

## Performance tests in standards on Li-ion batteries

This table covers performance tests for Li-ion batteries. It is made in the European projects eCaiman, Spicy and Naiades.

[batterystandards.info](http://batterystandards.info)



	IEC 62660-1:2010 (Cell Level)	ISO 12405-1:2011 (Module & System level)	ISO 12405-2:2012 (Module & System level)	QC/T 743-2006	DOE-INL/EXT-15-34184																																																														
Capacity	7.2 Capacity.	7.2 Energy and capacity at different temperatures and discharge rates. 7.2.2 Test procedure.	7.2 Energy and capacity at different temperatures and discharge rates. 7.2.2 Test procedure.	6.2.5 Discharge capacity at 20 °C 6.2.6 Discharge capacity at -20 °C 6.2.7 Discharge capacity at 55 °C	3.2 Static Capacity Test																																																														
	1/3 C for BEV 1C for HEV Temperature: 0, 25, 45 °C	1 C for BEV 10C & 20C for HEV Temperature: -25, RT, 40 °C	C/3, 1C, 2C, Max allowed Crate Temperature: -18,-10,0,RT, 40°C	C/3 Temperature:-20°C +/-2°C, 20° +/-5°C, 55 +/-2°C	C/3 at 30°C (recommended) and manufacturer or application specific																																																														
Power	7.4 Power. 7.4.1 Test method.	7.3 Power and internal resistance. 7.3.2 Pulse power characterization profile.	7.3 Power and internal resistance. 7.3.2 Pulse power characterisation profile.	6.2.8.1 High energy density battery. 6.2.8.2 High power density battery.	3.4 Hybrid Pulse Power Characterization Test																																																														
	10s pulse & 10 min pause SOC: 20, 50, 80 % Temperature: 40, 25, 0, -20°C	10s pulse & 10 min pause SOC: 80, 65, 50, 35, 20 % Temperature: -25, RT, 40 °C	10s pulse & 10 min pause SOC: 90,70, 50, 35, 20 % Temperature: -25,-18,-10,0,RT, 40°C	10s pulse & 10 min pause SOC: 90% to 10% with 10% increments Temperature: 20°C +/-5°C	10s pulse and 1h pause at 30°C (recommended) and manufacturer or application specific																																																														
	<p><b>Table 2 – Examples of charge and discharge current</b></p> <table border="1"> <thead> <tr> <th rowspan="2">Application</th> <th colspan="5">Charge and discharge current</th> </tr> <tr> <th colspan="5">A</th> </tr> </thead> <tbody> <tr> <td>BEV</td> <td>1/3 I<sub>L</sub></td> <td>1 I<sub>L</sub></td> <td>2 I<sub>L</sub></td> <td>5 I<sub>L</sub></td> <td>I<sub>max</sub></td> </tr> <tr> <td>HEV</td> <td>1/3 I<sub>L</sub></td> <td>1 I<sub>L</sub></td> <td>5 I<sub>L</sub></td> <td>10 I<sub>L</sub></td> <td>I<sub>max</sub></td> </tr> </tbody> </table>	Application	Charge and discharge current					A					BEV	1/3 I <sub>L</sub>	1 I <sub>L</sub>	2 I <sub>L</sub>	5 I <sub>L</sub>	I <sub>max</sub>	HEV	1/3 I <sub>L</sub>	1 I <sub>L</sub>	5 I <sub>L</sub>	10 I <sub>L</sub>	I <sub>max</sub>	<p><b>Table 3 – Pulse power characterization profile</b></p> <table border="1"> <thead> <tr> <th>Time increment s</th> <th>Time cumulative s</th> <th>Current</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>18</td> <td>18</td> <td>I<sub>dp,max</sub></td> </tr> <tr> <td>40</td> <td>58</td> <td>0</td> </tr> <tr> <td>10</td> <td>68</td> <td>-0,75 I<sub>dp,max</sub></td> </tr> <tr> <td>40</td> <td>108</td> <td>0</td> </tr> </tbody> </table>	Time increment s	Time cumulative s	Current	0	0	0	18	18	I <sub>dp,max</sub>	40	58	0	10	68	-0,75 I <sub>dp,max</sub>	40	108	0	<p><b>Table 3 – Pulse power characterisation profile</b></p> <table border="1"> <thead> <tr> <th>Time increment [s]</th> <th>Cumulative Time [s]</th> <th>Current</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>18</td> <td>18</td> <td>I<sub>dp,max</sub></td> </tr> <tr> <td>102</td> <td>120</td> <td>0,75 I<sub>dp,max</sub></td> </tr> <tr> <td>40</td> <td>160</td> <td>0</td> </tr> <tr> <td>20</td> <td>180</td> <td>-0,75 I<sub>dp,max</sub></td> </tr> <tr> <td>40</td> <td>220</td> <td>0</td> </tr> </tbody> </table>	Time increment [s]	Cumulative Time [s]	Current	0	0	0	18	18	I <sub>dp,max</sub>	102	120	0,75 I <sub>dp,max</sub>	40	160	0	20	180	-0,75 I <sub>dp,max</sub>	40	220	0	High Energy density Discharge 4,5C/3 @ 20°C +/-5°C High Power density Discharge 12C/3 @ 20°C +/-5°C	DCH: 30s @ I <sub>max</sub> Pause: 40s CH: 10s @ 0.75*I <sub>max</sub>
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Energy	7.5 Energy, 7.5.1 Test method.	Same as 7.2.	Same as 7.2																																																																
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Energy efficiency	7.8 Energy efficiency 7.8.1.1 Test for normal conditions.	7.8 Energy efficiency. 7.8.3 Test procedure.	7.4 Energy efficiency at fast charging. 7.4.2 Test procedure.																																																																
	Discharge at room temperature SOC: 100, 70 % Temperature: 45,0,-20°C	Discharge at room temperature SOC: 35, 50, 65 % Temperature: RT, 40, 0 °C	ASOC's : 10% SOC increment Temperature: Tmin, 0, RT °C 1C,2C, 1c max																																																																
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Despite our care we do not claim to cover all standards and that all test topics have been given here. The organisations that categorised the available test standards cannot be kept responsible for your decisions.

The involved institutes of this survey are:

