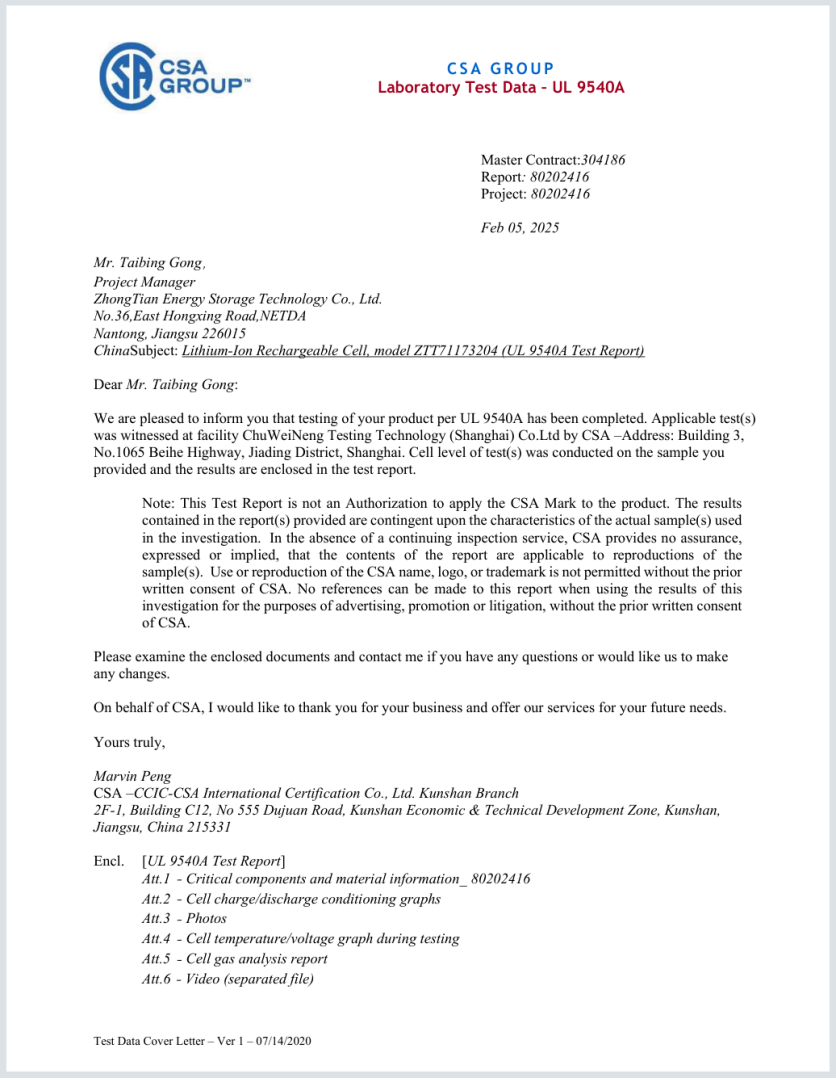
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E11. UL 9540A - Cell Level

Επίπεδο / αντικείμενο	Cell fire/explosion test
Φορέας / εκδότης	CSA Group
Πρότυπο / κανονιστική βάση	ANSI/CAN/UL 9540A:2019, 4th Ed.
Certificate / Report No.	80202416
Μοντέλο / ταυτοποίηση	ZTT71173204
Κατάσταση τεκμηρίωσης	COMPONENT
Αρχείο πηγής	3--锂离子电池 ZTT71173204 UL9540A检测报告 80202416.pdf

Αξιολόγηση: CSA-witnessed cell-level UL 9540A report dated 2025-02-05. Test report, not authorization to apply CSA Mark.

Σύνδεση με NFPA 855: Directly relevant to NFPA 855 9.1.5 fire/explosion testing chain.



CSA GROUP
Laboratory Test Data - UL 9540A

Master Contract:*304186*
Report*: 80202416*
Project: *80202416*

Feb 05, 2025

Mr. Taibing Gong,
Project Manager
ZhongTian Energy Storage Technology Co., Ltd.
No.36,East Hongxing Road,NETDA
Nantong, Jiangsu 226015
*China*Subject: *Lithium-Ion Rechargeable Cell, model ZTT71173204 (UL 9540A Test Report)*

Dear *Mr. Taibing Gong*:

We are pleased to inform you that testing of your product per UL 9540A has been completed. Applicable test(s) was witnessed at facility ChuWeiNeng Testing Technology (Shanghai) Co.Ltd by CSA –Address: Building 3, No.1065 Beihe Highway, Jiading District, Shanghai. Cell level of test(s) was conducted on the sample you provided and the results are enclosed in the test report.

Note: This Test Report is not an Authorization to apply the CSA Mark to the product. The results contained in the report(s) provided are contingent upon the characteristics of the actual sample(s) used in the investigation. In the absence of a continuing inspection service, CSA provides no assurance, expressed or implied, that the contents of the report are applicable to reproductions of the sample(s). Use or reproduction of the CSA name, logo, or trademark is not permitted without the prior written consent of CSA. No references can be made to this report when using the results of this investigation for the purposes of advertising, promotion or litigation, without the prior written consent of CSA.

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On behalf of CSA, I would like to thank you for your business and offer our services for your future needs.

Yours truly,

Marvin Peng
CSA –*CCIC-CSA International Certification Co., Ltd. Kunshan Branch*
2F-1, Building C12, No 555 Dujuan Road, Kunshan Economic & Technical Development Zone, Kunshan, Jiangsu, China 215331

Encl. [*UL 9540A Test Report*]
Att.1 - Critical components and material information_ 80202416
Att.2 - Cell charge/discharge conditioning graphs
Att.3 - Photos
Att.4 - Cell temperature/voltage graph during testing
Att.5 - Cell gas analysis report
Att.6 - Video (separated file)

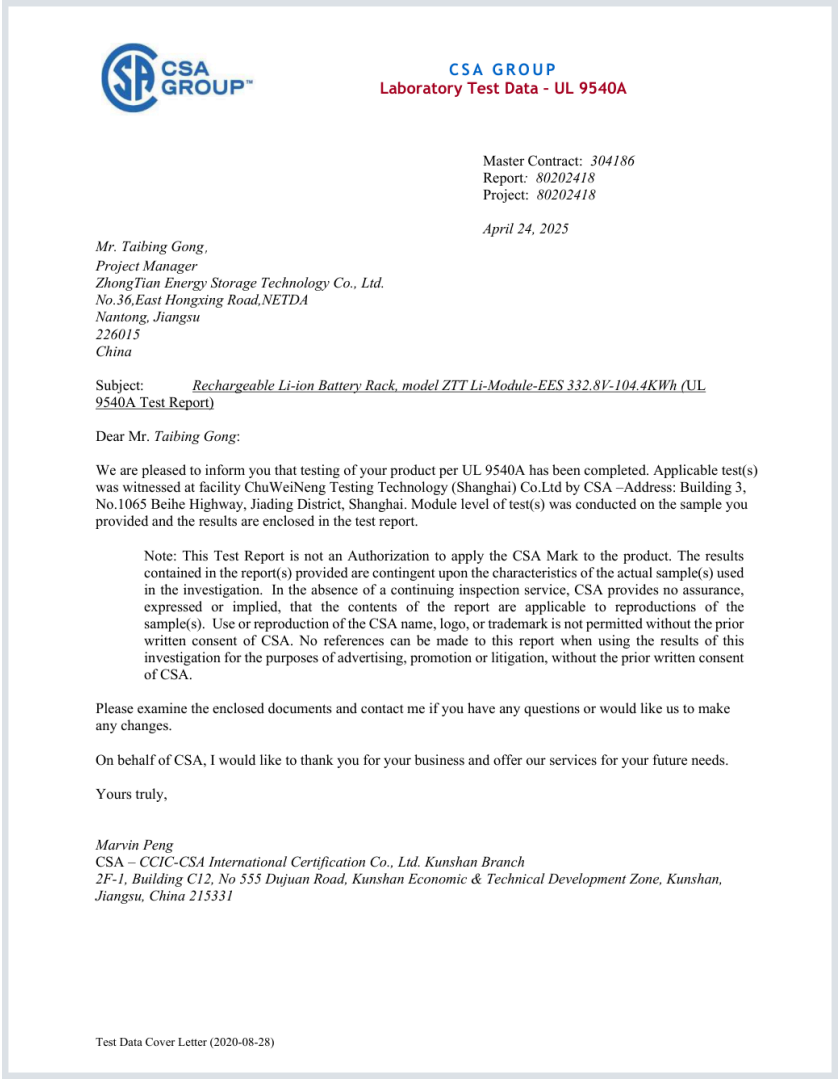
Test Data Cover Letter – Ver 1 – 07/14/2020

E12. UL 9540A - Module Level

Επίπεδο / αντικείμενο	Module fire/explosion test
Φορέας / εκδότης	CSA Group
Πρότυπο / κανονιστική βάση	ANSI/CAN/UL 9540A:2019, 4th Ed.
Certificate / Report No.	80202418
Μοντέλο / ταυτοποίηση	ZTT Li-Module-EES 332.8 V - 104.4 kWh
Κατάσταση τεκμηρίωσης	SUPPORTING
Αρχείο πηγής	report_2.pdf

Αξιολόγηση: CSA-witnessed module-level UL 9540A report dated 2025-04-24. To report παρέχει module-level fire-propagation evidence και εντάσσεται στο συνολικό UL 9540A evidence chain που χρησιμοποιείται για την αξιολόγηση της M261 fire-safety architecture.

Σύνδεση με NFPA 855: NFPA 855 9.1.5.1.3 requires representative tested modules/units to match intended installation configuration.



CSA GROUP
Laboratory Test Data - UL 9540A

Master Contract: *304186*
Report: *80202418*
Project: *80202418*

April 24, 2025

Mr. Taibing Gong,
Project Manager
ZhongTian Energy Storage Technology Co., Ltd.
No.36,East Hongxing Road,NETDA
Nantong, Jiangsu
226015
China

Subject: *Rechargeable Li-ion Battery Rack, model ZTT Li-Module-EES 332.8V-104.4KWh* (UL 9540A Test Report)

Dear Mr. *Taibing Gong*:

We are pleased to inform you that testing of your product per UL 9540A has been completed. Applicable test(s) was witnessed at facility ChuWeiNeng Testing Technology (Shanghai) Co.Ltd by CSA –Address: Building 3, No.1065 Beihe Highway, Jiading District, Shanghai. Module level of test(s) was conducted on the sample you provided and the results are enclosed in the test report.

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Please examine the enclosed documents and contact me if you have any questions or would like us to make any changes.

On behalf of CSA, I would like to thank you for your business and offer our services for your future needs.

Yours truly,

Marvin Peng
CSA – *CCIC-CSA International Certification Co., Ltd. Kunshan Branch*
2F-1, Building C12, No 555 Dujuan Road, Kunshan Economic & Technical Development Zone, Kunshan, Jiangsu, China 215331

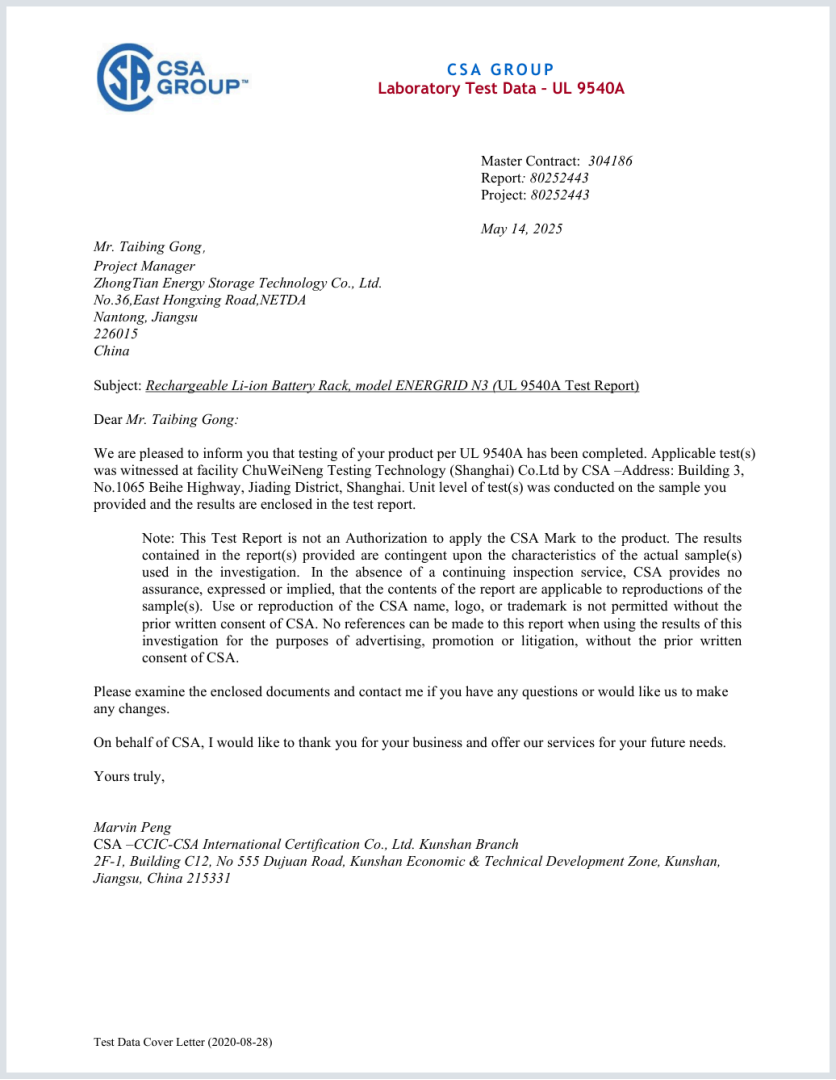
Test Data Cover Letter (2020-08-28)

E13. UL 9540A - Unit Level ENERGRID N3

Επίπεδο / αντικείμενο	Unit fire/explosion test
Φορέας / εκδότης	CSA Group
Πρότυπο / κανονιστική βάση	ANSI/CAN/UL 9540A:2019, 4th Ed.
Certificate / Report No.	80252443
Μοντέλο / ταυτοποίηση	ENERGRID N3
Κατάσταση τεκμηρίωσης	SUPPORTING
Αρχείο πηγής	report_1.pdf

Αξιολόγηση: CSA-witnessed unit-level test report dated 2025-05-14. It is valuable ZTT platform evidence but the tested unit is ENERGRID N3, not M261.

Σύνδεση με NFPA 855: Relevant to NFPA 855 9.1.5, but not an M261-specific unit-level report without accepted equivalency/configuration evidence.



CSA GROUP
Laboratory Test Data - UL 9540A

Master Contract: *304186*
Report: *80252443*
Project: *80252443*

May 14, 2025

Mr. Taibing Gong,
Project Manager
ZhongTian Energy Storage Technology Co., Ltd.
No.36,East Hongxing Road,NETDA
Nantong, Jiangsu
226015
China

Subject: *Rechargeable Li-ion Battery Rack, model ENERGRID N3 (*UL 9540A Test Report)

Dear *Mr. Taibing Gong:*

We are pleased to inform you that testing of your product per UL 9540A has been completed. Applicable test(s) was witnessed at facility ChuWeiNeng Testing Technology (Shanghai) Co.Ltd by CSA –Address: Building 3, No.1065 Beihe Highway, Jiading District, Shanghai. Unit level of test(s) was conducted on the sample you provided and the results are enclosed in the test report.

