SOLIDBAT

Deliverable D2.2

Cycling and abuse tests protocols

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Abbreviation	Definition
BOL	Beginning of life
CC	Constant current
C-rate	(Dis)charging rate
CV	Constant voltage
DCR	Direct Current Resistance
DOD	Depth of discharge
EOL	End of life
EV	Electric Vehicle
OCV	Open circuit voltage
OEM	Original Equipment Manufacturer
RT	Room temperature
SOC	State of charge
TRP	Thermal runaway propagation

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1 EXECUTIVE SUMMARY

This document reports on the definition of the electrochemical and safety testing protocols allowing the assessment of the experimental results towards the performance targets defined in T2.1. The prototypes manufactured in WP4 will be evaluated in WP5 and WP6 according to these test protocols. The parameters defined here are set as recommendations from the OEM point of view, but they will be evolutive with regards to the project advances and the input of all partners. Specifically, formation and cycling protocols will be tested and optimized on monolayer pouch cells, in ST3.4.2.

2 CELL FORMAT AND NUMBER OF CELLS

During the SOLIDBAT project, a large variety of cells will be prototyped by the partners. The different cell sizes are listed in Table 1 below:

Table 1. Different cells manufactured during the SOLIDBAT project

Cell name	Cell size	Aim	Tested by	Number
Lab-scale cells	Coin and monolayer pouch	Quick screening for evaluating polymer-based electrolytes and other composite materials	All partners working on material and electrolyte development	unlimited
Medium scale cells prototypes (pouch)	1Ah	Train and learn about 1Ah cell prototyping/optimization for the final 1Ah cells	CICe who also manages the fabrication of the 1Ah cells	80
Final Medium scale cells (pouch)	1Ah	Elaborate overall performance and potential bottlenecks in development	AMP, TME, RWTH, CEA, CID	120
Final Large scale cells (pouch)	5Ah	Used for different tests and battery module assembly	AMP, RWTH, CEA, CID	15

3 OEM TESTING REQUIREMENTS

Different types of tests will be performed on SOLIDBAT cells in the function of the final EV application. Some parameters and tests will be mandatory to validate the maturity and feasibility of SOLIDBAT cell technology.

- Electrochemical characterization tests: C-rate (in Charge and in Discharge), DCR, OCV vs SOC will be performed at different temperatures (25°C, 45°C and 60°C) to evaluate the charge and discharge capabilities of the technology developed during the SOLIDBAT project.

- Cycle life tests: cycle life, calendar ageing and durability at different temperatures to evaluate the technology performances developed during the SOLIDBAT project.

- Safety tests: overcharge and thermal stability abuse tests will be conducted in priority to evaluate the SOLIDBAT technology's behaviour developed during the project. Safety is a priority for EV applications.

To validate the results, it is important to have a perfect reproducibility and consistency. In this context, each test should be performed ideally on 3 different cells.

The voltage window during cell testing will be defined and adapted based on results obtained during the material phase development.

It is important to underline that some tests are mandatory for OEM in this project. Table 2 presents the mandatory tests selected for this project.

Table 2. List of tests for 1Ah and 5Ah cells in this project

	Test	Test conditions	Cell size
Electrochemical characterization tests	C-rate test in charge	C-rate from C/10 to 3C in charge at three different temperatures	1Ah & 5Ah
	C-rate test in discharge	C-rate from C/10 to 3C in discharge at three different temperatures	1Ah & 5Ah
	OCV-SOC	At 25°C	1Ah & 5Ah
	DCR	DCR at 25°C and different SOC	1Ah & 5Ah
Cycle life tests	Cycle life	Cycle lifetime at two different rates and different temperatures (25 – 45 - 60 °C)	1Ah & 5Ah
	Ageing	Three temperatures @ SOC100%	1Ah
Safety tests	Safety	Thermal stability	1Ah & 5Ah
		Overcharge	1Ah & 5Ah

Abuse tests will be conducted also on mini-modules of two cells at minimum to assess the risk of thermal runaway propagation. The stress condition to ensure the thermal runaway of one of these cells in the module will be determined according to the results on individual cells as listed in the table above.

