

[7th WRBRF (World Rechargeable Battery Regulatory Forum)]

Battery certification facility in Korea

2016. 10. 04-05 @ COEX

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Certification Standard of Battery for BESS

■ KBIA established certification standard, 2013. 5

- by 'third party test'

- Based on 2 standards

- KBIA-10104-01 Secondary Lithium-Ion Cell and Battery System - Battery Energy Storage System — Part 1 : Safety test
- KBIA-10104-02 Secondary Lithium-ion Cell and Battery System - Battery Energy Storage System — Part 2 : Performance test

- Scope : Secondary Li cells and batteries for Battery Energy Storage System

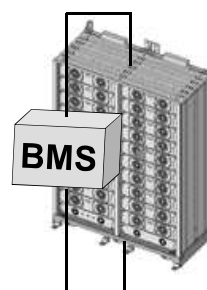
- Test unit ;



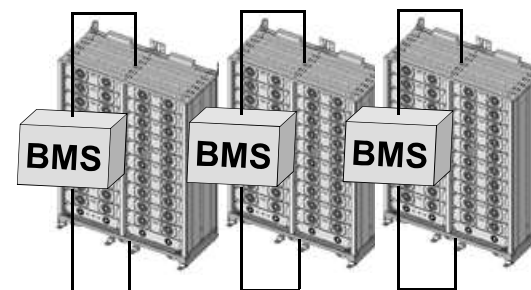
[Cell]



[Module]



[Rack]



[System]

Certification Tests

[Safety Certification Tests]

External Short-circuit [(30±10) mΩ]	"NF"
Impact	"NS, NF, NE"
Crush	"NF, NE"
Immersion	"NC, NF, NE"
Storage at high temperature	"NS, NF, NE"
Overcharge	"NF, NE"
Forced discharge	"NF, NE"
External short-circuit control	"BMS control"
Overdischarge control	"BMS control"
Overcharge control of voltage	"BMS control"
Overcharge control of current	"BMS control"
Overheating control	"BMS control"

[Performance Certification Tests]

Capacity	
Energy density	
Storage (RT, 45°C) (Recovery ≥ 90%)	
Cycle (Cell ≥ 85% after 500cyc.)	
(Module ≥ 85% & ΔV ≤ 0.1V after 500cyc.)	
Efficiency (≥ 95%)	

[KBIA-10104-01_2013]

6.4 External Short-circuit (5 mΩ)	"NL, NF, NE"
6.5 Impact	"NL, NF, NE"
6.6 Crush	"NL, NF, NE"
6.7 Immersion	"NL, NF, NE"
6.8 Storage at high temperature	"NL, NF, NE"
6.9 Overcharge	"NL, NF, NE"
6.10 Forced discharge	"NL, NF, NE"
7.3 External short-circuit control	"BMS control"
7.4 Overdischarge control	"BMS control"
7.5 Overcharge control of voltage	"BMS control"
7.6 Overcharge control of current	"BMS control"
7.7 Overheating control	"BMS control"

[KBIA-10104-02_2013]

6.1 Capacity	
6.2 Energy density	
6.3 Storage (RT, 45°C)	"No Requirement"
6.4 Cycle	
6.5 Efficiency	

KBIA-10104-01 vs. IEC 62619 CDV

Test	Test Condition	KBIA-10104-01	IEC 62619CDV
External Short-circuit	5mΩ @ 25℃ ±5 ℃	○	○
Impact	IEC 62619 CDV	○	○
Drop	drops from 2.5cm ~ 100cm	-	○
Crush	IEC 62660-1	○	-
Immersion	Immersion of battery in 0.6M Salt water	○	-
Storage at high temperature	exposure @ 85℃ / 3h	○	○
Overcharge	CC Charge / charge limit voltage x 150% or nominal voltage x 200%	○	○
Forced discharge	Reverse charge with 1C rate A / 90min	○	○
Internal short-circuit / Propagation	IEC 62133 Ed. 2 / IEC 62619 CDV	-	○
External short-circuit control	50mΩ / 1h	○	-
Overdischarge control	Discharge / discharge limit voltage x 90%	○	-
Overcharge control of voltage	Charge / charge limit voltage x 110%	○	○
Overcharge control of current	Charge with Max. charge current x 120%	○	○
Overheating control	Heat the cell in the battery system up to temperature limit + 5℃	○	○

KBIA-10104-02 vs. IEC 62620

Test	Test Condition	KBIA-10104-02	IEC 62620
Discharge performance @25℃	0.2, 1.0, 5.0C rate discharge @ 25℃±5 ℃	-	○
Capacity	0.5C rate discharge @ 25℃±2 ℃	○	-
Energy density	IEC 62660-2	○	-
Discharge performance @low Temp.	0.2, 1.0, 5.0C rate discharge @ 10, 0, -10, -20℃	-	○
High rate permissible current	6, 20 C rate discharge	-	○
Charge(Capacity) retention and recovery	28 days(IEC) or 30 days(KBIA) storage	○	○
Internal resistance	AC and DC resistance	-	○
Endurance in cycle	500 cycling	○	○
Endurance in storage at CV	Constant voltage charging for 6 months	-	○
Efficiency	Efficiency between charge and discharge	○	-

Authorized Test Lab.



KBIA signed the MOU with 6 test laboratories in 2013.

- **KERI** (Korea Electrotechnology Research Institute)
- **KIER** (Korea Institute of Energy Research)
- **KTC** (Korea Testing Certification)
- **KTL** (Korea Testing Laboratory)
- **KTR** (Korea Testing & Research Institute)
- **KATECH** (Korea Automotive Technology Institute)

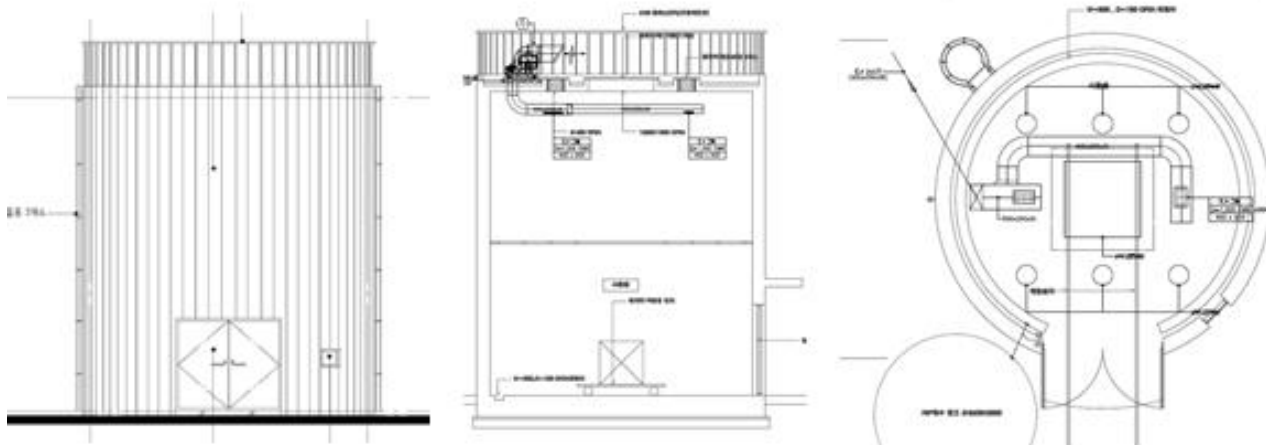
Test facility for battery in KERI (Korea Electrotechnology Research Institute)



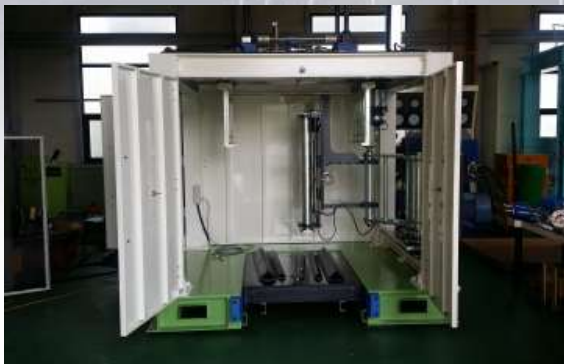
Safety test room



- Diameter : 6m
- Height : 7m
- Test capacity : $\leq 50\text{kWh}$
- Test
 - Overcharge
 - Overcharge Protection
 - Overcharge Control of Voltage
 - Overcharge Control of Current
 - Overheating Control
 - Forced Discharge
 - Overdischarge Protection
 - Loss of Thermal Control/Cooling
 - Propagation



Safety test equipment



[Impact / Drop]
1.8x1.0x0.5m, ~ 300kg



[Internal Short Circuit]
1000 x 1000 x 1000 (mm),
Speed $\leq 0.1\text{mm/s}$,
Measuring $\leq 10\text{ms}$



[Thermal Abuse]
800 x 800 x 1000 (mm),
RT ~ 200 °C



[External Short Circuit]
Short circuit Voltage : 500V
Short circuit Current : 50,000A
Sampling : ~ 200k/s



[Dewing-Temperature Change]
1.8 x 1.4 x 1.0m (2520L)
-40 ~ +100 °C / 30% ~ 98%

Cycler



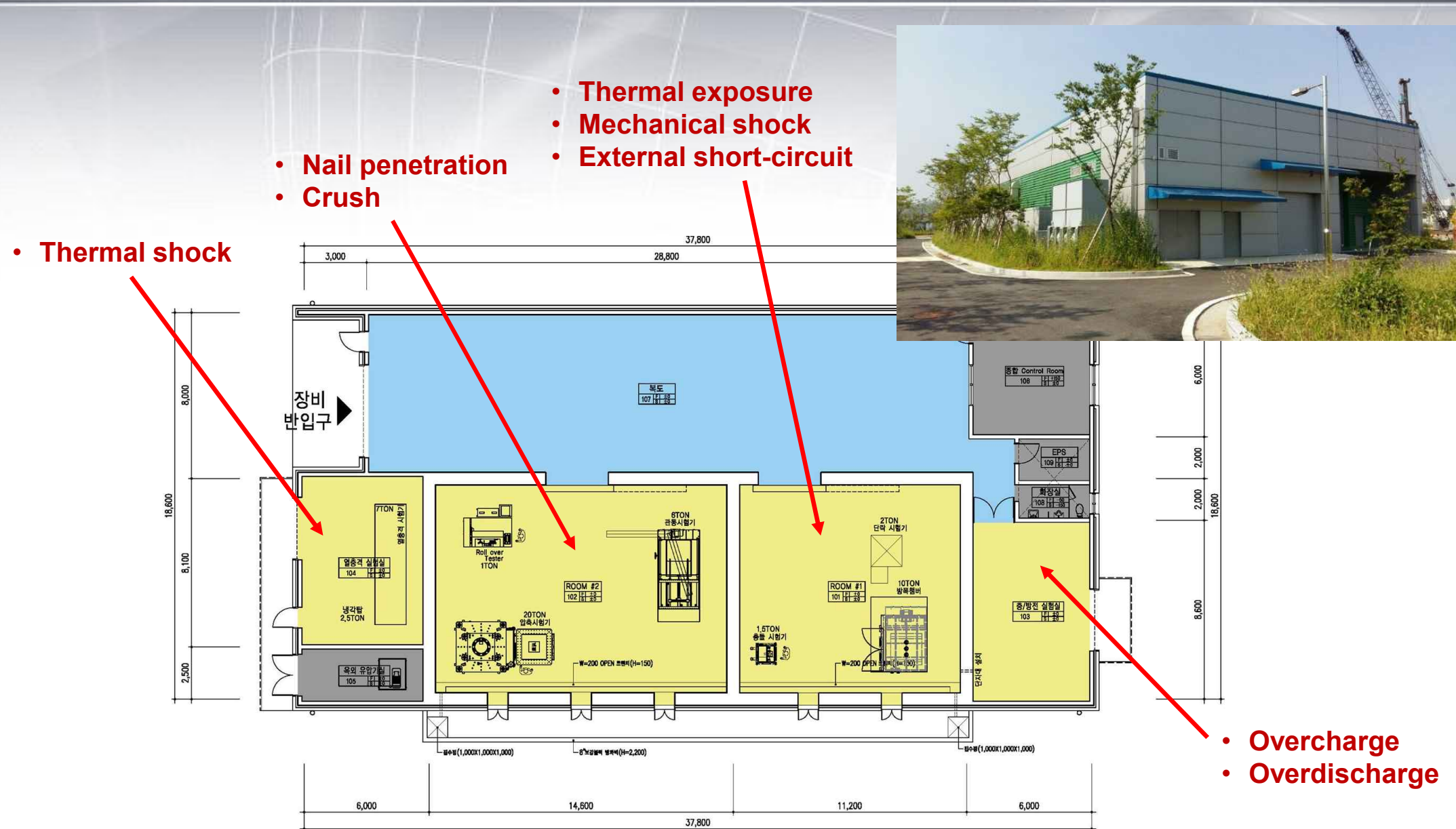
Spec.	Channel
5V - 2,000A	1
6V - 300A	8
12V - 60A	5
24V - 30A	2
48V - 60A	7
60V - 200A	4
60V - 300A	3
60V - 500A	1
60V - 900A	1
120V - 100A	10
1,000V - 800A	1