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Please examine the enclosed documents and contact me if you have any questions or would like us to make any changes.

On behalf of CSA, I would like to thank you for your business and offer our services for your future needs.

Yours truly,

Marvin Peng
CSA –*CCIC-CSA International Certification Co., Ltd. Kunshan Branch*
2F-1, Building C12, No 555 Dujuan Road, Kunshan Economic & Technical Development Zone, Kunshan, Jiangsu, China 215331

Test Data Cover Letter (2020-08-28)

E14. PCS Safety - IEC/EN 62109-1/-2

Επίπεδο / αντικείμενο	PCS component
Φορέας / εκδότης	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Πρότυπο / κανονιστική βάση	IEC/EN 62109-1:2010; IEC/EN 62109-2:2011
Certificate / Report No.	250626018GZU-VOC001
Μοντέλο / ταυτοποίηση	PWS1-125M-EX / PWS1-135M-EX families
Κατάσταση τεκμηρίωσης	COMPONENT
Αρχείο πηγής	PWS1-125M-EX(-R) PWS1-135M-EX(-R) PWS1-135M-MG(-R) 62109-1,-2 Cert.pdf

Αξιολόγηση: Intertek Test Verification of Conformity for bi-directional storage inverter family.

Σύνδεση με NFPA 855: Supports PCS safety; tie to delivered M261 through serial-specific BOM/nameplate.



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Test Verification of Conformity

Verification Number: 250626018GZU-VOC001

On the basis of the tests undertaken, the sample<s> of the below product has been tested by an accredited 3rd party laboratory in accordance to the referenced specification<s>/standard<s> at the time the tests were carried out. This verification is part of the full test report<s> and should be read in conjunction with it <them>.

This document can be used in support of a claim in meeting relevant <EU > legislation and mandatory Conformity Marking. And in accordance with EU / UK law, the claim is the sole obligation of the Manufacturer/ Importer.

Applicant Name & Address:	Shenzhen Sinexcel Electric Co., Ltd. Building 6, BaiWangXin High-tech, Industrial Park, Nanshan District, SHENZHEN Guangdong 518000, CHINA
Manufacturer Name & Address:	Shenzhen Sinexcel Electric Co., Ltd. Building 6, BaiWangXin High-tech, Industrial Park, Nanshan District, SHENZHEN Guangdong 518000, CHINA
Product Description:	Bi-directional Storage Inverter
Ratings & Principal Characteristics:	See Appendix: Test Verification of Conformity
Models/Type References:	PWS1-125M-EX, PWS1-125M-EX-R, PWS1-135M-EX, PWS1-135M-EX-R, PWS1-135M-MG, PWS1-135M-MG-R
Brand Names:	SINEXCEL
Specification<s>/Standards:	IEC/EN 62109-1: 2010 Safety of power converters for use in photovoltaic power systems – Part 1: General requirements IEC/EN 62109-2: 2011 Safety of power converters for use in photovoltaic power systems – Part 2: Particular requirements for inverters
Verification Issuing Office Name & Address:	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch. Room101/301/401/102/202/302/402/502/602/702/802, No. 7-2, Caipin Road, Huangpu District, Guangzhou, Guangdong, China
Date of Tests:	20 August 2025 to 07 September 2025
Test Report Number(s):	250626018GZU-001, 16 September 2025 250626018GZU-002, 16 September 2025

Additional information in Appendix.

Signature

Name: Elly Han
Position: Project Manager
Date: 23 September 2025

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Intertek Page 1 of 3 GFT-OP-11a (14 March 2025)

E15. PCS Safety - EN IEC 62477-1

Επίπεδο / αντικείμενο	PCS component
Φορέας / εκδότης	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Πρότυπο / κανονιστική βάση	EN IEC 62477-1:2023
Certificate / Report No.	250626018GZU-VOC002 / TR 250626018GZU-003
Μοντέλο / ταυτοποίηση	PWS1-125M-EX / PWS1-135M-EX families
Κατάσταση τεκμηρίωσης	COMPONENT
Αρχείο πηγής	PWS1-125M-EX(-R) PWS1-135M-EX(-R) PWS1-135M-MG(-R) 62477 Cert.pdf

Αξιολόγηση: Intertek verification for power electronic converter system safety.

Σύνδεση με NFPA 855: Supports PCS electrical safety and is consistent with the electrical-safety standards declared for the M261 architecture.



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Test Verification of Conformity

Verification Number: 250626018GZU-VOC002

On the basis of the tests undertaken, the sample<s> of the below product has been tested by an accredited 3rd party laboratory in accordance to the referenced specification<s>/standard<s> at the time the tests were carried out. This verification is part of the full test report<s> and should be read in conjunction with it <them>.

This document can be used in support of a claim in meeting relevant <EU > legislation and mandatory Conformity Marking. And in accordance with EU / UK law, the claim is the sole obligation of the Manufacturer/ Importer.

Applicant Name & Address:	Shenzhen Sinexcel Electric Co., Ltd. Building 6, BaiWangXin High-tech, Industrial Park, Nanshan District, SHENZHEN Guangdong 518000, CHINA
Manufacturer Name & Address:	Shenzhen Sinexcel Electric Co., Ltd. Building 6, BaiWangXin High-tech, Industrial Park, Nanshan District, SHENZHEN Guangdong 518000, CHINA
Product Description:	Bi-directional Storage Inverter
Ratings & Principal Characteristics:	See Appendix: Test Verification of Conformity
Models/Type References:	PWS1-125M-EX, PWS1-125M-EX-R, PWS1-135M-EX, PWS1-135M-EX-R, PWS1-135M-MG, PWS1-135M-MG-R
Brand Names:	SINEXCEL
Specification<s>/Standards:	EN IEC 62477-1:2023 Safety requirements for power electronic converter systems and equipment –Part 1: General
Verification Issuing Office Name & Address:	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch. Room101/301/401/102/202/302/402/502/602/702/802, No. 7-2, Caipin Road, Huangpu District, Guangzhou, Guangdong, China
Date of Tests:	20 August 2025 to 07 September 2025
Test Report Number(s):	250626018GZU-003, 16 September 2025

Additional information in Appendix.

Signature

Name: Elly Han
Position: Project Manager
Date: 23 September 2025

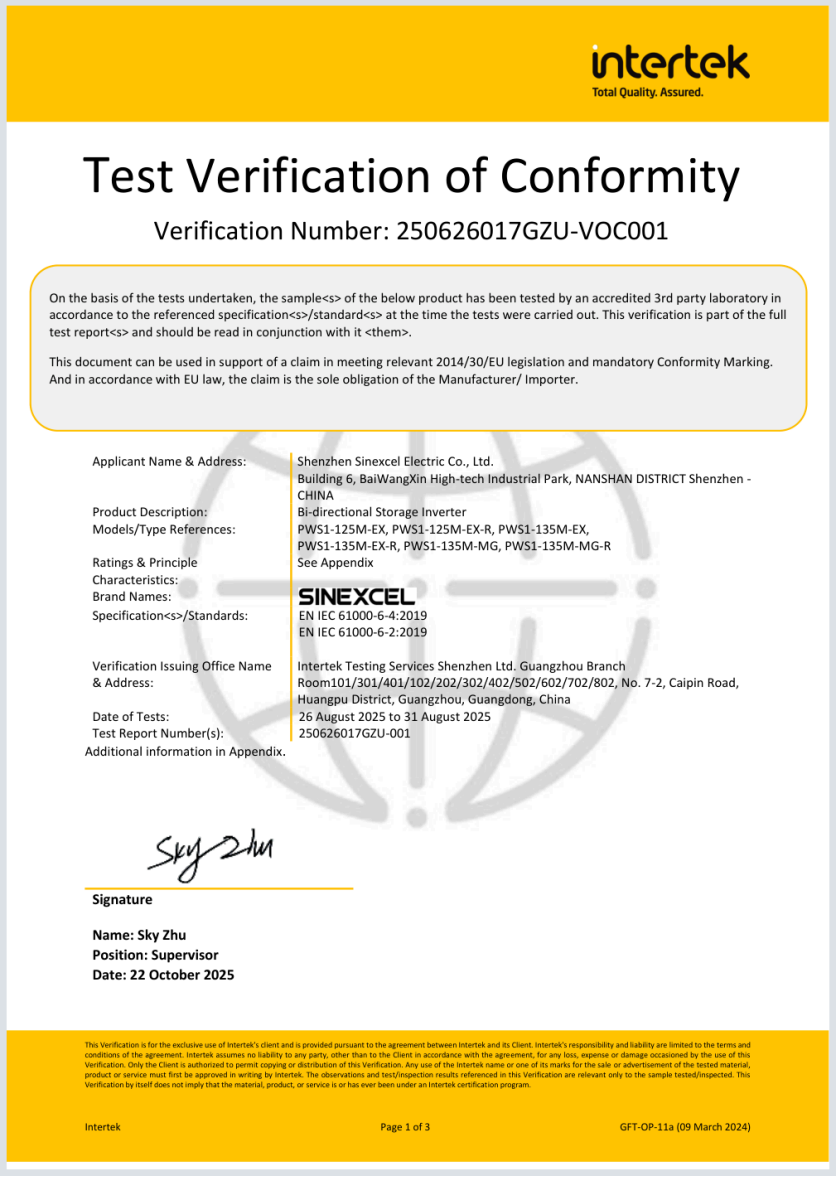
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E16. PCS EMC - Intertek

Επίπεδο / αντικείμενο	PCS component
Φορέας / εκδότης	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Πρότυπο / κανονιστική βάση	EN IEC 61000-6-4:2019; EN IEC 61000-6-2:2019
Certificate / Report No.	250626017GZU-VOC001 / TR 250626017GZU-001
Μοντέλο / ταυτοποίηση	PWS1-135M-EX family
Κατάσταση τεκμηρίωσης	COMPONENT
Αρχείο πηγής	PWS1-125M-EX(-R), PWS1-135M-EX(-R), PWS1-135M-MG(-R) 61000-6-4&-2 CE-EMC Cert.pdf

Αξιολόγηση: Third-party PCS EMC verification supporting EU EMC compliance claim.

Σύνδεση με NFPA 855: Component evidence; M261 also has direct system-level EMC attestation E02.



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Test Verification of Conformity

Verification Number: 250626017GZU-VOC001

On the basis of the tests undertaken, the sample<s> of the below product has been tested by an accredited 3rd party laboratory in accordance to the referenced specification<s>/standard<s> at the time the tests were carried out. This verification is part of the full test report<s> and should be read in conjunction with it <them>.

This document can be used in support of a claim in meeting relevant 2014/30/EU legislation and mandatory Conformity Marking. And in accordance with EU law, the claim is the sole obligation of the Manufacturer/ Importer.

Applicant Name & Address:	Shenzhen Sinexcel Electric Co., Ltd. Building 6, BaiWangXin High-tech Industrial Park, NANSHAN DISTRICT Shenzhen - CHINA
Product Description:	Bi-directional Storage Inverter
Models/Type References:	PWS1-125M-EX, PWS1-125M-EX-R, PWS1-135M-EX, PWS1-135M-EX-R, PWS1-135M-MG, PWS1-135M-MG-R
Ratings & Principle Characteristics:	See Appendix
Brand Names:	SINEXCEL
Specification<s>/Standards:	EN IEC 61000-6-4:2019 EN IEC 61000-6-2:2019
Verification Issuing Office Name & Address:	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Room101/301/401/102/202/302/402/502/602/702/802, No. 7-2, Caipin Road, Huangpu District, Guangzhou, Guangdong, China
Date of Tests:	26 August 2025 to 31 August 2025
Test Report Number(s):	250626017GZU-001

Additional information in Appendix.

Sky Zhu

Signature

Name: Sky Zhu
Position: Supervisor
Date: 22 October 2025

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Intertek Page 1 of 3 GFT-OP-11a (09 March 2024)

E17. PCS Grid Interface - EN 50549-1/-10

Επίπεδο / αντικείμενο	PCS component
Φορέας / εκδότης	TÜV Rheinland LGA Products GmbH
Πρότυπο / κανονιστική βάση	EN 50549-1:2019+A1; EN 50549-10:2022
Certificate / Report No.	AK 50695019 0001 / CN25Y8E2 001
Μοντέλο / ταυτοποίηση	PWS1-125M-EX / PWS1-135M-EX families
Κατάσταση τεκμηρίωσης	COMPONENT
Αρχείο πηγής	PWS1-125M-EX(-R) PWS1-135M-EX(-R) 50549-1-10 Cert.pdf

Αξιολόγηση: Certificate of Conformity; page 2 identifies the models, firmware V1.0 and Type A generation-unit RfG reference.

Σύνδεση με NFPA 855: Grid interconnection evidence; not an NFPA fire-safety certificate.



CERTIFICATE
of Conformity

Registration No.: AK 50695019 0001
Report No.: CN25Y8E2 001
Holder: Shenzhen Sinexcel Electric Co., Ltd.
Building 6, Zone 2, Nanshan Baiwangxin
High-tech Industry Park, No.1002
Songbai Road, Nanshan District,
Shenzhen
518055 Guangdong
P.R. China
Product: Converter
(Power Conversion System)

Type designation listed on the next page

The certificate of conformity refers to the above-mentioned product. This is to certify that the specimen is in conformity with the assessment requirement mentioned on the next page. This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity.

Certification Body

Date: 2025-09-19

A. Chen

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

www.tuv.com

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Precisely Right.

Page **1** of **2**

CERTIFICATE
of Conformity

Registration No.: AK 50695019 0001
Product: Converter
(Power Conversion System)
Tested according to: EN 50549-1:2019+A1
EN 50549-10:2022
Identification: Type Designation
PWS1-125M-EX, PWS1-125M-EX-R,
PWS1-135M-EX, PWS1-135M-EX-R

Firmware Version : V1.0
Compliant to:
-Requirement to Type A Generation Unit.
COMMISSION REGULATION(EU) 2016/631(RfG).
Remark : Refer to test report CN25Y8E2 001 for details.

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

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Page **2** of **2**

E18. PCS Grid Interface - EN 50549-2/-10

Επίπεδο / αντικείμενο	PCS component
Φορέας / εκδότης	TÜV Rheinland LGA Products GmbH
Πρότυπο / κανονιστική βάση	EN 50549-2:2019+A1; EN 50549-10:2022
Certificate / Report No.	AK 50695020 0001 / CN25NMKP 001
Μοντέλο / ταυτοποίηση	PWS1-125M-EX / PWS1-135M-EX families
Κατάσταση τεκμηρίωσης	COMPONENT
Αρχείο πηγής	PWS1-125M-EX(-R) PWS1-135M-EX(-R) 50549-2-10 Cert.pdf

Αξιολόγηση: Certificate of Conformity; page 2 identifies Type B generation-unit RfG reference.

Σύνδεση με NFPA 855: Grid interconnection evidence.



CERTIFICATE
of Conformity

Registration No.: AK 50695020 0001
Report No.: CN25NMKP 001
Holder: Shenzhen Sinexcel Electric Co., Ltd.
Building 6, Zone 2, Nanshan Baiwangxin High-tech Industry Park, No.1002 Songbai Road, Nanshan District, Shenzhen
518055 Guangdong
P.R. China
Product: Converter
(Power Conversion System)

Type designation listed on the next page

The certificate of conformity refers to the above-mentioned product. This is to certify that the specimen is in conformity with the assessment requirement mentioned on the next page. This certificate does not imply assessment of the production of the product and does not permit the use of a TÜV Rheinland mark of conformity.

Certification Body

Date: 2025-09-19

A. Chen

TÜV Rheinland LGA Products GmbH - Tillystraße 2 - 90431 Nürnberg

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Page **1** of **2**

CERTIFICATE
of Conformity

Registration No.: AK 50695020 0001

Product: Converter
(Power Conversion System)

Tested according to: EN 50549-2:2019+A1
EN 50549-10:2022

Identification: Type Designation
PWS1-125M-EX, PWS1-125M-EX-R,
PWS1-135M-EX, PWS1-135M-EX-R

Firmware Version : V1.0
Compliant to:
-Requirement to Type B Generation Unit.
COMMISSION REGULATION(EU) 2016/631(RfG).
Remark : Refer to test report CN25NMKP 001 for details.

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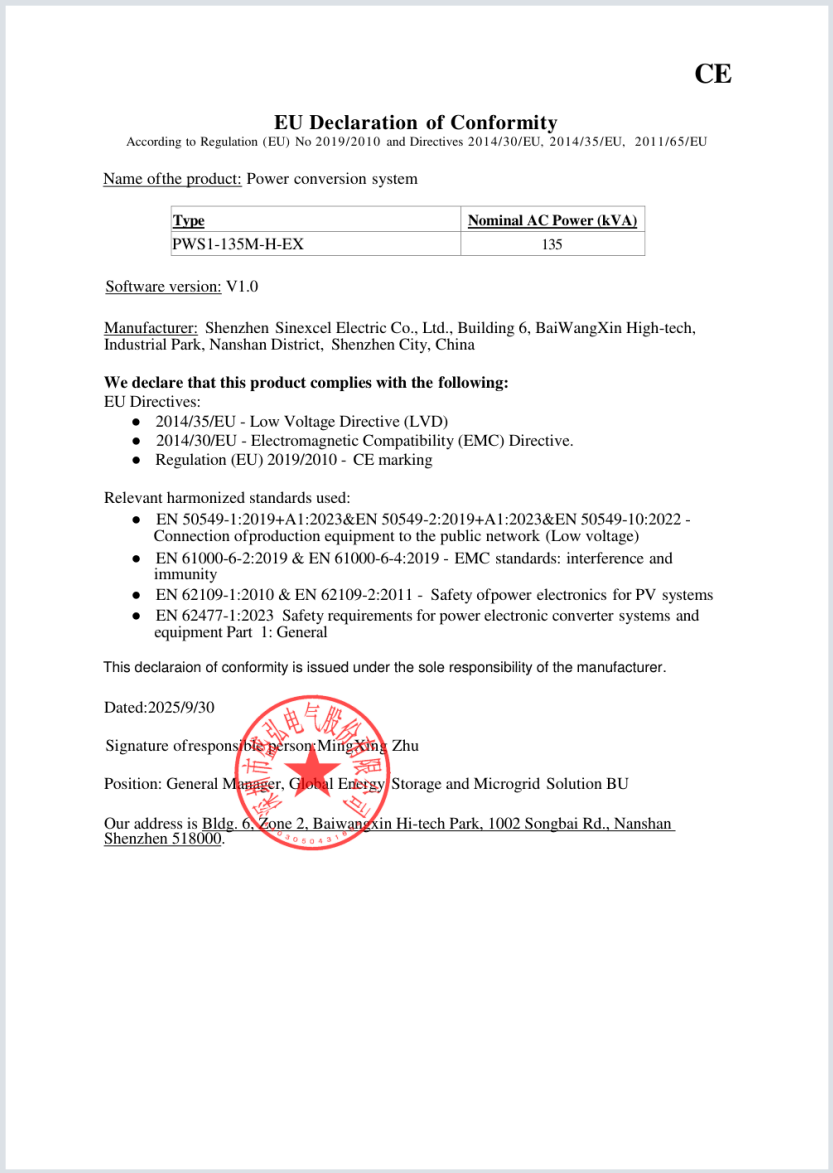
Page **2** of **2**

E19. PCS EU Declaration of Conformity

Επίπεδο / αντικείμενο	PCS component
Φορέας / εκδότης	Shenzhen Sinexcel Electric Co., Ltd.
Πρότυπο / κανονιστική βάση	LVD 2014/35/EU; EMC 2014/30/EU; EN 50549; EN 61000; EN 62109; EN 62477-1
Certificate / Report No.	Manufacturer DoC dated 2025-09-30
Μοντέλο / ταυτοποίηση	PWS1-135M-H-EX
Κατάσταση τεκμηρίωσης	COMPONENT
Αρχείο πηγής	CE_Declaration_of_Conformity_PWS1-135M-H-EX_已签章.pdf

Αξιολόγηση: Manufacturer EU Declaration of Conformity for 135 kVA PCS variant.

Σύνδεση με NFPA 855: Provides CE technical-file evidence supporting the PCS electrical-safety framework documented for the M261 architecture.



CE

EU Declaration of Conformity

According to Regulation (EU) No 2019/2010 and Directives 2014/30/EU, 2014/35/EU, 2011/65/EU

Name ofthe product: Power conversion system

Type	Nominal AC Power (kVA)
PWS1-135M-H-EX	135

Software version: V1.0

Manufacturer: Shenzhen Sinexcel Electric Co., Ltd., Building 6, BaiWangXin High-tech, Industrial Park, Nanshan District, Shenzhen City, China

We declare that this product complies with the following:

EU Directives:

- 2014/35/EU - Low Voltage Directive (LVD)
- 2014/30/EU - Electromagnetic Compatibility (EMC) Directive.
- Regulation (EU) 2019/2010 - CE marking

Relevant harmonized standards used:

- EN 50549-1:2019+A1:2023&EN 50549-2:2019+A1:2023&EN 50549-10:2022 - Connection ofproduction equipment to the public network (Low voltage)
- EN 61000-6-2:2019 & EN 61000-6-4:2019 - EMC standards: interference and immunity
- EN 62109-1:2010 & EN 62109-2:2011 - Safety ofpower electronics for PV systems
- EN 62477-1:2023 Safety requirements for power electronic converter systems and equipment Part 1: General

This declaraion of conformity is issued under the sole responsibility of the manufacturer.

Dated:2025/9/30

Signature ofresponsible person:MingXing Zhu

Position: General Manager, Global Energy Storage and Microgrid Solution BU

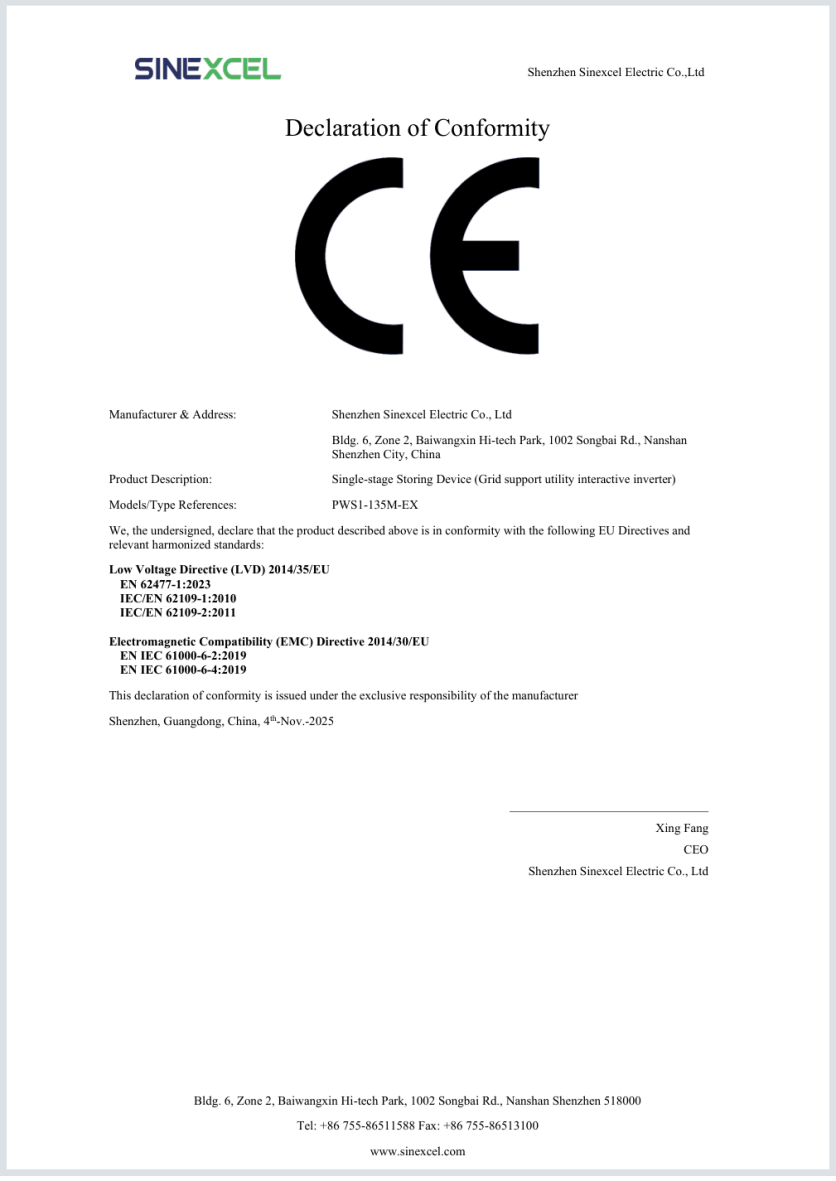
Our address is Bldg. 6, Zone 2, Baiwangxin Hi-tech Park, 1002 Songbai Rd., Nanshan Shenzhen 518000.

E20. PCS Declaration of Conformity - PWS1-135M-EX

Επίπεδο / αντικείμενο	PCS component
Φορέας / εκδότης	Shenzhen Sinexcel Electric Co., Ltd.
Πρότυπο / κανονιστική βάση	LVD 2014/35/EU; EMC 2014/30/EU; EN 62477-1; EN 62109; EN 61000
Certificate / Report No.	Manufacturer DoC dated 2025-11-04
Μοντέλο / ταυτοποίηση	PWS1-135M-EX
Κατάσταση τεκμηρίωσης	COMPONENT
Αρχείο πηγής	PWS1-135M-EX Declaration of conformity 20251106.pdf

Αξιολόγηση: Manufacturer declaration specifically for PWS1-135M-EX.

Σύνδεση με NFPA 855: Supports CE dossier for the PCS component.



SINEXCEL

Shenzhen Sinexcel Electric Co.,Ltd

Declaration of Conformity

CE

Manufacturer & Address:	Shenzhen Sinexcel Electric Co., Ltd Bldg. 6, Zone 2, Baiwangxin Hi-tech Park, 1002 Songbai Rd., Nanshan Shenzhen City, China
Product Description:	Single-stage Storing Device (Grid support utility interactive inverter)
Models/Type References:	PWS1-135M-EX

We, the undersigned, declare that the product described above is in conformity with the following EU Directives and relevant harmonized standards:

Low Voltage Directive (LVD) 2014/35/EU
EN 62477-1:2023
IEC/EN 62109-1:2010
IEC/EN 62109-2:2011

Electromagnetic Compatibility (EMC) Directive 2014/30/EU
EN IEC 61000-6-2:2019
EN IEC 61000-6-4:2019

This declaration of conformity is issued under the exclusive responsibility of the manufacturer

Shenzhen, Guangdong, China, 4th-Nov.-2025

Xing Fang
CEO
Shenzhen Sinexcel Electric Co., Ltd

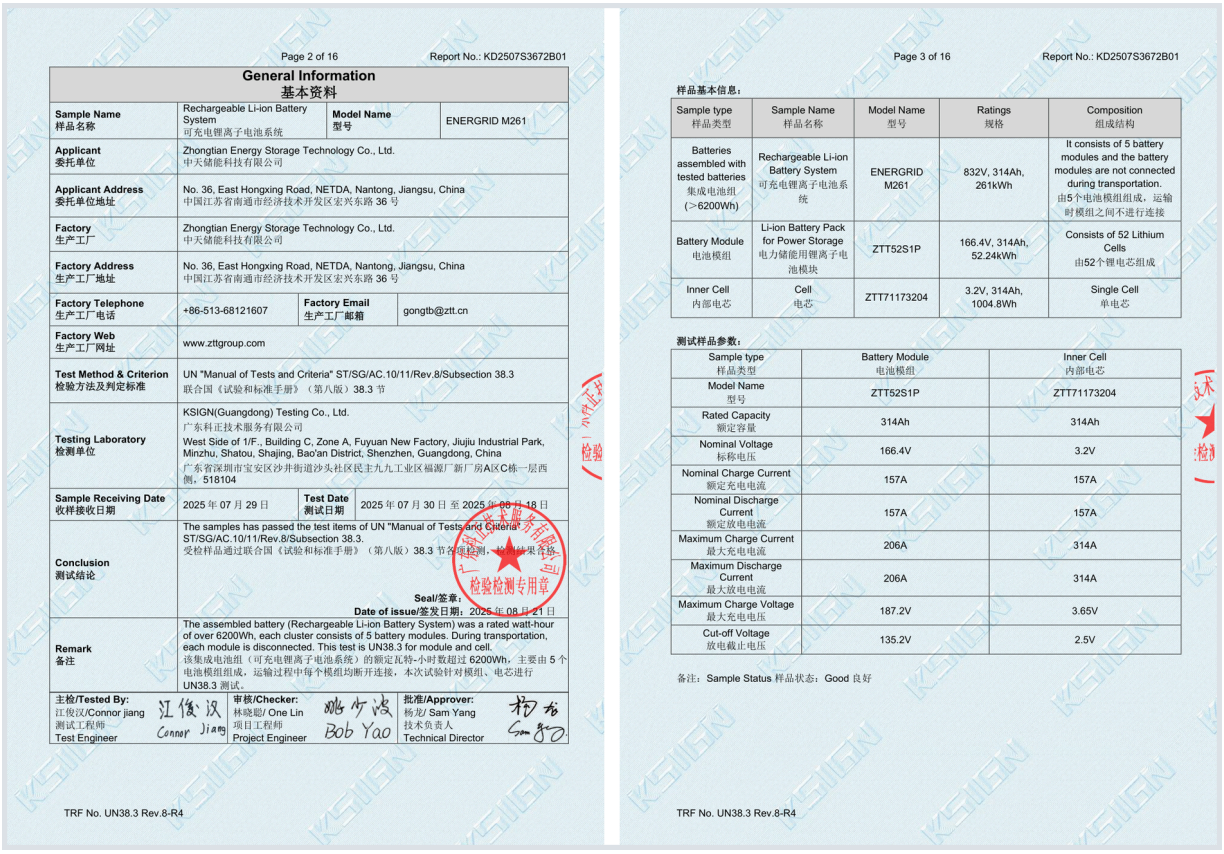
Bldg. 6, Zone 2, Baiwangxin Hi-tech Park, 1002 Songbai Rd., Nanshan Shenzhen 518000
Tel: +86 755-86511588 Fax: +86 755-86513100
www.sinexcel.com

E21. UN 38.3 - ENERGRID M261

Επίπεδο / αντικείμενο	Complete battery system / transport
Φορέας / εκδότης	KSIGN (Guangdong) Testing Co., Ltd.
Πρότυπο / κανονιστική βάση	UN Manual of Tests and Criteria, Rev.8, Subsection 38.3
Certificate / Report No.	KD2507S3672B01
Μοντέλο / ταυτοποίηση	ENERGRID M261
Κατάσταση τεκμηρίωσης	DIRECT
Αρχείο πηγής	UN38.3_ENERGRID M261_KD2507S3672B01.pdf

Αξιολόγηση: Report identifies M261 and records overall conclusion that samples passed the UN 38.3 test items.