4 1AH CELL ASSEMBLY OPTIMISATION STUDY

Before the final 1Ah cells are delivered to the various partners, CICe will undertake an assembly optimisation study to ensure that the final cells delivered to partners are of high and consistent quality. It is critical that the cells delivered for testing are assembled in a reproducible manner. The study will build upon the results obtained from the monolayer studies and ensure that the results and protocols defined at monolayer are appropriate when the cell is scaled to 1Ah.

From the 200 x 1Ah cells that need to be delivered for the project, 120 are needed for electrochemical testing (this is elaborated on further in Section 0). Therefore, 80 cells will be assembled for the fabrication and reproducibility optimisation study.

Four key studies will be conducted across the 80 x 1Ah cells to be assembled and will be conducted in the following order:

1. Assembly reproducibility study
2. Electrolyte step optimisation
3. Formation optimisation study
4. Pressure application optimisation study

Assembly reproducibility study

Before optimising any of the 1Ah cell steps, we will showcase the reproducibility of the 1Ah cell assembly procedure. The aim will be to demonstrate that cells are reproducible in terms of physical assembly parameters and in performance. CICe will measure the alignment of the stack to showcase that the assembled cells are similar in their fabrication. Simple electrochemical testing will be carried out to demonstrate that the cells exhibit similar performance during testing.

Electrolyte filling step optimisation

After demonstrating the reproducibility of cells, a small study will be conducted to optimise the electrolyte filling step for the 1Ah cells. This will not be a deep study, as the electrolyte filling step is being optimised at monolayer level in WP3. The aim here is to ensure that the optimised protocol and parameters confirmed at monolayer level are applicable to the 1Ah cell when appropriately scaled up. The difference in cell format and void space may impact on the ability to directly scale the protocol from monolayer to 1Ah scale. Therefore, we will do experiments on the first batch of 1Ah cells to validate the optimised electrolyte filling step. Again, simple electrochemical testing will be carried out to measure the performance of the cells during this study.

Formation optimisation study

Some of the cells will be dedicated to optimising the formation protocol for the 1Ah cells. Similarly to the electrolyte filling step study, the formation protocol will be first optimised at monolayer level in WP3 before scaling up to 1Ah. Therefore, this study will be used to validate that the formation protocol defined at monolayer level is appropriate when scaling up to 1Ah, or if tweaks and changes to the protocol are needed. The formation protocol will be validated using the same performance metrics that are utilised in the WP3 monolayer formation optimisation study.

Pressure application optimisation study

A selection of the 1Ah cells from the initial batch will be utilised for refining and optimising the pressure application protocol for cycling the cells. It is expected that the set-up of the pressure jigs (fixed plates vs springs) and the type of foam to be used will be agreed across all partners before the 1Ah cell assembly study will start. Therefore, the focus will be on determining the most effective pressure value to apply to the stacks to obtain the best performance.

For the initial batch of 1Ah cells, we will apply a relatively standard testing protocol consisting of a C-rate capability test followed by long cycling testing. The testing protocol is as follows:

1. C-rate test (conducted with CC/CC, with voltage range of 4.3 – 3.0 V, at 25 °C)
    (i) 2 cycles @ C/20
    (ii) 5 cycles @ C/10

(iii) 5 cycles @ C/5

(iv) 5 cycles @ C/3

(v) 5 cycles @ C/2

(vi) 5 cycles @ C/1

2. Cyclability test (conducted with CC/CC, with voltage range of 4.3 – 3.0 V, at 25 °C):

   (i) 2 recovery cycles @ C/20

   (ii) 300 cycles @ C/3 (or until cell reaches 80% state of health (SOH). 80% SOH refers to when the cells reach 80% of the specific discharge capacity achieved on the first cycle of the cyclability test at C/3)

The diagram below (Figure 1) shows how the initial group of assembled 1Ah cells could be broken down into the four studies.

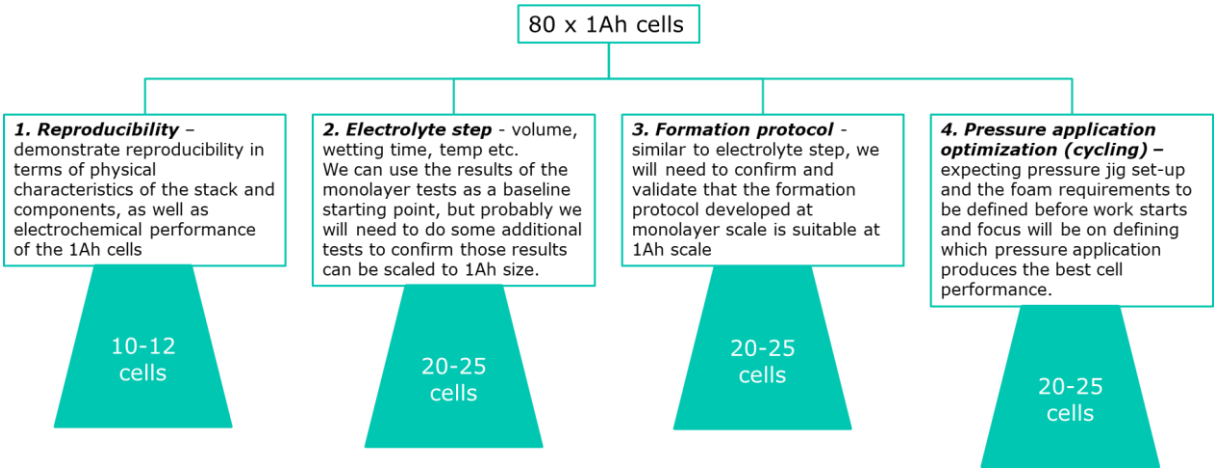


Figure 1. Test plan for the first batch of 1Ah cells.

It is possible and probable that cells are moved between boxes – for example, in the case that we need less cells for the formation and electrolyte optimization study due to the knowledge already gained from the monolayer study, we could move additional cells to the pressure study.

Following the successful completion of the initial batch of 1Ah cells and the associated studies, the final 1Ah cells will be assembled and distributed to partners for testing.

5 CELL DISTRIBUTION BETWEEN PARTNERS AND TESTS

In the table below (Table 3), is the list of electrical and safety tests to be done on the second batch of 1Ah cells.

Table 3. Test plan for second batch of 1Ah cells

1Ah cells			
Tests	**Tests conditions**	**Partners**	**Number of cells**
Cycle life (SOC 0% → 100%) Temperature	C/5 or C/3 at 25 °C	TME/CID	6
	C/5 or C/3 at 45 °C		6
	C/5 or C/3 at 60 °C		6
Cycle life C/5 or C/3 SOC + DoD		TME/CID	
	0% <-> 80% SOC		6
	10% <-> 90% SOC		6
	20% <-> 100% SOC		6
Cycle life Drive Profiles	WLTP 1	RWTH	Same cells as storage
	WLTP 2		
Storage/Ageing Temperature	25°C at SOC 100%	RWTH/AMP	6
	45°C at SOC 100%		6
	60°C at SOC 100%		6
Storage/Ageing SOC	45°C at SOC 20%	RWTH/AMP	6
	45°C at SOC 50%		6
	45°C at SOC 80%		6
C-rate tests	C/5 to 5C at 25 °C (constant charge)	AMP/RWTH	6
	C/5 to 5C at 45 °C (constant charge)		6
	C/5 to 5C at 60 °C (constant charge)		6
	C/5 to 5C at 25 °C (constant discharge)		6
	C/5 to 5C at 45 °C (constant discharge)		6
	C/5 to 5C at 60 °C (constant discharge)		6
OCV-SOC	C/5 or C/3 at 25 °C	AMP/RWTH	same cells for C-rate tests
DCR	DCR at 60 °C, 30 sec pulse	AMP/RWTH	
	DCR at 45 °C, 30 sec pulse		

	DCR at 25 °C, 30 sec pulse		
Safety	Thermal stability	CEA	3
	Overcharge		3
Postmortem		RWTH	3 (pristine) + cells after cycling
Total cells			**117**

All the results of WP6 which can be used within the framework of WP5 (modelling) will be transferred to it. Cells after cycling will be used for postmortem analyses.

About the 5Ah cells, we will only conduct few characteristic tests conducted on the 1Ah cells (cycle life + C-rate + safety). 15 5Ah cells will be fabricated during the project. In Table 4, a proposition:

Table 4. Test plan for 5Ah cells.

5Ah cells			
Tests	**Tests conditions**	**Partners**	**Number of cells**
Cycle life (SOC 0% → 100%)	C/3 or 1C at 25 °C	CID	3 or 0
C-rate tests	C/5 to 4C at 25 °C (constant charge)	AMP	3 or 0
	C/5 to 4C at 25 °C (constant discharge)		
OCV-SOC	C/5 or C/3 at 25 °C	AMP	
DCR	DCR at 60 °C, 30 sec pulse	AMP	
	DCR at 25 °C, 30 sec pulse		
	DCR at 45 °C, 30 sec pulse		
Safety	Thermal stability	CEA	2
	Overcharge		2
	Thermal propagation on mini-module		8
Total cells			**15**

6 STANDARD PROCEDURE AFTER CELL ASSEMBLY

Once the cells are fabricated, different steps will be applied from the formation to the end of life.

6.1 Formation procedure

The formation procedure is essential and helps activate the materials in the battery (by forming the interphases for example). The initial capacity of the cell is determined at the end of this formation step. It is also a mean of quality control. A proper formation ensures that the battery will perform optimally throughout its lifespan.

As described in Section 4, the optimal formation protocol will be studied at monolayer and then validated again at 1Ah scale.

Cell shipment procedure

The cells will be shipped at 30% SOC, protected individually in a dedicated box. The shipment will be ensured by an appropriate transportation service, in accordance with the regulations in force.

6.2 Storage prior testing (after receiving the cells)

The storage after delivery shall be reduced at maximum to avoid any overdischarge to happen. A maximum storage time of 1 month at RT after delivery shall be targeted.

6.3 Check-up before testing

After shipping and before sample testing, each cell needs to realize a check-up (Table 5) to assess the quality and reproducibility of each cell (1Ah and 5Ah). This test consists in performing a check-up at 25°C including DCR test. The real capacity, potential and resistance will be measured during this test.

The C/3 rate can be adjusted depending on the real performances of the technology developed during this project.

The CC value could be X = C/10, C/5, C/4 or C/3. It depends on the cell performances.

Before performing check-up test, the cell will be close to at SOC 100%.

At the end of check-up test, the cell will be at SOC 0%.

The current pulses can be adjusted during the test depending on the real performances of the cell (based on Imax). Imax is determined as the maximum current pulse applied when the cut off is reached during the 30s period.

Table 5. Check-up test procedure

Step	Temp.	Protocol for BOL test or check up	Comments
0	25 °C	Cell in chamber during 2 h at 25 °C to stabilize the temperature	Temperature stabilization
1		Charge the cell at X CC until upper voltage limit	
2		Charge the cell through CV at upper voltage limit until I<C/20	
3		Rest 30 min	
4		Discharge the cell at X CC until lower voltage limit	Capacity check
5		Rest 30 min	
6		Charge the cell at X CC until upper voltage limit	
7		Charge the cell through CV at upper voltage limit until I<C/100	
8		Rest 30 min	
9		Discharge the cell at X CC until SOC 50% (50% of the full capacity of the cell based on step 4)	
10		Rest 30 min	
11		Discharge at **0.5C** for 30s	
12		Rest 30 min	
13		Charge the cell at X CC until SOC 50% (50% of the full capacity of the cell based on step 4)	
14		Rest 30 min	
15		Charge at **0.5C** for 30s	
16		Rest 30 min	
17		Discharge the cell at X CC until SOC 50% (50% of the full capacity of the cell based on step 4)	
18		Rest 30 min	
19		Go to Step 11 by changing the C-rate current value by 1C then 1.5C then 2C. Then go to next step	
20		Discharge the cell at X CC until lower voltage limit	
21		Rest 30 min	

6.4 End Of Life (EOL)

The End-Of-Life refers to the cell reaching 80% of SOH, which means 80% of the capacity measured during the check-up.

7 CYCLE LIFE TESTS

7.1 Cycle life tests protocol

The cycle life test aims at quantifying the cyclability of SOLIDBAT cells. This cycling test will be performed at three different temperatures (25, 45, and 60 °C) and two different C-rates (C/3 and 1C). The cycling test will be performed using a CC-CV mode at a constant C-rate. A protocol is visible in the following table (Table 6).

Table 6. Cycle life test protocol

Step	Temp.	Protocol for cycle life	Comments
0	25 °C	Check-up test	
1	X °C	Cell in chamber during 2 h at X °C to stabilize the temperature	
2		Charge the cell at YC CC until upper voltage limit	
3		Charge the cell through CV until upper voltage limit until I<C/20	
4		Rest 10 min	
5		Discharge the cell at YC CC until lower voltage limit	
6		Rest 10 min	
7		Go to step 2, 49 times	
8		Then go to step 0, Z times	

X= 25, 45, and 60 °C

Y= C/5 and C/3

Z= To be determined in function of the capacity retention during cycling. Possible to stop the step when 80% of SOH is reached, that means 80% of the capacity remained during the check-up vs the first check-up test.

It is recommended to stop the test with a check-up test to have a complete characterization of the cell.

7.2 Calendar tests protocol

The ageing test (Table 7) can give important information of calendar loss. This test will be realized at different storage temperatures.

The C/3 rate can be adjusted and decreased in the function of the real performance of the technology developed during the project.

The CC value could be Z: C/10, C/5 or C/3.

Table 7. Calendar test protocol

Step	Temp.	Protocol for Ageing test	Comments
0	25 °C	Check-up test	
1		Charge the cell at **Z** CC until upper voltage limit	
2		Charge the cell through CV until upper voltage limit until I<C/20	
3		Rest 30 min	
4	**X** °C	Cell in chamber during 2 h at **X** °C to stabilize the temperature	
5	**X** °C	Store the cell in the thermostat box at **X** °C	
6	25 °C	After 1 month, check-up test at 25 °C	
7	25 °C	Go back to step 1, Repeat **Y** times	

X: 10, 25, or 60 °C

Y: To be determined during the project. It is possible to stop the test when 80% of SOH is reached, that means 80% of the capacity remained during the BOL test or check-up vs. the first check-up test.

8 CHARACTERIZATION TESTS

8.1 OCV-SOC protocol

The OCV-SOC protocol (Table 8) belongs to the characterization test part.

The C/3 rate can be adjusted and decreased depending on the real performances of the technology developed during the project.

Y and Z will be determined in function of the first results of cycle life obtained with lab-scale cells or first 1Ah cells.

Table 8. OCV-SOC test protocol

Step	Temp.	Protocol for OCV-SOC	Comments
0	25 °C	Check-up test	
1		Charge the cell at C/10 CC until upper voltage limit	
2		Charge the cell through CV until upper voltage limit until I<C/20	
3		Rest 2 h	
4		Discharge the cell at C/10 CC until SOC 95%	
5		Rest 2 h	
6		Repeat step 4 and 5 at SOC 90, 85, 80, 70, 60, 50, 40, 30, 20 15, 10, 5 and 0%	
7		Charge the cell at C/10 CC until SOC 1%	
8		Rest 2 h	
9		Repeat step 7 and 8 at SOC 5, 10, 15, 20, 30, 40, 50, 60, 70, 80, 85, 90, 95 and 100%	
10		Check-up test	
11		Charge the cell at C/3 CC until upper voltage limit	
12		Charge the cell through CV until upper voltage limit until I<C/20	
13		Rest 10 min	
14		Discharge the cell at C/3 CC until lower voltage limit	
15		Rest 10 min	
16		Then go to step 11, 1 time	
17		Then repeat step 11 to 15, Z times At EOL, repeat step 0 to 10	

8.2 DCR protocol

The DCR test gives the value of the resistance in function of different temperatures, the percentage of SOC and the applied current.