Test facility for battery in KTC (Korea Testing Certification)

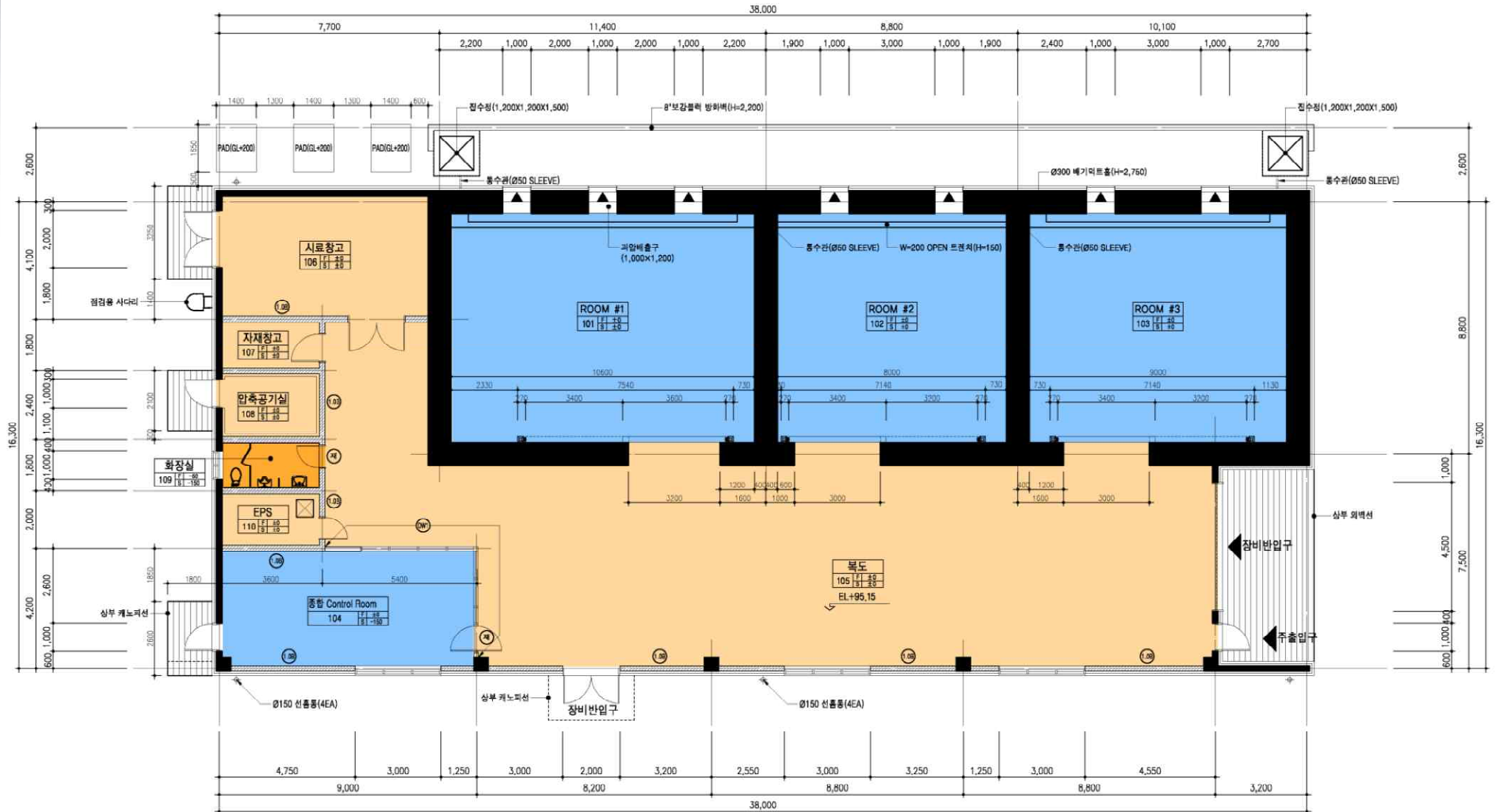


※ A test facility is currently under construction, planned for completion in 2017.
Test service will be available since then.

Safety test room – 1



Safety test room – 2



Safety test equipment



[Impact / Drop]
15.8mm, 61cm, 9.1kg



[Nail penetration]
Battery size :
1500 x 1500 x 1500 (mm)

[Thermal shock]

Battery size :
1500 x 1500 x 1500 (mm)
-50 ~ 90°C



[Crush]
300 ton



[Safety chamber]
3000 x 3000 x 2700 (mm)



[Roll-Over]
Battery size :
1500 x 1500 x 1500 (mm)
360°

Cycler



Spec.	Channel
5V - 90A	12
5V - 240A	2
5V - 500A	2
6V - 50A	12
48V - 40A	4
70V - 30A	1
52V - 600A	1
100V - 100A	4
60V - 150A	2
180V - 200A	2
300V - 250A	2
500V - 500A	1
900V - 500A	1
1,200V - 400A	1
1,200V - 600A	1

Test facility for battery in KTL (Korea Testing Laboratory)

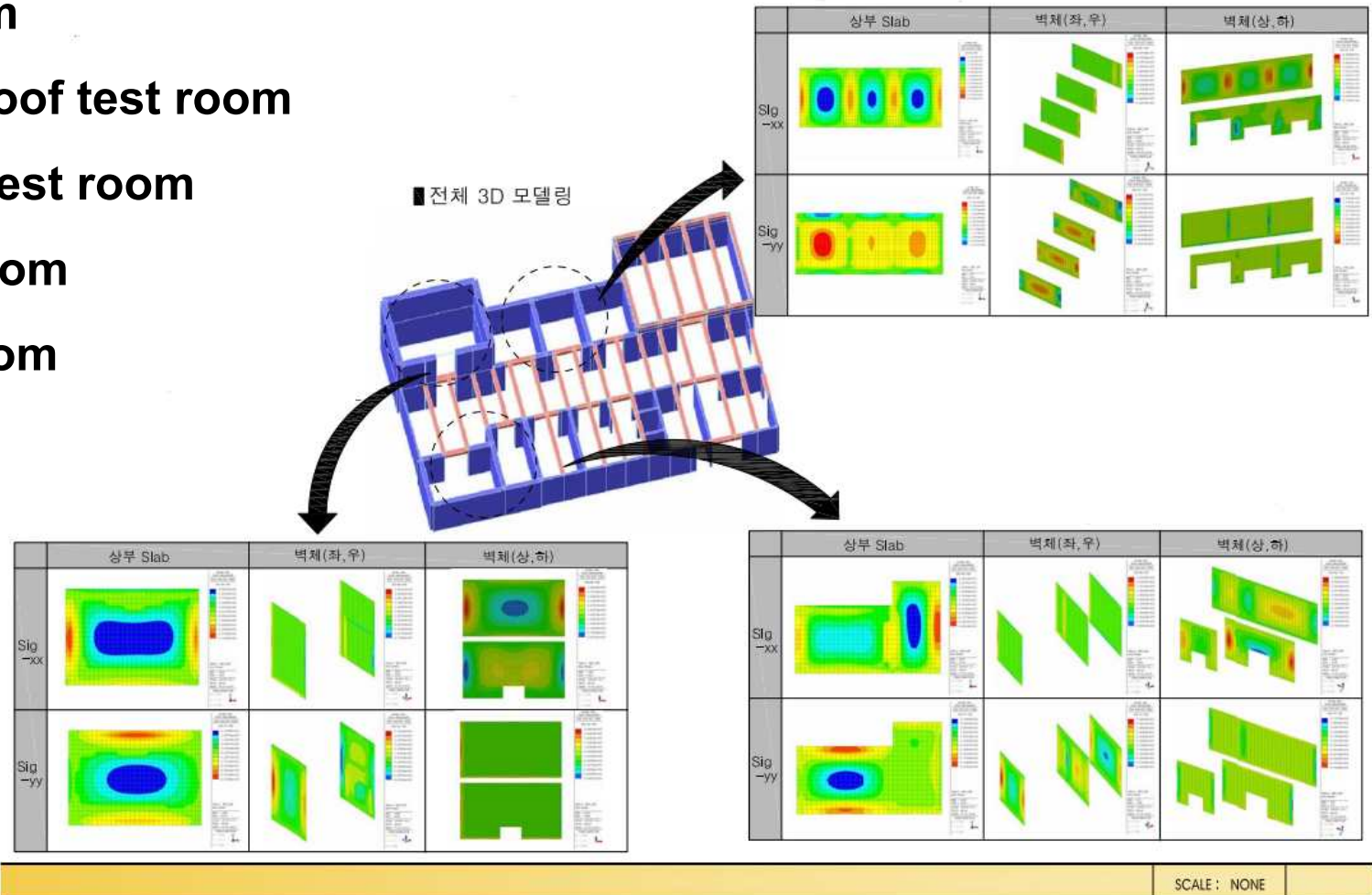


※ A test facility is currently under construction, planned for completion in 2017.
Test service will be available since then.

Safety test room

5 safety test rooms (Test capacity : $\leq 100\text{kWh}$)

- Fire test room
- Explosion proof test room
- Overcharge test room
- Crush test room
- Other test room



Cycler & Safety test equipment



[Cycler]

500V - 200A (2ch)
600V - 600A (2ch)
1,200V - 300A (1ch)



[Safety chamber]



[Temp./humidity chamber]



[Crush / Impact]

		EV						Industry	
		IEC 62660-1	IEC 62660-2	IEC 62660-3	ISO 12405-1	ISO 12405-2	ISO 12405-3	IEC 62619	IEC 62620
1	Power	●	-	-	-	-	-	-	-
2	Power & IR	-	-	-	●	●	-	-	●
3	Energy	●	-	-	-	-	-	-	-
4	Energy & Capacity @RT	-	-	-	●	●	-	-	●
5	Energy & Capacity @T, I,A	-	-	-	●	●	-	-	●
