Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals

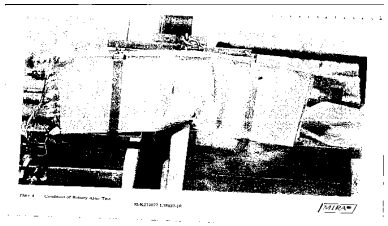
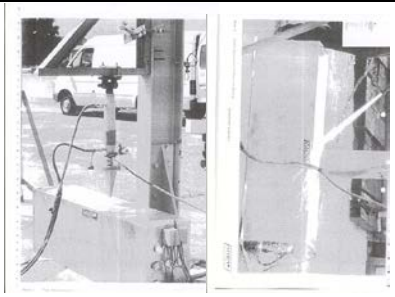
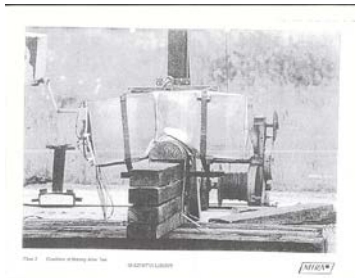
5 September 2018

Sub-Committee of Experts on the Transport of Dangerous Goods

Fifty-fourth session
Geneva, 26 November-5 December 2018
Item 2 (f) of the provisional agenda
Recommendations made by the Sub-Committee on its fifty-first, fifty-second and fifty-third sessions and pending issues: miscellaneous pending issues

Sodium-Nickel chloride ($Na\text{-}NiCl_2$)

Transmitted by the expert from Switzerland

n°	Test	Certification body	Date	Image	Standard	Application	Battery / Cell	SOC%	Status	Report	Video	Result	Description
1	***Crash Barrier Penetration***	**MIRA The Motor Industry Research Association**	1992			Automotive	Battery	100	HOT	yes	no	**Positive**	Dropping the battery from a height of 9.8 meters onto the end of a 1 meter long section of Arm coTM crash barrier so that the barrier impacted the center of the battery's side; this test was intended to simulate the effects of a side impact.
2	***Fire extinguishing on a Damaged Battery***	**MIRA The Motor Industry Research Association**	1992		-	Automotive	Battery	100	HOT	yes	no	**Positive**	MIRA tested the effects of applying an aqueous foam fire fighting gent on a fullycharged battery by piercing it with a hydraulic ram, with drawing the pike, and applying the contents of two `Chubb" handheld fire extinguishers—dispensing a total of 18 kg of aqueous foam, the entire contents of the extinguishers —at 3-minute intervals over a 30-minute duration.145 The test objective was simply to observe the effects of such an action on a charged, damaged, Zebra battery.
3	***Drop Test (10m)***	**MIRA The Motor Industry Research Association**	1992		-	Automotive	Battery	100	HOT	yes	no	**Positive**	Dropping the battery from a height of 10 meters onto a rigid 150-mm radius half-cylinder, and was intended to simulate the effects of a side impact into a pole or tree.
4	***Petrol Fire Test***	**MIRA The Motor Industry Research Association**	1992		-	Automotive	Battery	100	HOT	yes	no	**Positive**	The fullly charged, fully operational battery was suspended 400 mm above a tray containing burning gasoline, and maintained there for 30 minutes. Both wind speed and ambient temperatures were measured at the beginning of the test and found to be zero, and 20°C, respectively. The battery case vacuum was also released to include the loss of its insulating effect.

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5	***Immersion Test***	**MIRA The Motor Industry Research Association**	1995		-	Automotive	Battery	100	HOT	yes	yes	**Positive**	Immersion Test in Salt water
6	***Vibration Test***	**Cape Environmental**	1996		-	Automotive	Battery	100	HOT	yes	no	**Positive**	
7	***Crash test***	**TNO**	2012		EURONCAP	Automotive	Battery	101	HOT	yes	yes	**Positive**	EuroNCAP Frontal OBD 64km/h crash test performed at TNO
8	***Vibration Test***	**Centrotecnica**	2014		UL1973	Energy Storage / Light Raiway	Cell	100	COLD	yes	no	**Positive**	The test reference is UL1973, section B.2.2.2. One fresh sample of the cell shall be subjected to simple harmonic motion with an amplitude of 0.8 mm (1.6 mm total maximum excursion). The frequency is to be varied at a rate of 1 Hz/min between 10 and 55 Hz, and return in not less than 90 nor more than 100 min. The cell is tested in three mutually perpendicular directions unless it has only two axes of symmetry, in which case it is only to be tested perpendicular to each axis. The vibration conditioning shall be at an ambient of 20 ±5°C (68 ±7.5°F). At the conclusion of the testing, the cell is to be operated (i.e. charged/discharged) for 1 cycle at it normal operating temperature to determine if it is hazardous after being subjected to the vibration conditioning.
9	***Shock Test***	**Centrotecnica**	2014		UL1973	Energy Storage / Light Raiway	Cell	100	COLD	yes	no	**Positive**	The test reference is UL1973, section B.2.2.1. A fresh sample of the cell shall comply with the shock test as outlined below. The sample is to be secured to the testing machine by means of a rigid mount, which supports all mounting surfaces of the sample. Each sample is to be subjected to a total of three shocks of equal magnitude. The shocks are to be applied in each of three mutually perpendicular directions for a total of 18 shocks unless the sample has only two axes of symmetry, in which case only two directions are tested for a total of 6. The parameters of the shock applied are as noted in the Table 1 below. The shocks shall be applied with the sample at room temperature of 25 ±5°C (77 ±7.5°F). At the conclusion of the shock testing the sample is operated (i.e. charged/discharged) at its normal operating temperature for 1 cycle to determine if it has been made hazardous as a result of the shock conditioning.