The DCR protocol is described in Table 9.

Table 9. DCR protocol

Step	Temp.	Protocol for DCR measurement	Comments
0	25 °C	Check-up test	
1	Z °C	Charge the cell at X CC until upper voltage limit	
2		Charge the cell through CV until upper voltage limit until I<C/20	
3		Rest 30 min	
4		Discharge the cell at X CC until SOC **80**%	
5		Rest 30 min	
6		Discharge at **0.5C** for 30 s	
7		Rest 30 min	
8		Charge the cell at XC until SOC 80%	
9		Rest 30 min	
10		Charge at **0.5C** for 30 s	
11		Rest 30 min	
12		Discharge the cell at XC until SOC 80%	
13		Rest 30 min	
14		Go to Step 6 by changing the C-rate current value by 1C then 1.5C than 2C. Then go to next step	
18		Go back to Step 4 by changing the SOC: 60, 40, and then 20%	

Z: 25, 45, and 60 °C

The CC value could be X: C/10, C/5 or C/3 in the function of the real performance of the technology developed during the project.

In function of the needs, it could be possible to complete the DCR test by 10 and 90% SOC.

8.3 C-rate protocol

The C-rate test (Table 10) can give information on the quick charge and discharge capacity for the technology developed during the SOLIDBAT project.

The C-rate test will be done in charge and in discharge at 25 °C and at various current rates (C/10, C/5, C/3, C/2, C, 2C, 3C, 4C and 5C).

The CC value could be X: C/10, C/5 or C/3 in the function of the real performance of the technology developed during the project.

Table 10. C-rate test protocol

Step	**Temp.**	**Protocol for C-rate test in discharge**	**Comments**
0	25 °C	Check-up test	
1		Charge the cell at **X** CC until upper voltage limit	
2		Charge the cell through CV until upper voltage limit until I<C/20	
3		Rest 30 min	
4		Discharge the cell at **Y** CC until lower voltage limit	**Y**: C/10, C/5, C/3, C/2, C, 2C, 3C, 4C, 5C
5		Rest until T= 25 °C	
6		Go back to step 1 by changing **Y**	
7		Check-up test	
Step	**Temp.**	**Protocol for C-rate test in charge**	**Comments**
0	25 °C	Check-up test	
1		Charge the cell at **Y** CC until upper voltage limit	**Y**: C/10, C/5, C/3, C/2, C, 2C, 3C, 4C, 5C
2		Charge the cell through CV until upper voltage limit until I<C/20	
3		Rest until T= 25 °C	
4		Discharge the cell at **X** CC until lower voltage limit	
5		Rest 30 min	
6		Go back to step 1 by changing **Y**	
7		Check-up test	

9 SAFETY TESTS

During the SOLIDBAT project, safety tests will be performed on 1Ah and 5Ah cells, and finally on mini-modules of 2 cells minimum. Two different tests will be performed in priority:

- Overtemperature
- Overcharge

A check-up will be carried out prior to the safety test to ensure that the cell under evaluation is representative to the other cells. The protocol described in Table 5 will be followed from step 0 to 8.

At minimum 2 cells will be tested for each safety test conditions. A third cell may be tested for reproducibility check.

During each test, temperatures, current applied and cell voltage will be recorded (1 point every 500ms).