6	Storage	●	-	-	-	-	-	-	●
7	No Load SOC Loss	-	-	-	●	●	-	-	-
8	SOC Loss at Storage	-	-	-	●	●	-	-	-
9	Cranking Power @LT	-	-	-	●	-	-	-	-
10	Cranking Power @HT	-	-	-	●	-	-	-	-
11	Cycle Life	●	-	-	●	●	-	-	●
12	Endurance in Storage @CV	-	-	-	-	-	-	-	●
13	Energy Efficiency	●	-	-	●	-	-	-	-
14	Energy Efficiency@Fast Charging	-	-	-	-	●	-	-	-
15	Vibration	-	●	●	x	x	x	-	-
16	Mechanical Shock	-	●	●	x	x	x	-	-
17	Drop	-	-	-	-	-	●	●	-
18	Impact	-	-	-	-	-	-	●	-
19	Dewing-Temperature Change	-	-	-	●	●	●	-	-
20	Thermal Shock Cycling	-	-	-	●	●	●	-	-
21	Crush	-	-	●	-	-	-	-	-
22	Inertial Load at Vehicle Crash	-	-	-	-	-	x	-	-
23	Contact Force at Vehicle Crash	-	-	-	-	-	x	-	-
24	Water Immersion	-	-	-	-	-	●	-	-
25	Simulated Vehicle Fire	-	-	-	-	-	x	-	-
26	Thermal Abuse	-	-	-	-	-	-	●	-
27	High Temperature Endurance	-	●	●	-	-	-	-	-
28	Temperature Cycling	-	●	●	-	-	-	-	-
29	External Short Circuit	-	●	●	-	-	-	●	-
30	Short Circuit Protection	-	-	-	●	●	●	-	-
31	Overcharge	-	●	●	-	-	-	●	-
32	Overcharge Protection	-	-	-	●	●	●	-	-
33	Overcharge Control of Voltage	-	-	-	-	-	-	●	-
34	Overcharge Control of Current	-	-	-	-	-	-	●	-
35	Overheating Control	-	-	-	-	-	-	●	-
36	Forced Discharge	-	●	●	-	-	-	-	-
37	Overdischarge Protection	-	-	-	●	●	●	-	-
38	Loss of Thermal Control/Cooling	-	-	-	-	-	x	-	-
39	Internal Short Circuit	-	-	●	-	-	-	●	-
40	Propagation	-	-	-	-	-	-	●	-



Thank you....

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KERI