# IEC 62924

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# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

## Railway applications – Fixed installations – Stationary energy storage system for DC traction systems

## Applications ferroviaires – Installations fixes – Système stationnaire de stockage d'énergie pour les systèmes de traction en courant continu

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## FOREWORD

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International Standard IEC 62924 has been prepared by IEC technical committee 9: Electrical equipment and systems for railways.

The text of this standard is based on the following documents:

| FDIS | Report on voting |
|---|---|
| 9/2221/FDIS | 9/2244/RVD |

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

# INTRODUCTION

To save natural resources and counteract global warming, techniques to save energy and/or to improve environmental characteristics are drawing strong interest. In the railway industry, electric rail vehicles fitted with regenerative braking systems have been introduced, not only to save energy, but also to ease maintenance and to reduce the adverse effects of heat generated during braking (especially in tunnels).

However, in DC electric railways, when a train regenerates power, usually the power has to be consumed within the DC network, because DC power supply substations are usually not reversible. There is no guarantee that adequate load exists for regenerative braking trains; in such a circumstance, regenerative braking becomes ineffective, either in part or in whole. In this situation, the power supply network is unreceptive. Among the emerging technologies to improve receptivity is stationary energy storage systems (ESSs). A stationary ESS charges regenerative energy when the power supply network is unreceptive and stores it for use at a later time.

International Standards for stationary ESSs have not been issued. Before ESSs become widely used, international standardization of the basic system structure and measurement method for efficiency, etc., will serve as a guideline for users and manufacturers who want to introduce ESSs.

# RAILWAY APPLICATIONS – FIXED INSTALLATIONS – STATIONARY ENERGY STORAGE SYSTEM FOR DC TRACTION SYSTEMS

## 1 Scope

This document specifies the requirements and test methods for a stationary energy storage system to be introduced as a trackside installation and used in a power supply network of a DC electrified railway. This system can take electrical energy from the DC power supply network, store the energy, and supply the energy back to the DC power supply network when necessary. This document does not apply to onboard energy storage systems.

This document applies to systems which are installed to achieve one or more of the following objectives.

- Absorption of regenerative energy:
  - effective use of regenerative energy (saving energy);
  - reduction of rolling stock maintenance (reduction of brake shoe/pad wear, etc.);
  - avoidance of adverse effects of heat generated during braking (e.g. in tunnels, etc.).
- Power compensation:
  - compensation of line voltage;
  - reduction of peak power;
  - reduction in the requirement of the rectifier rating.

If this system is combined with one or more of the following functions, this document may be used as a guideline:

- reverse transmission of regenerated power to the upstream power supply network (e.g. inverting or reversible substations);
- use of the regenerated energy for purposes other than the running of trains, such as for station facilities, etc.;
- resistive consumption of regenerated power.

Although it is assumed that the system uses the following typical energy storage technologies, this document also applies to other existing or future technologies:

- batteries (lithium-ion, nickel metal hydride, etc.);
- capacitors (electric double layer capacitors, lithium-ion capacitors, etc.);
- flywheels.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60146 (all parts), *Semiconductor converters*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60850, *Railway applications – Supply voltages of traction systems*