Before each test:

- Take pictures of the cells before tests from different points of view
- Measure the cell dimension in centimeters
- Measure the cell weight in g
- Thermocouples will be positioned on the cell, on the setup and in the ambient air (center of the cell, tabs, upper face, lower face, jigs, box atmosphere, etc.)
- The cell must be insulated from the jigs with glass wool or equivalent efficient thermal insulation
- During the safety tests, the cells will be maintained under pressure (Pressure = same pressure during cycling test), between jigs or equivalent pressurized setup.
- At least one camera will be implemented to record the test; in practical several cameras will be present if relevant (open-air test)

After each test:

- Take pictures of the cells after tests from different points of view
- Measure the cell dimension in centimeters
- Measure the cell weight in g

Overtemperature and overcharge protocols:

The aim of these abuse tests is to cause the thermal runaway of the cells in fully charged state by its overheating or its overcharging, and measure thermal runaway features.

For **overtemperature abuse tests**, the cell will be put between jigs. A heating pad will be created by trapping a Ni-Cr wire within two layers of ceramic tape. Then, the pad will be added face to the cell within the jigs. A thermal insulation layer will be added between the pad and the jig to prevent heat loss during the heating phase of the test. A compressed sandwich containing the cell will thus be created.

Depending on the type of test (calorimetric test or open-air test), this stack will be put respectively into a closed vessel or not. If it will be an open-air test, the focus will mainly be the recording of the thermal runaway, thanks to several cameras from different points of view. In this case, the instrumentation in thermocouples will be light: just on the cell, the jigs and the ambient air.

If it will be a calorimetric test, the instrumented stack will be put within a closed and sealed vessel (Figure 2), fully equipped with thermocouples, so as to be able to calculate

the energy released by the cell during thermal runaway, Q_+ (kJ), using equation (1) below, where m_{setup} is the mass of the whole setup (vessel+cell+jig) (g), c_{p_setup} is the mean specific heat capacity of the setup (kJ/g/K), ΔT_{setup} is the temperature change of the setup (K), and $Q_{heating}$ is the heating energy applied to the cell by the wire supply (kJ).

$$Q_+ = m_{setup}.c_{p_setup}.\Delta T_{setup} - Q_{heating} \quad (1)$$

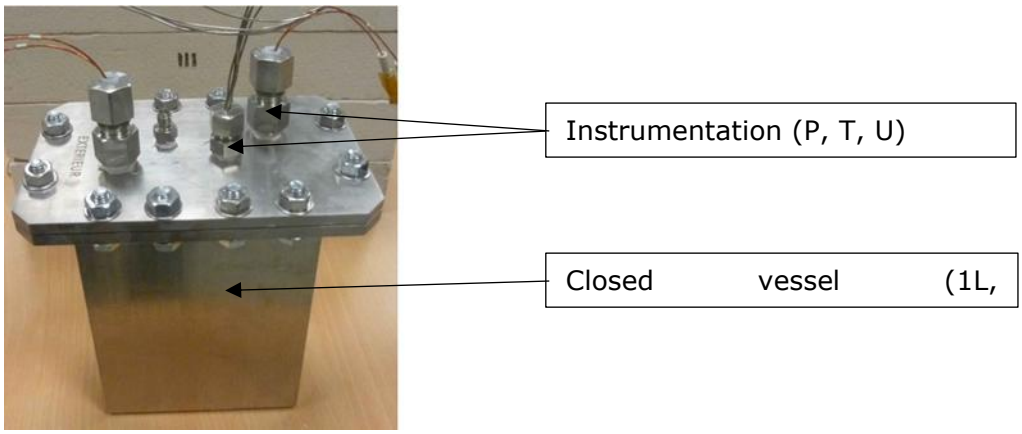


Figure 2. Example of closed vessel for calorimetric abuse test

The optical view of the runaway will not be allowed by this kind of setup.

In both cases, the cell will then be slowly charged until reaching full capacity, just before the abuse test. This one will start with a controlled heating phase of the cell, with a slope of minimum 6°C/min. The power will finely be controlled with a power supply and will be sent to the heating pad until thermal runaway will occur.

The classical temperature profiles during this kind of abuse test are presented in Figure 3.