Σύνδεση με NFPA 855: Transport safety evidence; separate from NFPA installation compliance.



General Information 基本资料

Sample Name 样品名称	Rechargeable Li-ion Battery System 可充电锂离子电池系统	**Model Name 型号**	ENERGRID M261
Applicant 委托单位	Zhongtian Energy Storage Technology Co., Ltd. 中天储能科技有限公司		
Applicant Address 委托单位地址	No. 36, East Hongxing Road, NETDA, Nantong, Jiangsu, China 中国江苏省南通市经济技术开发区宏兴东路 36 号		
Factory 生产工厂	Zhongtian Energy Storage Technology Co., Ltd. 中天储能科技有限公司		
Factory Address 生产工厂地址	No. 36, East Hongxing Road, NETDA, Nantong, Jiangsu, China 中国江苏省南通市经济技术开发区宏兴东路 36 号		
Factory Telephone 生产工厂电话	+86-513-68121607	**Factory Email 生产工厂邮箱**	gongtb@ztt.cn
Factory Web 生产工厂网址	www.zttgroup.com		
Test Method & Criterion 检验方法及判定标准	UN "Manual of Tests and Criteria" ST/SG/AC.10/11/Rev.8/Subsection 38.3 联合国《试验和标准手册》（第八版）38.3 节		
Testing Laboratory 检测单位	KSIGN(Guangdong) Testing Co., Ltd. 广东科正技术服务有限公司 West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China 广东省深圳市宝安区沙井街道沙头社区民主九九工业区福源厂新厂房A区C栋一层西侧，518104		
Sample Receiving Date 收样接收日期	2025 年 07 月 29 日	**Test Date 测试日期**	2025 年 07 月 30 日 至 2025 年 08 月 18 日
Conclusion 测试结论	The samples has passed the test items of UN "Manual of Tests and Criteria" ST/SG/AC.10/11/Rev.8/Subsection 38.3. 受检样品通过联合国《试验和标准手册》（第八版）38.3 节各项检测，检测结果合格。 Seal/签章： Date of issue/签发日期：2025 年 08 月 21 日		
Remark 备注	The assembled battery (Rechargeable Li-ion Battery System) was a rated watt-hour of over 6200Wh, each cluster consists of 5 battery modules. During transportation, each module is disconnected. This test is UN38.3 for module and cell. 该集成电池组（可充电锂离子电池系统）的额定瓦特-小时数超过 6200Wh，主要由 5 个电池模组组成，运输过程中每个模组均断开连接，本次试验针对模组、电芯进行 UN38.3 测试。		

主检/Tested By: 江俊汉/Connor jiang 测试工程师 Test Engineer	**审核/Checker:** 林晓聪/ One Lin 项目工程师 Project Engineer	**批准/Approver:** 杨龙/ Sam Yang 技术负责人 Technical Director

TRF No. UN38.3 Rev.8-R4

样品基本信息：

Sample type 样品类型	Sample Name 样品名称	Model Name 型号	Ratings 规格	Composition 组成结构
Batteries assembled with tested batteries 集成电池组 (>6200Wh)	Rechargeable Li-ion Battery System 可充电锂离子电池系统	ENERGRID M261	832V, 314Ah, 261kWh	It consists of 5 battery modules and the battery modules are not connected during transportation. 由5个电池模组组成，运输时模组之间不进行连接
Battery Module 电池模组	Li-ion Battery Pack for Power Storage 电力储能用锂离子电池模块	ZTT52S1P	166.4V, 314Ah, 52.24kWh	Consists of 52 Lithium Cells 由52个锂电芯组成
Inner Cell 内部电芯	Cell 电芯	ZTT71173204	3.2V, 314Ah, 1004.8Wh	Single Cell 单电芯

测试样品参数：

Sample type 样品类型	Battery Module 电池模组	Inner Cell 内部电芯
Model Name 型号	ZTT52S1P	ZTT71173204
Rated Capacity 额定容量	314Ah	314Ah
Nominal Voltage 标称电压	166.4V	3.2V
Nominal Charge Current 额定充电电流	157A	157A
Nominal Discharge Current 额定放电电流	157A	157A
Maximum Charge Current 最大充电电流	206A	314A
Maximum Discharge Current 最大放电电流	206A	314A
Maximum Charge Voltage 最大充电电压	187.2V	3.65V
Cut-off Voltage 放电截止电压	135.2V	2.5V

备注：Sample Status 样品状态：Good 良好

TRF No. UN38.3 Rev.8-R4

E22. MSDS - ENERGRID M261

Επίπεδο / αντικείμενο	Complete battery system / hazardous materials
Φορέας / εκδότης	Technical service laboratory
Πρότυπο / κανονιστική βάση	Material Safety Data Sheet
Certificate / Report No.	KD2507S3672B04
Μοντέλο / ταυτοποίηση	ENERGRID M261
Κατάσταση τεκμηρίωσης	DIRECT
Αρχείο πηγής	MSDS _ENERGRID M261_KD2507S3672B04.pdf

Αξιολόγηση: M261-specific MSDS for Rechargeable Li-ion Battery System.

Σύνδεση με NFPA 855: Supports NFPA 855 emergency/O&M documentation and responder information.



材料安全数据表

MATERIAL SAFETY DATA SHEET

产品名称 Goods Name	:	可充电锂离子电池系统 Rechargeable Li-ion Battery System
型号 Model Name	:	ENERGRID M261
委托单位 Applicant	:	中天储能科技有限公司 Zhongtian Energy Storage Technology Co., Ltd.
报告编号 Report Number	:	KD2507S3672B04
发行日期 Issue Date	:	August 21, 2025

（制作：绞雄风） Written by: 绞雄风　　（批准：杨龙） Approved by: 杨龙

广东科正技术服务有限公司
KSIGN(Guangdong) Testing Co., Ltd.

KSIGN(Guangdong) Testing Co., Ltd. 广东科正技术服务有限公司 TRF No. MSDS-R3
West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China 广东省深圳市宝安区沙井街道沙头社区民主九九工业区福源厂新厂房 A 区 C 栋一层西侧、518104
Tel.: +(86) 0755-2985 2678 Fax: +(86) 0755-2985 2397 E-mail: info@gdksign.cn http:www.gdksign.com Page 1 of 11

E23. RoHS Test Report - Cell 314 Ah

Επίπεδο / αντικείμενο	Cell / material compliance
Φορέας / εκδότης	Bureau Veritas
Πρότυπο / κανονιστική βάση	RoHS chemical testing
Certificate / Report No.	(9325)224-0739-R1
Μοντέλο / ταυτοποίηση	ZTT71173204
Κατάσταση τεκμηρίωσης	COMPONENT
Αρχείο πηγής	4--RoHS Test Report-Cell 314.pdf

Αξιολόγηση: Material compliance evidence for the cell model.

Σύνδεση με NFPA 855: Not an NFPA fire/explosion certificate; supports wider EU/environmental technical file.

BUREAU VERITAS

TEST REPORT
测试报告

LAB NO. 报告号码 : **(9325)224-0739-R1**
DATE 完成日期 : **Aug 27, 2025**
PAGE 页码 : **1 OF 12**

The report is amendment of and supersedes the previous report (9325)224-0739 dated Aug 22, 2025

APPLICANT 申请人公司名称	:	**ZHONGTIAN ENERGY STORAGE TECHNOLOGY CO., LTD.** NO.36, EAST HONGXING ROAD, NETDA, NANTONG, JIANGSU, CHINA 中天储能科技有限公司 江苏省南通经济技术开发区宏兴东路 36 号
CONTACT PERSON 联系人名称	:	徐婧瑶
DATE OF SUBMISSION 样品收取日期	:	Aug 12, 2025 2025 年 8 月 12 日
TEST PERIOD 所需工作周期	:	Aug 12, 2025to Aug 21, 2025 2025 年 8 月 12 日至 2025 年 8 月 21 日
SAMPLE DESCRIPTION 样品描述	:	锂离子电芯
Color: 颜色		银色
Style No/ Model no.: 款号		ZTT71173204
P.O. No.: 订单号		/
Country of Origin: 来源地		/
Country of Destination: 目的地		/
BURER 买家	:	/
MANUFACTURER 制造商	:	ZHONGTIAN ENERGY STORAGE TECHNOLOGY CO., LTD. NO.36, EAST HONGXING ROAD, NETDA, NANTONG, JIANGSU, CHINA 中天储能科技有限公司 江苏省南通经济技术开发区宏兴东路 36 号

RW

Bureau Veritas Consumer Products Services (Guangzhou) Co., Ltd
No. 183, Shinan Road, Meilin Plaza, Dongchong, Nansha, Guangzhou, Guangdong Province, China 511453
Tel: (86) 20 2290 2088 Fax: (86) 20 3490 9303
Email: BVCPS_pyinfo@bureauveritas.com
Website: cps.bureauveritas.com

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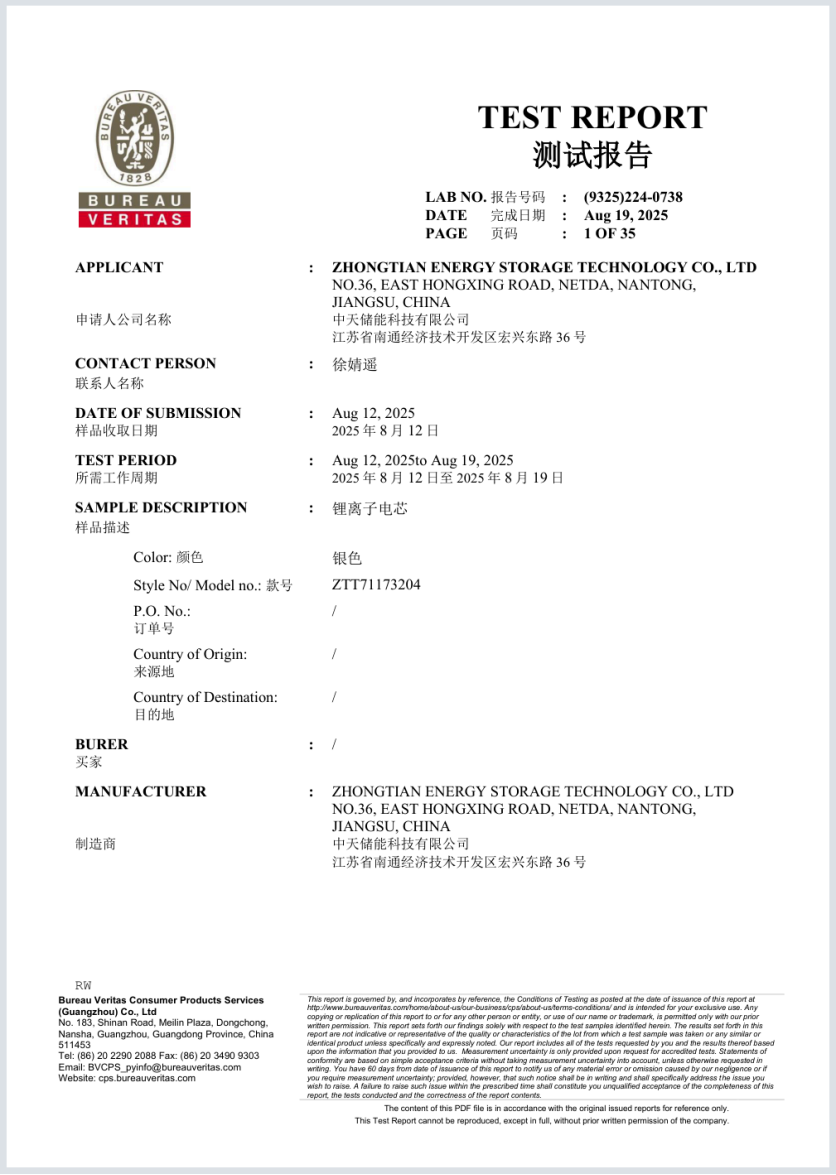
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E24. REACH Test Report - Cell 314 Ah

Επίπεδο / αντικείμενο	Cell / chemical compliance
Φορέας / εκδότης	Bureau Veritas
Πρότυπο / κανονιστική βάση	REACH chemical testing
Certificate / Report No.	(9325)224-0738
Μοντέλο / ταυτοποίηση	ZTT71173204
Κατάσταση τεκμηρίωσης	COMPONENT
Αρχείο πηγής	5--REACH Test Report-Cell 314.pdf

Αξιολόγηση: Chemical compliance evidence for the cell model.

Σύνδεση με NFPA 855: Not an NFPA fire/explosion certificate.