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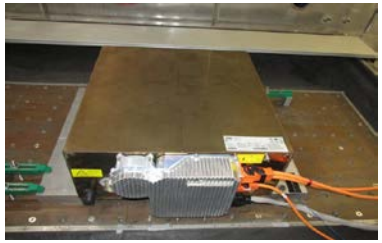
10	***Crush test UL 1973 section 8.3***	**FIAMM**	2012		UL1973	Energy Storage / Light Raiway	Battery	100	COLD	yes	no	**Positive**	The Battery enclosure has sufficient strength to safety withstand a crash force of 1112 N for 1 min without catch fire, explode, or leakage electrolyte. - No evidence of a dielectric breakdown. Current measured to 1 kV ac for 1′ = 0.145 mA - The measured insulation resistance > 1 MΩ.
11	***Impact Test UL 1973 section 8.4***	**FIAMM**	2012		UL1973	Energy Storage / Light Raiway	Battery	100	COLD	yes	no	**Positive**	
12	***Vibration test UL 1973 section 8.1***	**FIAMM**	2012		UL1973	Energy Storage / Light Raiway	Battery	100	COLD	yes	no	**Positive**	The test reference is UL1973, section 8.1. The sample is to be secured to the testing machine by means of a rigid mount, which supports all mounting surfaces of the sample. The sample shall be subjected to a vibration test in accordance with the Simulated Long Life Testing at Increased Random Vibration Levels Tests of the Standard for Railway Applications – Rolling Stock Equipment – Shock and Vibration Tests, IEC 61373, for the appropriate Category and Class of equipment as determined by the intended rail installation (Category and Class of equipment is defined in the Standard for Railway Applications – Rolling Stock Equipment – Shock and Vibration Tests, IEC 61373; in this case category 1, class B, body mounted). The sample shall be subjected to vibration in 3 mutually perpendicular directions. The sample shall be examined 6 h after testing. The sample shall not leak electrolyte, catch fire or explode.
13	***Vibration Test***	**SGS Societè General de Sourveillance-TUV**	2016		R100-2 Annex 8A	Automotive	Battery	50	COLD	yes	yes	**Positive**	The tested-devices shall be subjected to a vibration having a sinusoidal waveform with a logarithmic sweep between 7Hz and 50Hz and back to 7Hz traversed in 15min. This cycle shall be repeated 12 times for a total of 3h in the vertical direction of the mounting orientation of the REESS as specified by the manufacturer.

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14	***Mechanical Shock***	**SGS Societè General de Sourveillance-TUV**	2016		R100-2 Annex 8C	Automotive	Battery	50	HOT	yes	yes	**Positive**	The tested-device shall be decelerated or, at the choice of the applicant, accelerated in compliance with the acceleration corridors which are specified in Tables 1 to 3.
15	***Mechanical Integrity***	**SGS Societè General de Sourveillance-TUV**	2016		R100-2 Annex 8D	Automotive	Battery	70	HOT	yes	yes	**Positive**	The tested-device shall be crushed between a resistance and a crush plate as described in Figure 1 with a force of at least 100kN, but not exceeding 105kN, unless otherwise specified in accordance with Paragraph 6.4.2. of this Regulation, with an onset time less than 3min and a hold time of at least 100ms but not exceeding 10s. A higher crush force, a longer onset time, a longer hold time, or a combination of these, may be applied at the request of the manufacturer. The application of the force shall be decided by the manufacturer together with the Technical Service having consideration to the direction of travel of the REESS relative to its installation in the vehicle. The application force being applied horizontally and perpendicular to the direction of travel of the REESS. The test shall end with an observation period of 1h at the ambient temperature conditions of the test environment.

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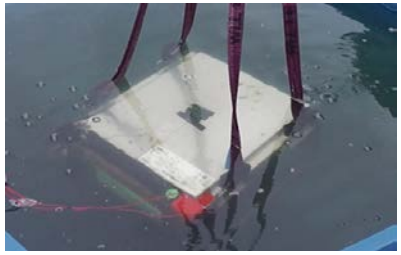
16	***Fire Resistance***	**SGS Societè General de Sourveillance-TUV**	2016	 	R100-2	Automotive	Battery	50	HOT	yes	yes	**Positive**	The tested-device shall be placed on a grating table positioned above the pan, in an orientation according to the manufacturer's design intent. The grating table shall be constructed by steel rods, diameter 6-10mm, with 4-6cm in between. If needed the steel rods could be supported by flat steel parts. The flame to which the tested-device is exposed shall be obtained by burning commercial fuel for positive-ignition engines (hereafter called "fuel") in a pan. The quantity of fuel shall be sufficient to permit the flame, under free burning conditions, to burn for the whole test procedure. The fire shall cover the whole area of the pan during whole fire exposure. The pan shall therefore exceed the horizontal projection of the tested-device by at least 20cm, but not more than 50cm. The sidewalls of the pan shall not project more than 8cm above the level of the fuel at the start of the test. The pan filled with fuel shall be placed under the tested-device in such a way that the distance between the level of the fuel in the pan and the bottom of the tested-device corresponds to the design height of the tested-device above the road surface at the unladen mass. (only relevant for Vehicle based Tests) The pan filled with fuel shall be placed under the tested-device in such a way that the distance between the level of the fuel in the pan and the bottom of the tested-device is approximately 50cm (only relevant for component based Tests) […] During the test, the tested-device shall exhibit no evidence of explosion..
17	***Immersion Test***	**FIAMM**	2012		-	Automotive	Battery	100	HOT	yes	yes	**Positive**	Soaking tank 900 liters of salted water 5% NaCl for 3 hours