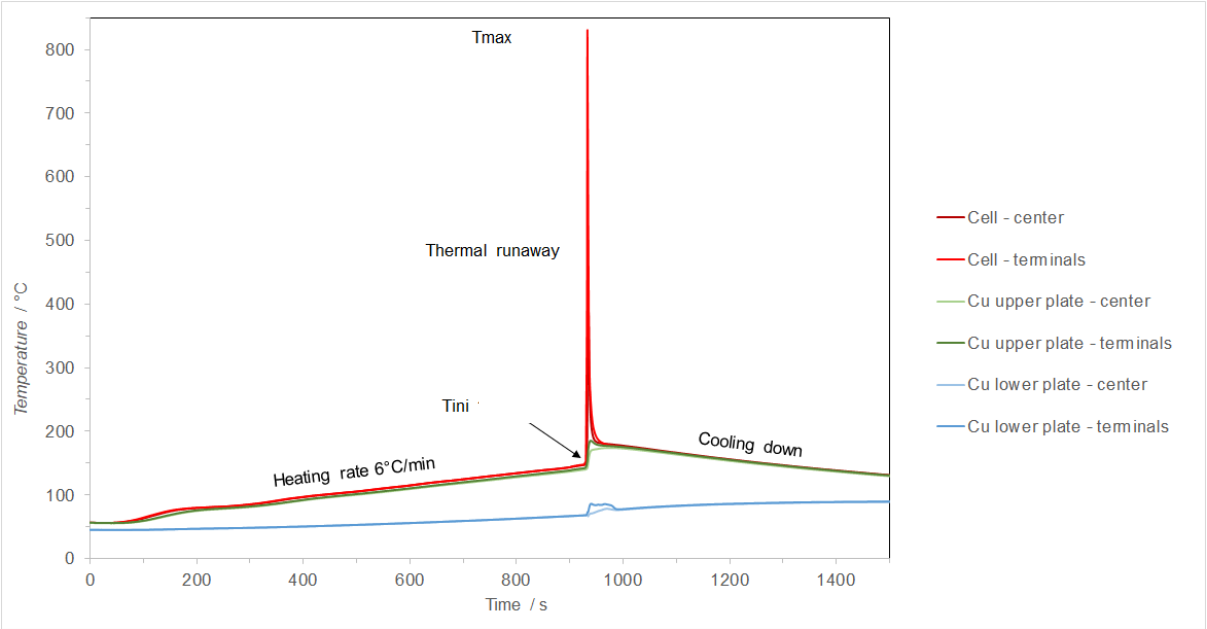


Figure 3. Example of temperature profiles during overtemperature abuse test

For **overcharging abuse tests**, the preparation phases will be the same as for overheating abuse tests: open-air or closed vessel, jigs, thermocouples, cameras, etc. Only the heating pad -and linked thermal insulation- will not be added.

The cell will then be slowly charged until reaching full capacity, just before the abuse test. This one will start with a controlled overcharge phase of the cell, at constant C-rate (typically 1C), until thermal runaway will occur.

These two protocols are applicable for both cell and mini-module tests. In this last case, only one of the constitutive cells of the mini-module will be thermically or electrically abused (trigger cell), the other(s) being only considered as target cell(s).

10 MODULE SPECIFICATION AND TESTS

Each module will be composed ideally of 4 cells of 5Ah assembled in series, to target around 15V mean voltage (each cell is around 3.7 V nominal voltage). Each cell will be individually packaged in a coffee-bag packaging and monitored by voltage sensors.

In order to characterize the self-heating behaviour within the module assembly, some thermocouples will be positioned in several areas. This will help to understand where are the hot and cold points to optimize module's design and harmonize at maximum its thermal homogeneity.

Thermal runaway propagation tests (TRP) will be performed on these mini-modules to evaluate if thermal runaway propagation from cell to cell happens or not.

11 CONCLUSIONS

This deliverable relies on electrochemical and safety testing protocols for the 1Ah and 5Ah cells. These tests will be performed in the frame of WP6. This complete list of tests allows covering the main requirements needed by SOLIDBAT to answer the proposal and ensure technical and practical conclusions on the 1Ah and 5Ah cells developed inside the project. An important note is that this deliverable is evolutive and could be updated depending on the preliminary results obtained at lab-scale level (WP3).



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