BUREAU VERITAS

TEST REPORT
测试报告

LAB NO. 报告号码 : **(9325)224-0738**
DATE 完成日期 : **Aug 19, 2025**
PAGE 页码 : **1 OF 35**

APPLICANT : **ZHONGTIAN ENERGY STORAGE TECHNOLOGY CO., LTD**
NO.36, EAST HONGXING ROAD, NETDA, NANTONG, JIANGSU, CHINA
申请人公司名称
中天储能科技有限公司
江苏省南通经济技术开发区宏兴东路 36 号

CONTACT PERSON : 徐婧遥
联系人名称

DATE OF SUBMISSION : Aug 12, 2025
样品收取日期
2025 年 8 月 12 日

TEST PERIOD : Aug 12, 2025to Aug 19, 2025
所需工作周期
2025 年 8 月 12 日至 2025 年 8 月 19 日

SAMPLE DESCRIPTION : 锂离子电芯
样品描述

Color: 颜色 银色
Style No/ Model no.: 款号 ZTT71173204
P.O. No.: 订单号 /
Country of Origin: 来源地 /
Country of Destination: 目的地 /

BURER : /
买家

MANUFACTURER : ZHONGTIAN ENERGY STORAGE TECHNOLOGY CO., LTD
NO.36, EAST HONGXING ROAD, NETDA, NANTONG, JIANGSU, CHINA
制造商
中天储能科技有限公司
江苏省南通经济技术开发区宏兴东路 36 号

RW

Bureau Veritas Consumer Products Services (Guangzhou) Co., Ltd
No. 183, Shinan Road, Meilin Plaza, Dongchong, Nansha, Guangzhou, Guangdong Province, China 511453
Tel: (86) 20 2290 2088 Fax: (86) 20 3490 9303
Email: BVCPS_pyinfo@bureauveritas.com
Website: cps.bureauveritas.com

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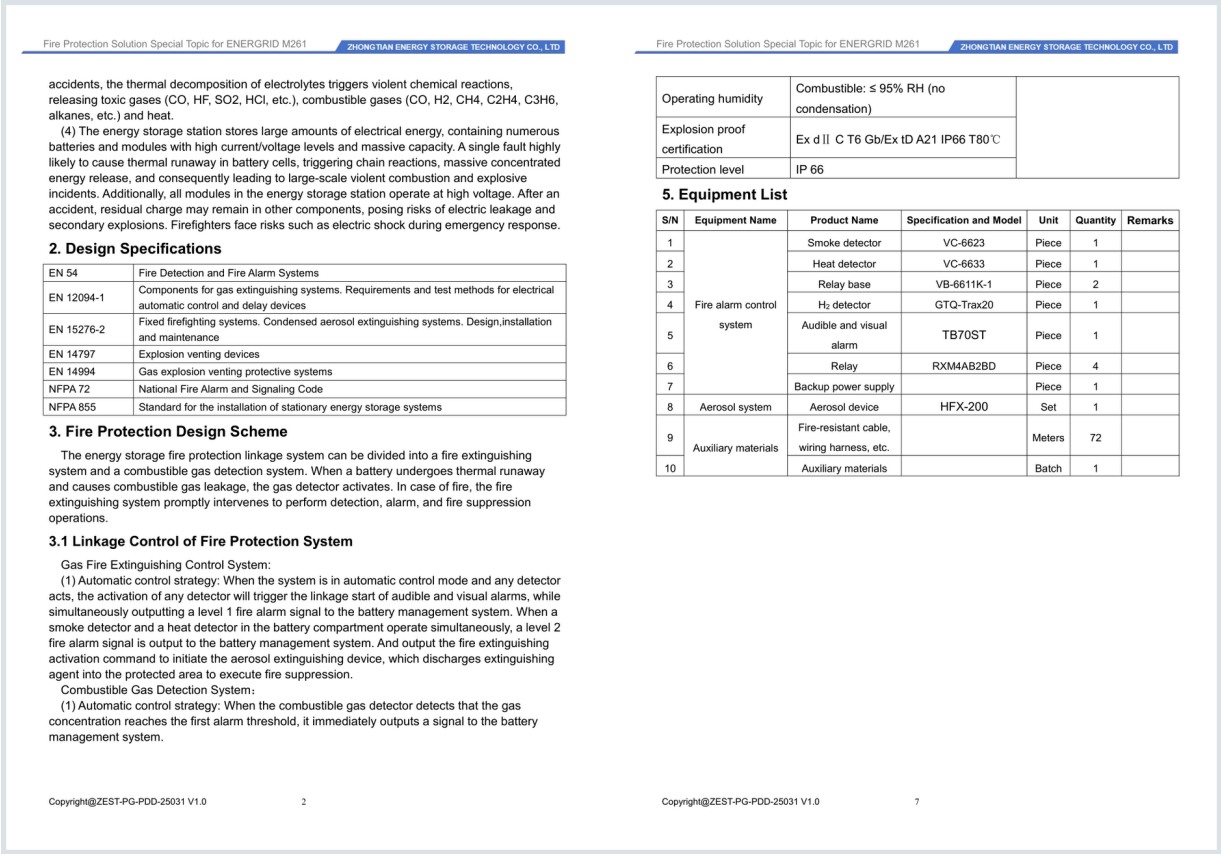
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E25. M261 Fire Protection Solution

Επίπεδο / αντικείμενο	Complete ESS fire subsystem
Φορέας / εκδότης	ZTT / ZEST engineering
Πρότυπο / κανονιστική βάση	EN 54; EN 12094-1; EN 15276-2; EN 14797; EN 14994; NFPA 72; NFPA 855
Certificate / Report No.	ZEST-PG-PDD-25031 V1.0
Μοντέλο / ταυτοποίηση	ENERGRID M261
Κατάσταση τεκμηρίωσης	DIRECT
Αρχείο πηγής	03 Fire Fighting System for ENERGRID M261 V1.0.pdf

Αξιολόγηση: M261-specific engineering document defining detection, alarm, aerosol extinguishing, H2 detection and component list.

Σύνδεση με NFPA 855: Directly relevant to NFPA 855 detection, suppression and explosion/gas mitigation design and supports the documented fire-safety architecture of the M261.



accidents, the thermal decomposition of electrolytes triggers violent chemical reactions, releasing toxic gases (CO, HF, SO2, HCl, etc.), combustible gases (CO, H2, CH4, C2H4, C3H6, alkanes, etc.) and heat.

(4) The energy storage station stores large amounts of electrical energy, containing numerous batteries and modules with high current/voltage levels and massive capacity. A single fault highly likely to cause thermal runaway in battery cells, triggering chain reactions, massive concentrated energy release, and consequently leading to large-scale violent combustion and explosive incidents. Additionally, all modules in the energy storage station operate at high voltage. After an accident, residual charge may remain in other components, posing risks of electric leakage and secondary explosions. Firefighters face risks such as electric shock during emergency response.

2. Design Specifications

EN 54	Fire Detection and Fire Alarm Systems
EN 12094-1	Components for gas extinguishing systems. Requirements and test methods for electrical automatic control and delay devices
EN 15276-2	Fixed firefighting systems. Condensed aerosol extinguishing systems. Design,installation and maintenance
EN 14797	Explosion venting devices
EN 14994	Gas explosion venting protective systems
NFPA 72	National Fire Alarm and Signaling Code
NFPA 855	Standard for the installation of stationary energy storage systems

3. Fire Protection Design Scheme

The energy storage fire protection linkage system can be divided into a fire extinguishing system and a combustible gas detection system. When a battery undergoes thermal runaway and causes combustible gas leakage, the gas detector activates. In case of fire, the fire extinguishing system promptly intervenes to perform detection, alarm, and fire suppression operations.

3.1 Linkage Control of Fire Protection System

Gas Fire Extinguishing Control System:

(1) Automatic control strategy: When the system is in automatic control mode and any detector acts, the activation of any detector will trigger the linkage start of audible and visual alarms, while simultaneously outputting a level 1 fire alarm signal to the battery management system. When a smoke detector and a heat detector in the battery compartment operate simultaneously, a level 2 fire alarm signal is output to the battery management system. And output the fire extinguishing activation command to initiate the aerosol extinguishing device, which discharges extinguishing agent into the protected area to execute fire suppression.

Combustible Gas Detection System:

(1) Automatic control strategy: When the combustible gas detector detects that the gas concentration reaches the first alarm threshold, it immediately outputs a signal to the battery management system.

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Operating humidity	Combustible: ≤ 95% RH (no condensation)	
Explosion proof certification	Ex d Ⅱ C T6 Gb/Ex tD A21 IP66 T80℃	
Protection level	IP 66	

5. Equipment List

S/N	Equipment Name	Product Name	Specification and Model	Unit	Quantity	Remarks
1	Fire alarm control system	Smoke detector	VC-6623	Piece	1	
2		Heat detector	VC-6633	Piece	1	
3		Relay base	VB-6611K-1	Piece	2	
4		H_2 detector	GTQ-Trax20	Piece	1	
5		Audible and visual alarm	TB70ST	Piece	1	
6		Relay	RXM4AB2BD	Piece	4	
7		Backup power supply		Piece	1	
8	Aerosol system	Aerosol device	HFX-200	Set	1	
9	Auxiliary materials	Fire-resistant cable, wiring harness, etc.		Meters	72	
10		Auxiliary materials		Batch	1	

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E26. GTQ-Trax20 Gas Detector Compliance

Επίπεδο / αντικείμενο	Fire subsystem component
Φορέας / εκδότης	Component manufacturer / conformity documentation
Πρότυπο / κανονιστική βάση	CE / explosive-atmosphere and gas detector compliance as documented
Certificate / Report No.	05 FGD-Trax20 CE Compliance
Μοντέλο / ταυτοποίηση	GTQ-Trax20
Κατάσταση τεκμηρίωσης	COMPONENT
Αρχείο πηγής	05 FGD-Trax20 CE Compliance.pdf

Αξιολόγηση: Component evidence for the combustible gas/H2 detector included in the M261 fire equipment list.

Σύνδεση με NFPA 855: Supports gas-detection element of NFPA 855 protection architecture.



Attestation of Compliance

Reference No. : LCS211104042AE

Applicant : Intersense Safety Fire System (Shanghai) Co. Ltd.

Address : 4th Floor, Block 6, No. 1355, Chengbei Road, Jiading District, Shanghai

Trade Mark : N/A

Product : Fixed Gas Detector

Model : GTQ-Trax20

Tested according to : EN 50270:2015

The submitted products have been tested by us with the listed standards.

This Attestation of Compliance is issued according to the council Directive 2014/30/EU, Referred to as the Electromagnetic Compatibility. It confirms that the listed product complies with all essential requirements of the EMC directive and applies only to the sample and its technical documentation submitted to Shenzhen LCS Compliance Testing Laboratory Ltd. for testing.

After preparation of the necessary technical documentation as well as the EC conformity declaration the required CE marking can be affixed on the product.Other relevant Directives have to be observed.

CE

LCS TESTING LABORATORY APPROVED Manager

Date of issue: November 24, 2021

Shenzhen LCS Compliance Testing Laboratory Ltd.
Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China
Tel: (86)0755-82591330 Fax: (86)0755-82591332
Http://www.lcs-cert.com Email: webmaster@lcs-cert.com

扫码查询真伪 Scan,Query authenticity

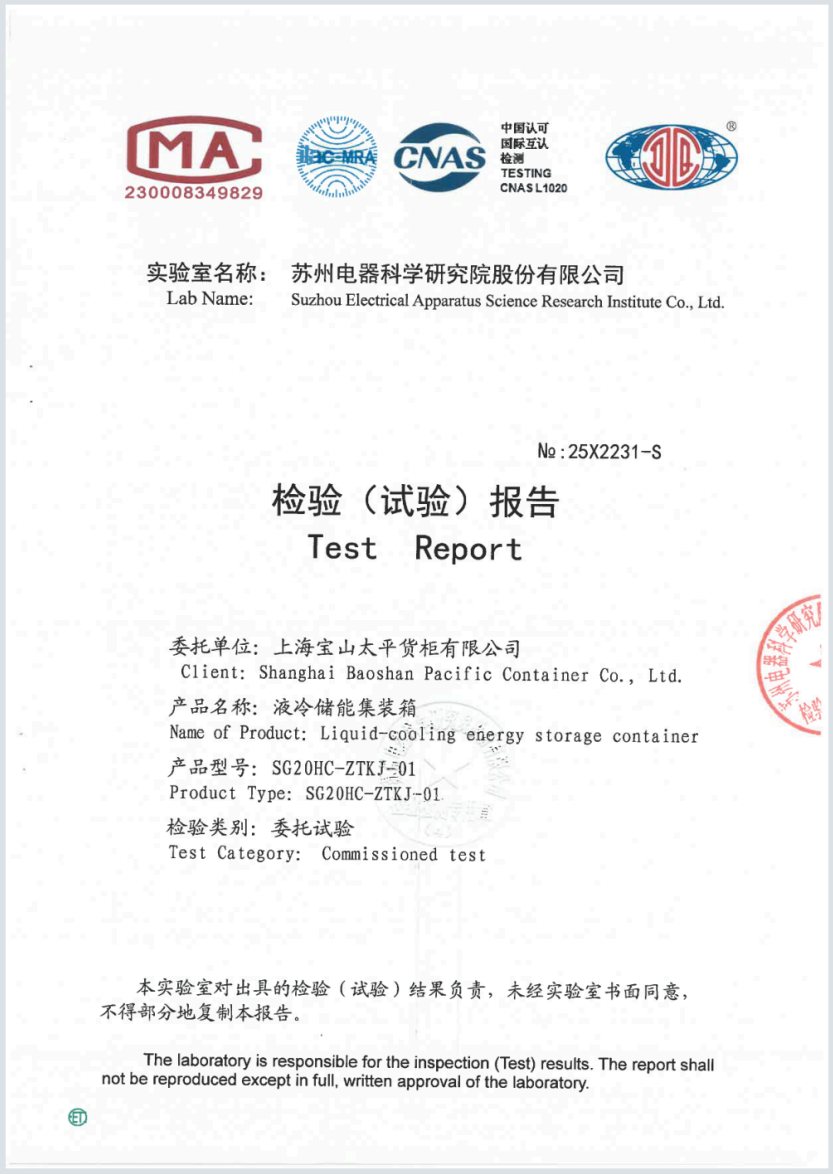
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E27. IP54 Test Evidence - ENERGRID N3

Επίπεδο / αντικείμενο	Enclosure / environmental
Φορέας / εκδότης	Third-party laboratory
Πρότυπο / κανονιστική βάση	IEC 60529 / IP54 evidence
Certificate / Report No.	12--IP54-ENERGRID N3 EN
Μοντέλο / ταυτοποίηση	ENERGRID N3
Κατάσταση τεκμηρίωσης	SUPPORTING
Αρχείο πηγής	12--IP54-ENERGRID N3 EN.pdf

Αξιολόγηση: The supplied third-party IP54 report is for ENERGRID N3. The M261 datasheet independently declares IP54. Together, these documents provide the enclosure-protection evidence used in this dossier for the M261 IP54 rating.

Σύνδεση με NFPA 855: Environmental protection evidence; not a direct NFPA listing item.



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中国认可
国际互认
检测
TESTING
CNAS L1020

实验室名称： 苏州电器科学研究院股份有限公司
Lab Name: Suzhou Electrical Apparatus Science Research Institute Co., Ltd.

№:25X2231-S

检验（试验）报告
Test Report

委托单位：上海宝山太平货柜有限公司
Client: Shanghai Baoshan Pacific Container Co., Ltd.
产品名称：液冷储能集装箱
Name of Product: Liquid-cooling energy storage container
产品型号：SG20HC-ZTKJ-01
Product Type: SG20HC-ZTKJ-01
检验类别：委托试验
Test Category: Commissioned test

本实验室对出具的检验（试验）结果负责，未经实验室书面同意，不得部分地复制本报告。

The laboratory is responsible for the inspection (Test) results. The report shall not be reproduced except in full, written approval of the laboratory.

E28. C5-H Coating System Test

Επίπεδο / αντικείμενο	Coating / corrosion
Φορέας / εκδότης	Marine Coatings Quality Supervision and Test Center of Chemical Industry
Πρότυπο / κανονιστική βάση	ISO 12944-6:2018 C5-H
Certificate / Report No.	TW 231124
Μοντέλο / ταυτοποίηση	Jotamastic 80 + Jotamastic 80 + Futura Classic RAL 7035
Κατάσταση τεκμηρίωσης	SUPPORTING
Αρχείο πηγής	13--C5-H Testing Report_ISO 12944-6_EN.pdf

Αξιολόγηση: Testing conclusion PASS for the specified coating system under C5-H requirements. This evidence supports the C5 anti-corrosion declaration of the M261 datasheet and the coating-system durability basis used in this dossier.

Σύνδεση με NFPA 855: Supports outdoor environmental durability, not NFPA fire listing.

化学工业海洋涂料质量监督检验中心

Marine Coatings Quality Supervision and Test Center of Chemical Industry

检 测 报 告

Testing Report

No:TW 231124

样品名称 Sample Name	涂层体系（Jotamastic 80 125μm + Jotamastic 80 125μm + Futura Classic Ral 7035 50μm） Coating System (Jotamastic 80 125μm + Jotamastic 80 125μm + Futura Classic Ral 7035 50μm)	商 标 Trademark	/
委托单位地址 Address of Entrusting Corporation	江苏省张家港保税区扬子江化学工业园南海路39号 No. 39 Nanhai Road, Jiangsu Yangtze River International Chemical Industry Park, Zhangjiagang Free Trade Zone, Jiangsu 215634, China	批 号 Batch Number	/
样品生产单位 Manufacturer	佐敦涂料（张家港）有限公司 Jotun Coatings(Zhangjiagang) Co., Ltd.	到样日期 Sample Receiving Date	2023-10-07
样品状态 Sample Description	9块样板，表面平整光滑。 9 PCS prepared panels, flat and smooth surface.		
检测依据 Test Standards	ISO 12944-6：2018色漆和清漆—防护涂料体系对钢结构的防腐蚀保护—第6 部分：实验室性能测试方法 ISO 12944-6：2018 Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Part 6:Laboratory performance test methods		
检测项目 Test Items	共3项：1.附着力 2.冷凝试验 3.耐中性盐雾试验 Total 3: 1.Pull-off test 2.Water condensation 3.Salt spray test		
检测日期 Testing Period	2023-10-07 - 2023-12-22		
检测结论 Conclusion	测试结果符合：ISO 12944-6：2018腐蚀等级C5-H的技术指标要求，检测结论为合格。 Testing results meet the requirement of ISO 12944-6: 2018 C5-H, testing conclusion is PASS. 签发日期/Issued date: 2024年02月21日		
备注 Remarks			

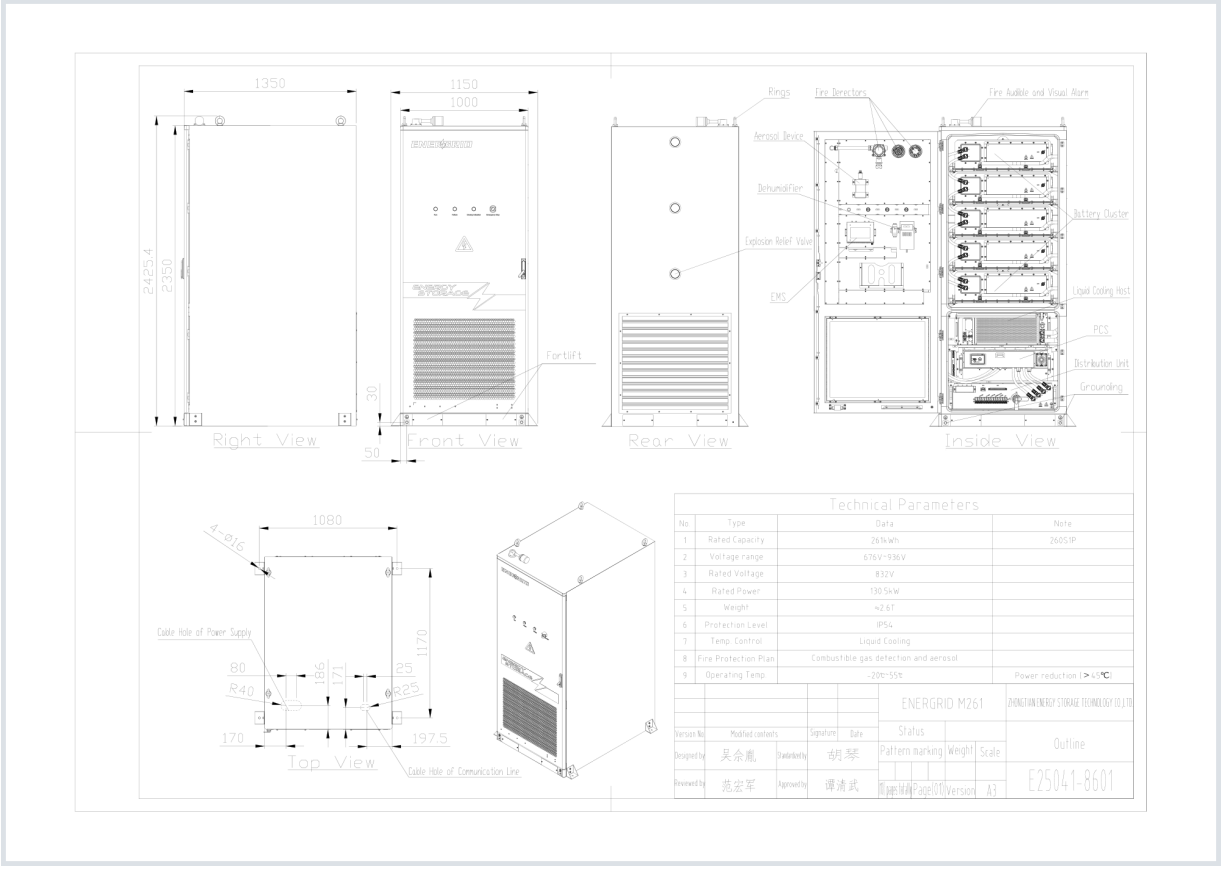
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E29. M261 General Arrangement Drawing

Επίπεδο / αντικείμενο	Complete ESS engineering
Φορέας / εκδότης	ZTT / engineering drawing
Πρότυπο / κανονιστική βάση	Engineering drawing / dimensional evidence
Certificate / Report No.	Ver. A3
Μοντέλο / ταυτοποίηση	ENERGRID M261
Κατάσταση τεκμηρίωσης	DIRECT
Αρχείο πηγής	04 ENERGRID M261 Drawing Ver. A3.pdf

Αξιολόγηση: Provides dimensional/layout evidence used in installation design and clearances.

Σύνδεση με NFPA 855: Supports NFPA 855 construction documents and site layout.



E30. M261 Initial BOM

Επίπεδο / αντικείμενο	Complete ESS engineering / components
Φορέας / εκδότης	ZTT / BOM
Πρότυπο / κανονιστική βάση	Bill of Materials
Certificate / Report No.	Initial BOM
Μοντέλο / ταυτοποίηση	ENERGRID M261
Κατάσταση τεκμηρίωσης	DIRECT
Αρχείο πηγής	08 BESS_Initial_BOM_EN.pdf

Αξιολόγηση: Provides component-level traceability framework including battery cells, cables, PCS and fire-related equipment and establishes the documented BOM structure for the M261 configuration.

Σύνδεση με NFPA 855: Supports equipment identification and configuration control required for compliance evidence.

Initial Bill of Materials (BOM) Ver. A0

No.	Material Status	Main Material Name	Specification / Model	Qty	Unit	Remarks / Special Requirements
1	**In-house & Purchased**	**Battery Outdoor Cabinet**	**261 kWh**	**1**	**Set**	
1.1	Purchased Part	Battery Cell	314 Ah	260	Pcs	
1.2	Purchased Part	Liquid-Cooled Module Enclosure	52S1P	5	Set	Fuse included
1.3	Purchased Part	BMS	52S / two-level architecture	1	Set	
1.4	Purchased Part	Inter-box Power Cable	Box negative to box positive / 70 mm² / double plug / L ≈ 385 mm	4	Pcs	
1.5	Purchased Part	Box Main Positive Power Cable	Box main positive to HV box / 70 mm² / double plug / L ≈ 2300 mm	1	Pcs	
1.6	Purchased Part	Box Main Negative Power Cable	Box main negative to HV box / 70 mm² / double plug / L ≈ 1350 mm	1	Pcs	
1.7	Purchased Part	Power Cable from Distribution Box to PCS	AC power cable from distribution box to PCS / 4×70 + 1×35 mm² / L ≈ 400 mm	1	Set	
1.8	Purchased Part	Integrated Modular PCS	Integrated HV box function; rated power 135 kW; AC-side grid-connection voltage 400 V	1	Unit	
1.9	In-house Part	Distribution Box	CE version	1	Set	
1.10	Purchased Part	Power Supply and Communication Cables inside the Outdoor Cabinet	Incl. AC/DC power cables, serial communication cables, Ethernet cables and matching accessories	1	Set	
1.11	Purchased Part	Liquid Cooling Unit	5 kW cooling capacity	1	Unit	
1.12	Purchased Part	Matching Piping	\	1	Set	
1.13	Purchased Part	Coolant	\	1	Set	
1.14	Purchased Part	Fire Alarm and Firefighting System	Cabinet-level aerosol fire suppression, audible & visual alarm, smoke detector, heat detector, H2 detector, etc.	1	Set	
1.15	Purchased Part	Outdoor Cabinet	1000×1350×2350 mm (for reference); incl. cabinet body, racks, power distribution system, lighting system, water immersion detection, etc.	1	Unit	IP54, C3/C4/C5
1.16	Purchased Part	EMS	\	1	Set	
1.17	Purchased Part	Dehumidifier	0.5 L	1	Unit	
1.18	\	PACK Manufacturing Cost	Production and manufacturing cost of battery clusters and various self-fabricated electrical cabinets	1	Item	
1.19	\	Outdoor Cabinet Pre-Assembly Cost	Work that can be pre-installed, fixed, wired and commissioned inside the outdoor cabinet	1	Item	

E31. M261 Installation & User Manual - architecture and operation

Επίπεδο / αντικείμενο	Complete ESS / operation
Φορέας / εκδότης	ZTT / ZEST
Πρότυπο / κανονιστική βάση	Installation, operation, startup/shutdown, EMS/BMS description
Certificate / Report No.	User Manual V4
Μοντέλο / ταυτοποίηση	ENERGRID M261
Κατάσταση τεκμηρίωσης	DIRECT
Αρχείο πηγής	M261_User_Manual_V4.pdf

Αξιολόγηση: Direct M261 manual identifying five 52S packs, 135 kW integrated PCS, 5 kW liquid-cooling host, distribution box, fire protection and EMS. It also documents startup, shutdown, emergency isolation and HMI monitoring.

Σύνδεση με NFPA 855: Supports NFPA 855 construction documents, commissioning, operation and emergency-planning evidence.

3 Product Description

3.1 Introduction of the Energy Storage Cabinet

The M261 liquid-cooling energy storage cabinet consists of 5 liquid cooling battery packs, a 135kW integrated PCS(working in synergy with PDU), an power distribution box, a 5kW liquid-cooling host and piping, and a fire protection system. Each pack consists of 52 battery cells connected in series, with a cell rated capacity of 314Ah. The electrical safety protection devices are included in the power distribution box.

The batteries and electrics have separate containers, equipped with advanced BMS and energy conversion systems, featuring high energy density, long life, high safety and wide temperature range. It is an ideal green energy storage power product for application areas such as Photovoltaic-Energy Storage-Charging Integrated System, park micro-grid, etc.

3.2 Layout of the Energy Storage Cabinet

3.2.1 Layout

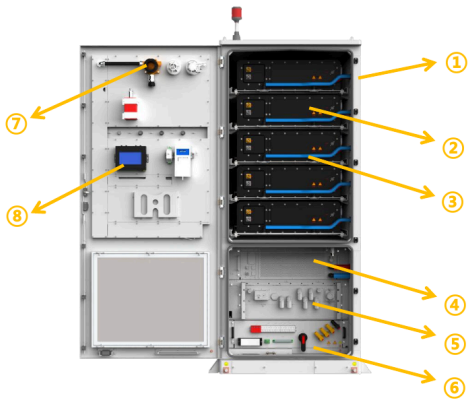


Figure 3-1 Internal layout (Picture for reference only, subject to the available products.)

Table 3-1 Components of the liquid-cooling energy storage cabinet

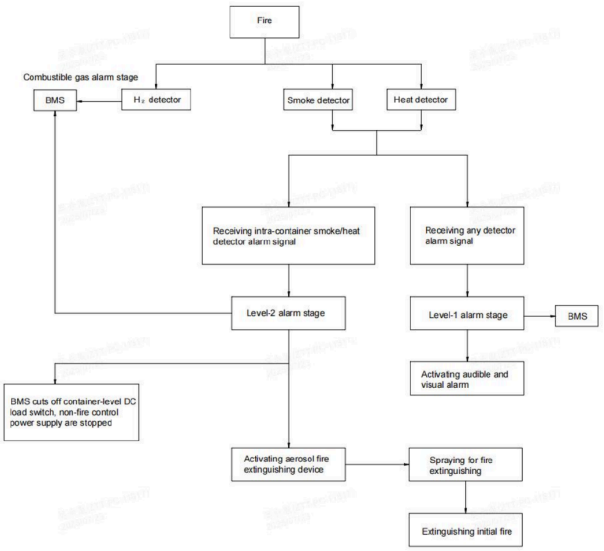
E32. M261 Fire Alarm Levels - Maintenance Manual

Επίπεδο / αντικείμενο	Complete ESS / fire O&M
Φορέας / εκδότης	ZTT / ZEST
Πρότυπο / κανονιστική βάση	Level-1 / Level-2 fire alarm functional maintenance procedure
Certificate / Report No.	Maintenance Manual Section 5.3
Μοντέλο / ταυτοποίηση	ENERGRID M261 / industrial & commercial liquid-cooling cabinet
Κατάσταση τεκμηρίωσης	DIRECT
Αρχείο πηγής	M261_Maintenance_Manual.pdf

Αξιολόγηση: Defines Level-1 as triggering either temperature or smoke detector with sound/light alarm; Level-2 as simultaneous temperature + smoke with sound/light, suppression linkage, BMS fault feedback and system power-off.

Σύνδεση με NFPA 855: Direct evidence for cause-and-effect logic, commissioning and emergency-response documentation.

5.3 Maintenance of the Fire Alarm System



5.3.1 Level-1 Fire Alarm detection (temperature alarm, smoke alarm, power on)

Use a smoke temperature gun to trigger the temperature or smoke sensor, the system will trigger a level-1fire alarm and start the sound and light alarm.

5.3.2 Level-2 Fire Alarm (temperature alarm, smoke alarm, power on)

Use a smoke temperature gun to trigger the temperature and smoke sensors, the system will trigger a level-2 fire alarm, start the sound and light alarm, activating the linkage mechanism to spray the inert gases, synchronously sending the feedback of fault information to the BMS system, and the system will be powered off .

5.4 Container Inspection

5.4.1 Enclosure Inspection (power off)

E33. M261 Fire Control Linkage Commissioning

Επίπεδο / αντικείμενο	Complete ESS / fire commissioning
Φορέας / εκδότης	ZTT / ZEST
Πρότυπο / κανονιστική βάση	Simulated fire-control linkage and manual-start test procedure
Certificate / Report No.	Maintenance Manual Section 6.5
Μοντέλο / ταυτοποίηση	ENERGRID M261 / industrial & commercial liquid-cooling cabinet
Κατάσταση τεκμηρίωσης	DIRECT
Αρχείο πηγής	M261_Maintenance_Manual.pdf

Αξιολόγηση: Defines safe simulated linkage test using relay in place of actual aerosol discharge, detector warm-up, alarm verification, automatic linkage and manual-start test followed by reset.

