P2657

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Status: PAR for a New IEEE Standard

1.1 Project Number: P2657
1.2 Type of Document: Guide
1.3 Life Cycle: Full Use

2.1 Title: Guide on Energy Feedback Systems for DC Traction Power Supply System

3.1 Working Group: Energy Feedback System for DC Traction Application (VT/RTSC/Energy Feedback System)
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None

3.2 Sponsoring Society and Committee: IEEE Vehicular Technology Society/Rail Transportation Standards Committee (VT/RTSC)
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4.1 Type of Ballot: Entity
4.2 Expected Date of submission of draft to the IEEE-SA for Initial Sponsor Ballot: 08/2020
4.3 Projected Completion Date for Submittal to RevCom
Note: Usual minimum time between initial sponsor ballot and submission to Revcom is 6 months.: 02/2021

5.1 Approximate number of entities expected to be actively involved in the development of this project: 7
5.2 Scope: This guide specifies the requirements and testing methods for a stationary energy feedback system to be used in trackside installations for a DC electrified railway power supply network. This system can harvest electric energy from the DC power supply network and feed the energy back to the AC power supply network.
This guide covers terms and definitions, rating values, performance requirements, and test requirements. Performance requirement include efficiency, temperature, lifetime, control and protection, electromagnetic compatibility (EMC), and mechanical characteristics. Test requirement will cover methods and criteria for type test, routine test, and commissioning test.
This guide covers systems that are installed to achieve the feedback of regenerative energy or power compensation.
However, the systems which have the following functions but are not apart an energy feedback system are not included:
* Resistive consumption of regenerated power
* Energy storage system
* Bidirectional converter systems (etc. reversible substation) instead of diode rectifiers and inverters
Although it is assumed that the system uses the following typical semiconductor devices as the converter switch component, this guide is intended to apply to other existing or future devices:
* Thyristor
* Insulated Gate Bipolar Transistors (IGBT)

5.3 Is the completion of this standard dependent upon the completion of another standard: No
5.4 Purpose: The purpose of this guide is to standardize the performance requirements and testing methodology for energy feedback systems. In addition, the use of this guide is to achieve:

- Efficient use of regenerative energy (energy conservation)
- Reduction of rolling stock maintenance (reduction of pads/brake shoe wear, etc.)
- Avoid adverse effects of heat generated during braking (e.g. in tunnels, etc.)
- Provide reactive power compensation for grid
- Allow for the reduction of the rectifiers' design
capacity

5.5 Need for the Project: Transportation is an energy intensive industry and it is not surprising that electric rail transit operators are amongst the largest electricity consumers in urban areas. To save natural resources and counteract global warming, techniques to save energy and/or to improve environmental quality are attracting great attention.
In DC traction power supply systems, electric rail vehicles fitted with regenerative braking systems have been introduced. However, the energy regenerated by a braking train usually has to be consumed within the DC network, because the majority of DC power supply substations are often unidirectional. Nevertheless, it is not guaranteed that there are adequate loads for regenerative braking trains. In such a circumstance, regenerative braking becomes ineffective, either in part or in whole. There are several technologies to solve this problem:
* Resistor consumption - the surplus regenerate energy is consumed by resistors;
* Energy Storage Systems (ESSs) - the surplus regenerate energy is stored in EDLC or batteries;
* Energy feedback Systems (EFSs) - the surplus regenerate energy is feedback to the AC power system.

For the resistor consumption technology, the standard IEC 60322 was published, and for the ESSs, the standard IEC 62924 was published as well. However, while there are various kinds of EFSs that have already been used in many countries, there are no existing standards for EFSs. With many different suppliers of products, we expect EFSs will continued to be applied in the future decades. Therefore, it is necessary to put forward a standard for EFSs.

5.6 Stakeholders for the Standard: Equipment manufacturers, railway infrastructure operators, train manufacturer, and other interested entities.

Intellectual Property
6.1.a. Is the Sponsor aware of any copyright permissions needed for this project?: No
6.1.b. Is the Sponsor aware of possible registration activity related to this project?: No

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7.1 Are there other standards or projects with a similar scope?: No
7.2 Joint Development
Is it the intent to develop this document jointly with another organization?: No

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8.1 Additional Explanatory Notes: