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SHORT-CIRCUIT TESTS ON VERY HIGH POWER SUPERCAPACITOR MODULE BASED ON 9 000 FARADS CELL DESIGNED FOR LIGHT RAILWAY TRANSPORTATION SYSTEMS

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Abstract

Urban light railway applications get benefit of high power energy storage systems to assume peak power and energy during starting and breaking phases for recovery energy of the vehicles. A typical power ratio of ten is observed between peak and average power delivered through the catenary. Such embedded energy storage system allows reducing energy consumption by recovering the full inertia energy during breaking time, reducing electrical line losses and offer an hectometric autonomy. New high power supercapacitors are developed specially for light railway vehicles with the objectives of reducing: cells number, volume and weight of the energy storage system designed for about 1,5kWh. However, by increasing cell size and capacity, the cells assembly present higher risk due to the highest energy integration with a very strong power capability. The paper presents the experimental results of this highest cell capacity until the worst case of short-circuit failure due to electrical fail or crash accident. Such events are to be considered for public transportation to evaluate the fire and explosion risks. Short-circuit test results show high fault current, over 10kA for one cell, and 43,8kA for a modular assembly of 24 cells. Test protocol and metrology are discussed.

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