Σύνδεση με NFPA 855: Supports NFPA 855 commissioning/functional-test evidence for detection and suppression controls.

		refrigerant.
Fan overloading	The fan motor is stuck, causing a locked-rotor	Check whether the fan blades and motor bearings are stuck by foreign objects.
Thermostat abnormality of electric heating	1. Thermostat abnormality 2. Lack of liquid in water circuit	1. Check if the thermostat circuit is normal. 2. Check if the water flow and filter are dirty or blocked.

6.5 Simulated Fire Control Linkage Spraying Test

6.5.1 Test Item 1

The fire protection system is in a normal power on state, confirm the following:

A. The detector is powered on and maintained for 10 minutes to warm up and reach the monitoring state;

B. Observe the indicator light of the signal processing unit and keep it in normal state;

C. The fire emergency start button is in an unoperated state;

D. The sound and light alarm is in normal state;

E. The aerosol device is replaced by a relay to simulate aerosol spraying;

Confirm the protection zone and confirm the position of the detection system in the protection zone. After the detector is commissioned, the fire control system needs to be reset.

Simulated linkage system spraying test:

Use cigarettes or incompletely burned paper (which will produce smoke, CO and other flammable gases) to act on the composite detector until the alarm indicator light on the detector lights up and lasts for a period of time; At the same time, the sound and light alarm is activated, and then observe whether the relay is activated and whether the light on the relay is on. If the light is on, it means that the spraying of PERFLUORO is completed.

6.5.2 Test Item 2

E34. ENERGRID M261 - IEC 62933-5-2:2020 TÜV SÜD Compliance Document

Πεδίο / αντικείμενο	Complete ESS - grid-integrated electrochemical energy storage system
Φορέας / εκδότης	TÜV SÜD Product Service GmbH - Certification Body
Πρότυπο / κανονιστική βάση	IEC 62933-5-2:2020
Compliance Document No.	D 003115 0019 Rev. 00
Test report No.	704082443305-00
Holder	ZhongTian Energy Storage Technology Co., Ltd.
Μοντέλο / ταυτοποίηση	ENERGRID M261
Ημερομηνία	14 May 2025
Κατάσταση τεκμηρίωσης	DIRECT - complete ESS
Αρχείο πηγής	ENERGRID M261 IEC62933证书.pdf

Αξιολόγηση: Πρόκειται για M261-specific system-level compliance document. Η σελίδα 2 ταυτοποιεί ρητά το ENERGRID M261 και καταγράφει 832 Vdc nominal, 676-936 Vdc operating range, 314 Ah, 130 kW charge/discharge, IP54, Class I και -20 έως +55 °C, με ένδειξη “Tested according to: IEC 62933-5-2:2020”. Το evidence αυτό είναι ποιοτικά ισχυρότερο από component-only certificates για την τεκμηρίωση της safety architecture του complete cabinet.

ATTESTATION ◆ ATTESTATO ◆ ATTESTACIÓN ◆ BESCHEINIGUNG ◆ ATTESTATION

Product Service

Compliance Document

No. D 003115 0019 Rev. 00

Holder of Certificate: **ZhongTian Energy Storage Technology Co., Ltd.**
No. 36 Hongxing Road intersection
Development Area
226015 Nantong, Jiangsu
PEOPLE'S REPUBLIC OF CHINA

Product: **Batteries**
Energy Storage System

This Compliance document confirms the compliance with the listed standards on a voluntary basis. It refers only to the sample submitted for testing and certification and does not certify the quality or safety of the serial products. For details see: www.tuvsud.com/ps-cert

Test report no.: 704082443305-00

Date, 2025-05-14

(Kai Zhao)

TÜV SÜD Product Service GmbH • Certification Body • Ridlerstraße 65 • 80339 Munich • Germany

TÜV®

E34-A - TÜV SÜD Compliance Document, page 1: certificate holder, product category, test report 704082443305-00 and issue date 14/05/2025.

ATTESTATION ◆ ATTESTATO ◆ ATESTACIÓN ◆ BESCHEINIGUNG ◆ ATTESTATION

Product Service

Compliance Document

No. D 003115 0019 Rev. 00

Model(s): **ENERGRID M261**

Parameters:

Nominal Voltage	DC 832 V
Operating Voltage Range	DC 676 V, ..., 936 V
Rated Capacity	314 Ah
Maximum Charging Power	130 kW
Maximum Discharging Power	130 kW
Nominal Input Voltage for Auxiliary Power Supply	3/N/PE AC 230/400 V
Nominal Input Frequency for Auxiliary Power Supply	50/60 Hz
Maximum Input Power for Auxiliary Power Supply	5 kW
Ingress Protection	IP54
Protective Class	I
Operating Ambient Temperature	-20 °C, ..., 55 °C

Tested according to: IEC 62933-5-2:2020

TÜV SÜD Product Service GmbH • Certification Body • Ridlerstraße 65 • 80339 Munich • Germany

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E34-B - TÜV SÜD Compliance Document, page 2: model ENERGRID M261, tested parameters and explicit IEC 62933-5-2:2020 reference.

Σύνδεση με τον συνολικό φάκελο: το E34 πρέπει να διαβάζεται μαζί με τα E02-E06 (M261/battery-system EMC και IEC safety), E11-E13 (UL 9540A fire/explosion testing chain), E14-E20 (PCS safety/grid interface), E21-E24 (transport/material compliance) και E25-E33 (fire detection, suppression, operating logic και commissioning).

E35. D70 Metal Explosion-Proof / Pressure-Relief Valve - M261

Επίπεδο / αντικείμενο	M261 cabinet - pressure-relief / explosion-vent component
ZTT traceability	Email 09/10/2026, Henry Shu (ZTT): “Specification for relief valves of M261 cabinet.”
Component manufacturer	Shanghai Found Automation Equipment Co., Ltd.
Document	D70 Metal Explosion-Proof Valve Specification
Document No. / Rev.	TE-RC-2405-004 / A0
Issue date	05/01/2024
Key performance	IP68; ≥3100 L/min @10 kPa; burst pressure 4±1 kPa; air-flow area 1788 mm²; 720 h salt spray; -40…+125°C; UL94 V-0; RoHS2.0
Evidence classification	DIRECT TRACEABILITY + COMPONENT SPECIFICATION
Source file	D70_Metal_Explosion-Proof_Valve_Specification_EN.pdf

Αξιολόγηση: Το supplier specification είναι M261-traceable μέσω γραπτής επιβεβαίωσης ZTT. Το D70 παρέχει quantitative pressure-relief data και τεκμηριώνει πλήρως τη λογική normal pressure balancing + emergency explosion venting του cabinet, ως παθητικό επίπεδο προστασίας συμπληρωματικό προς gas detection, shutdown και aerosol suppression.

Σύνδεση με NFPA 855: το D70 παρέχει συγκεκριμένο burst threshold και vent-flow geometry και, σε συνδυασμό με gas detection, fire detection, automatic shutdown και aerosol suppression, τεκμηριώνει το layered explosion-control / deflagration-mitigation concept του M261 σύμφωνα με τη λογική του §9.6.5.6 και του HMA.

Product Name	Document Classification	6 Pages in Total
D70 Metal Explosion-Proof Valve	Confidential	

Document Name: D70 Metal Explosion-Proof Valve Specification

Document No.: TE-RC-2405-004

Document Version: A0

Prepared by: Liao Dongcheng Date 2024-01-05

Reviewed by: Hu Wenxia Date 2024-01-05

Approved by: Ran Lize Date 2024-01-05

Shanghai Found Automation Equipment Co., Ltd.

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E35-A - D70 supplier specification cover: document TE-RC-2405-004 Rev.A0, Shanghai Found Automation Equipment Co., Ltd.

1. Introduction

1.1 Product Introduction:

Balances the internal-external pressure difference of battery boxes and other high-density sealed products, ensuring that under normal conditions, changes in the external environment (such as temperature and altitude) will not cause sealing failure due to the pressure difference exceeding the product's tolerance.

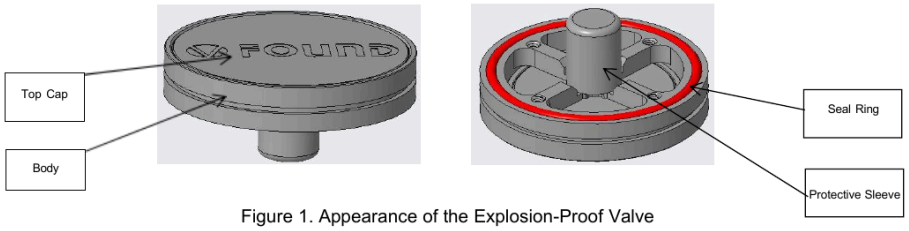


Figure 1. Appearance of the Explosion-Proof Valve

Table 1. Parts and Materials List

No.	Name	Material	Specification	Remarks
1	Body	AL 6063	Ø70*13	
2	Top Cap	AL 6063	Ø65.6*6.3	
3	Seal Ring	Silicone Rubber	(OD * ID * Wire Dia.) =ø66*ø59.8*3.1	
4	Protective Sleeve	AL 6063	Ø17*21.7	

1.2 Basic Product Dimensions

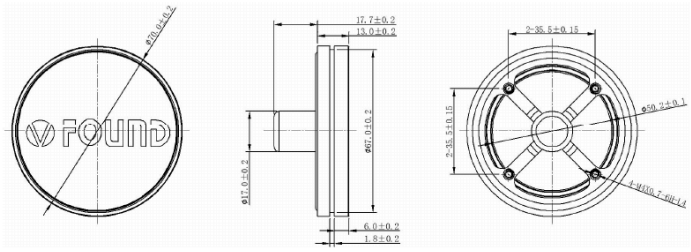


Figure 2. Dimensions of the Explosion-Proof Valve

E35-B - D70 component construction, materials and dimensions.

1.3 Working Principle

1.3.1 Pressure Balancing Function:

Balances the internal-external pressure difference of battery boxes and other highly sealed products, ensuring that under normal working conditions, changes in the external environment (such as temperature and altitude) will not cause sealing failure due to the pressure difference exceeding the product's tolerance.

1.3.2 Explosion-Venting Function:

When the internal pressure of sealed products such as battery boxes rises rapidly, the vent port of the explosion-proof valve opens to release the internal gas quickly and directionally, thereby preventing explosion of the battery box or other sealed products.

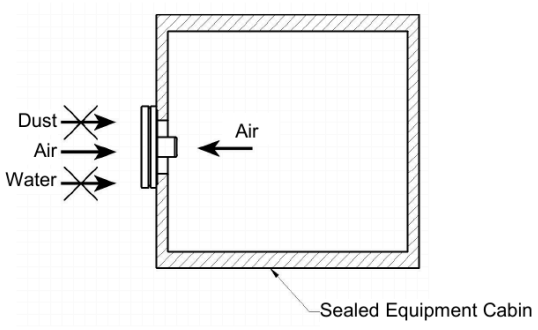


Figure 3. Working Principle of the Explosion-Proof Valve

2. Main Performance Parameters

Table 2. Performance Parameters

No.	Item	Unit	Technical Specification
1	Protection Rating	/	IP68 (1 m water depth, 24 H)
2	Membrane Air Permeability	L/min@10.0kPa	≥3100
3	Burst Pressure	Kpa	4±1
4	Air Flow Area	mm2	1788
5	Installation Torque	N ·m	1.5±0.3
6	Ultimate Failure Torque	N ·m	≥2.5
7	Neutral Salt Spray Resistance	H	720
8	Temperature Resistance	℃	-40~125

E35-C - Working principle and main performance parameters, including 4±1 kPa burst pressure and 1788 mm² air-flow area.

9	Product Life	Year	10
10	Environmental Requirement	/	RoHS2.0
11	Flame Retardancy Rating	/	UL94 -V0
12	Weight	g	98.2±3

3. Installation Requirements and Recommendations

3.1 Mounting Interface Requirements:

Flatness, Roughness, Thickness, Tolerance Mounting hole requirements: flatness < 0.2, roughness < Ra3.2, profile < 0.5

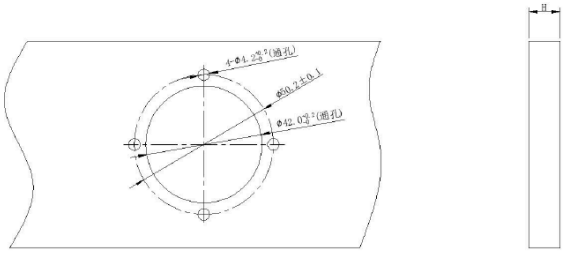
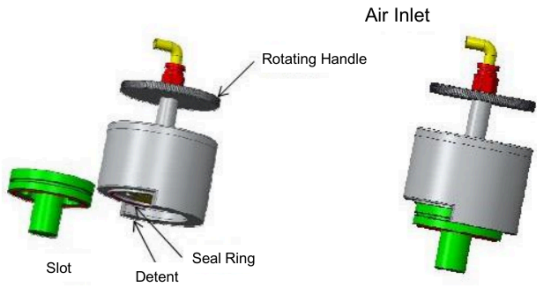


Figure 4. Recommended Hole Dimensions

Note: H = wall thickness of the mounting housing, unit: mm; recommended installation torque 1.5+/-0.3 N.m, failure torque >=2.5 N.m Mounting plate thickness 1<=H<=1.5 mm; the waterproof stud cap thickness must be <=2.5 mm (OD <= 11 mm).

3.2 Airtightness Test Fixture: Scheme and Operation Steps (with Figures)



(1) Pull up the rotary handle and rotate it clockwise (spring compressed) until it can no longer rotate; the pressing plate is then fixed at the limit position of the body;

(2) Push the fixture slot into the product groove until it fits tight;

E35-D - Additional ratings and mounting-interface requirements.

Παράρτημα B - Φωτογραφική τεκμηρίωση UL 9540A δοκιμών

Σκοπός. Στο παρόν παράρτημα ενσωματώνονται απευθείας σελίδες από τα CSA Group UL 9540A test reports, ώστε ο αναγνώστης να βλέπει όχι μόνο το certificate/report reference αλλά και την πραγματική διάταξη δοκιμής, το venting, την εξέλιξη του thermal runaway και την κατάσταση μετά τη δοκιμή. Οι εικόνες διατηρούν το πρωτότυπο CSA header, project/network number, model και figure captions για πλήρη ιχνηλασιμότητα.

B.1 Module / pack-level UL 9540A test - ZTT Li-Module-EES 332.8 V / 104.4 kWh

Φορέας δοκιμής	CSA Group Testing & Certification Inc.
Project / Network	80202418
Μοντέλο	ZTT Li-Module-EES 332.8V-104.4kWh
Πρότυπο	ANSI/CAN/UL 9540A:2019 - Module Level

Η παρακάτω ακολουθία δείχνει την πραγματική module-level διάταξη και την εξέλιξη της δοκιμής. Στο report, ένα cell χρησιμοποιείται για initiation του thermal runaway και καταγράφεται cell-to-cell propagation εντός του module. Οι φωτογραφίες είναι ιδιαίτερα χρήσιμες για την τεχνική αξιολόγηση της γεωμετρίας του module, της θέσης των αισθητήρων/θερμοζευγών και της συμπεριφοράς του enclosure κατά το συμβάν.

The results relate only to the items tested.
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Master Contract:	304186	Model:	ZTT Li-Module-EES 332.8V-104.4KWh	Page number 13 of 24
Project / Network:	80202418	Description:	Lithium-ion Rechargeable battery module	

Attachment 3 – Photos

General sample photos

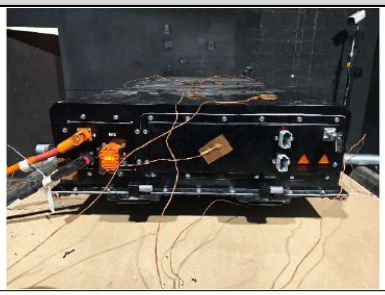


Figure 1: Module front view



Figure 2: Module side view



Figure 3: Module internal view

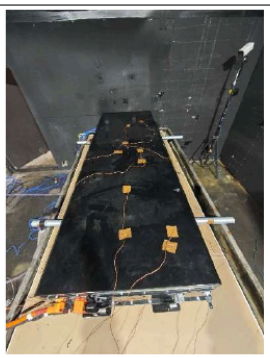


Figure 4: Module top view

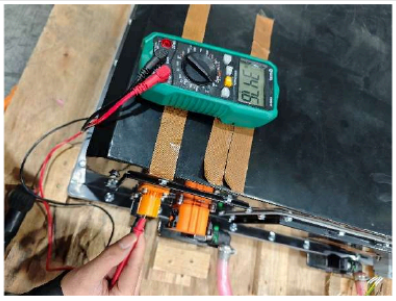


Figure 5: Module voltage before test



Figure 6: Module weight before test

Εικόνα Β-1. CSA UL 9540A module-level: γενικές φωτογραφίες του module πριν τη δοκιμή - front, side, internal και top view, μαζί με voltage/weight verification.

The results relate only to the items tested.
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Master Contract:	304186	Model:	ZTT Li-Module-EES 332.8V-104.4KWh	Page number 14 of 24
Project / Network:	80202418	Description:	Lithium-ion Rechargeable battery module	

Photos during test in progress



Figure 7: At test start (Time in 13:32)



Figure 8: During cell venting (Time in 14:10)



Figure 9: During thermal runaway (Time in 14:22)



Figure 10: During thermal runaway (Time in 14:25)



Figure 11: During thermal runaway (Time in 14:26)



Figure 12: During thermal runaway (Time in 14:28)

Εικόνα Β-2. CSA UL 9540A module-level: test in progress - test start, cell venting και διαδοχικές φάσεις thermal runaway.

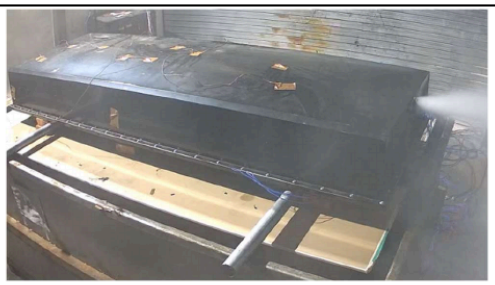


Figure 13: During thermal runaway (Time in 14:31)



Figure 14: During thermal runaway (Time in 14:43)



Figure 15: During thermal runaway (Time in 15:17)



Figure 16: Test End (Time in 08:30 next day)

Εικόνα Β-3. CSA UL 9540A module-level: συνέχιση thermal runaway και κατάσταση στο test end την επόμενη ημέρα.

Τεχνική ανάγνωση των module φωτογραφιών. Η ακολουθία τεκμηριώνει ορατή εκτόνωση/καπνό κατά το venting και το thermal runaway και συμπληρώνει τα μετρούμενα στοιχεία του CSA report (θερμοκρασίες, gas generation, heat release και propagation observations). Το module-level UL 9540A report αποτελεί ισχυρό fire-propagation evidence για την τεχνική αξιολόγηση του M261 σε συνδυασμό με το M261-specific IEC 62933-5-2 system certificate, τα cell-level tests και το documented fire/explosion protection architecture.

B.2 Cell-level UL 9540A test - ZTT71173204, 3.2 V / 314 Ah LFP

Φορέας δοκιμής	CSA Group Testing & Certification Inc.
Project / Network	80202416
Cell model	ZTT71173204 - 3.2 V / 314 Ah - LFP prismatic
Πρότυπο	ANSI/CAN/UL 9540A:2019 - Cell Level

Στο cell-level test η CSA τεκμηριώνει την προετοιμασία του ZTT71173204, τη θέση heater και thermocouples, το venting, την έναρξη thermal runaway και την κατάσταση του cell μετά το συμβάν. Οι φωτογραφίες βοηθούν να συνδεθούν οι θερμοκρασιακές καμπύλες και η gas analysis με τη φυσική συμπεριφορά του συγκεκριμένου prismatic LFP cell.



Figure 6: TC location on cell wide surface not covered by heater

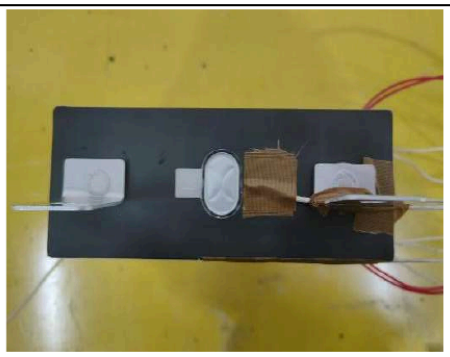


Figure 7: TC location near cell vent and positive node

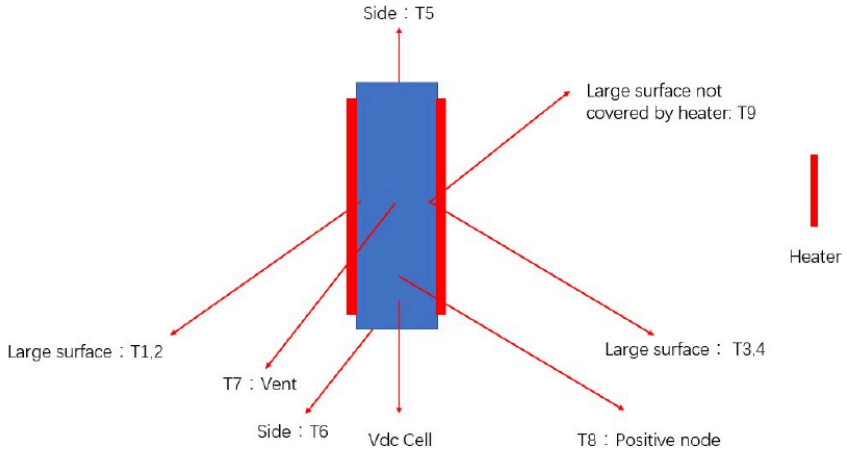


Figure 8: TC location (Top view)

Εικόνα B-4. CSA UL 9540A cell-level: heater και thermocouple installation / measurement locations στο ZTT71173204.

Sample Number: 202410008-1

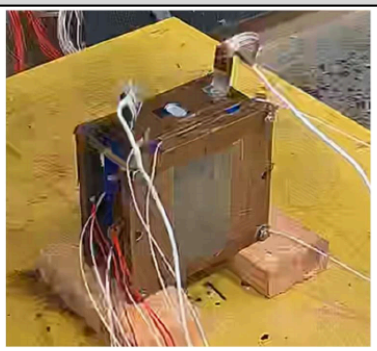


Figure 9: At test start (Time in 18:08)

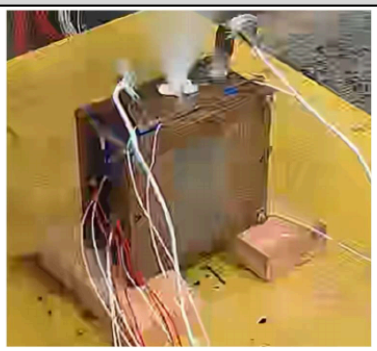


Figure 10: During cell venting (Time in 19:11)

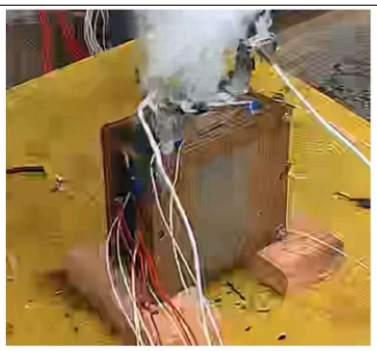


Figure 11: During thermal runaway (Time in 19:21)

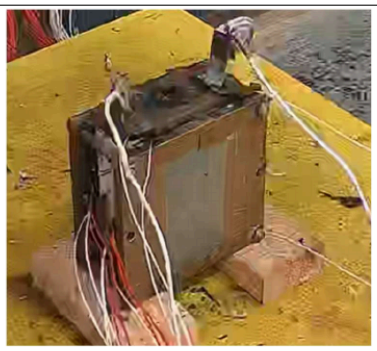


Figure 12: After thermal runaway-1



Figure 13: After thermal runaway-2



Figure 14: After thermal runaway-3

Εικόνα Β-5. CSA UL 9540A cell-level, Sample 202410008-1: test start, cell venting, thermal runaway και post-test condition.

CSA GROUP

Laboratory Test Data - UL 9540A Checklist and Test Result (Cell Level)

ORIGINAL TEST DATA

The results relate only to the items tested.
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Master Contract:	304186	Model:	ZTT71173204	Page number 22 of 33
Project / Network:	80202416	Description:	Li-ion battery cell	

Sample Number: 202410008-2

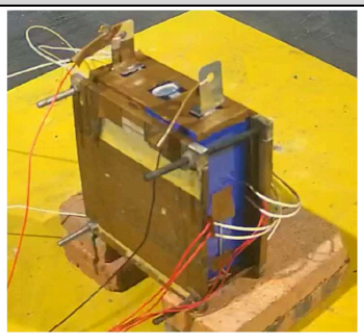


Figure 15: At test start (Time in 16:18)

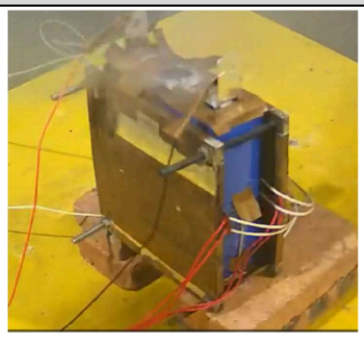


Figure 16: During cell venting (Time in 17:01)

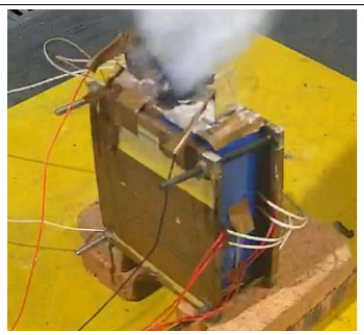


Figure 17: During thermal runaway (Time in 17:13)

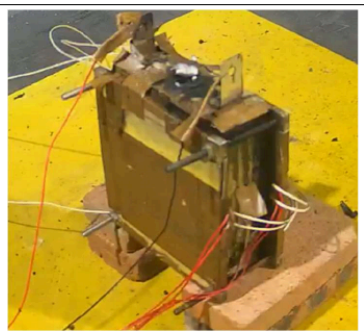


Figure 18: After thermal runaway-1



Figure 19: After thermal runaway-2



Figure 20: After thermal runaway-3

UL 9540A Checklist and Test Result – *Version6.1 : 2022-08-02*

Εικόνα Β-6. CSA UL 9540A cell-level, επόμενη δοκιμή sample: επαναληπτική ακολουθία venting, thermal runaway και post-test condition.

Σύνδεση με το M261. Το ZTT71173204 είναι το cell για το οποίο ο φάκελος περιλαμβάνει IEC 62619, UL 1973, RoHS, REACH και UL 9540A evidence. Η αλυσίδα cell-level και module-level testing, σε συνδυασμό με την 1P260S αρχιτεκτονική και το M261-specific IEC 62933-5-2 Compliance Document, υποστηρίζει συνεκτικά την fire-safety qualification του συστήματος κατά την τεχνική αντιστοίχιση με NFPA 855 §9.1.5.

Cross-reference στο dossier: E11 = UL 9540A Cell Level (80202416), E12 = UL 9540A Module Level (80202418), E13 = UL 9540A Unit Level ENERGRID N3 (80252443). Το παρόν Παράρτημα Β συμπληρώνει τα E11-E12 με φωτογραφική τεκμηρίωση της πραγματικής δοκιμής.

Τελικό Συμπέρασμα - Συμμόρφωση με NFPA 855:2023

Με βάση το σύνολο των πιστοποιητικών, test reports, manufacturer documentation, fire-protection design documents και M261-specific system evidence που αξιολογήθηκαν στο παρόν dossier, το ZTT ENERGRID M261 τεκμηριώνεται ως συμμορφούμενο με τις εφαρμοστέες τεχνικές απαιτήσεις του NFPA 855:2023 για stationary lithium-ion Energy Storage Systems, στο πεδίο που αφορά τον εξοπλισμό, την αρχιτεκτονική ασφαλείας και τις απαιτήσεις εγκατάστασης που αποτυπώνονται στον φάκελο.

Η τεκμηρίωση καλύπτει system-level safety κατά IEC 62933-5-2:2020, battery-system safety κατά IEC 62619/IEC 63056, cell qualification, fire/thermal-runaway testing κατά UL 9540A, PCS electrical safety και EMC, gas/smoke/heat detection, BMS/PCS/EMS protective logic, liquid cooling, Level-1 και Level-2 fire response, automatic electrical shutdown, HFX-200 aerosol suppression, D70 pressure relief/explosion venting, environmental protection, transport safety, commissioning procedures και emergency operation logic.

Η fire and explosion safety προσέγγιση είναι πολυεπίπεδη: έγκαιρη ανίχνευση αερίου και πυρκαγιάς, alarm και BMS feedback, αυτόματη διακοπή φόρτισης/εκφόρτισης, ενεργοποίηση suppression σε confirmed Level-2 event και παθητική εκτόνωση πίεσης μέσω του M261-specific D70 valve. Τα στοιχεία αυτά λειτουργούν συμπληρωματικά και συγκροτούν συνεκτικό protection concept συμβατό με τη φιλοσοφία hazard mitigation, fire control και explosion control του NFPA 855:2023.

Συνεπώς, για την εξεταζόμενη διαμόρφωση ENERGRID M261 και με εγκατάσταση σύμφωνα με τα manufacturer manuals, το approved project layout, τις προβλεπόμενες αποστάσεις και τις διαδικασίες commissioning/operation που περιγράφονται στον φάκελο, δεν εντοπίζεται τεχνικό κενό που να εμποδίζει τη συμμόρφωση με το NFPA 855:2023. Οι απαιτήσεις που υλοποιούνται σε επίπεδο έργου - layout, σήμανση, emergency plan, SAT/commissioning και O&M records - αποτελούν κανονικό μέρος της εφαρμογής του προτύπου και όχι έλλειψη του προϊόντος.

Τελική αξιολόγηση: COMPLIANT WITH APPLICABLE NFPA 855:2023 TECHNICAL REQUIREMENTS.

