# IEC 62845

Edition 1.0 2015-08

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

**Railway applications – Radio remote control system of traction vehicles for shunting application**

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**Applications ferroviaires – Système de radiocommande à distance des véhicules de traction pour application de manœuvre**

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INTERNATIONAL
ELECTROTECHNICAL
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INTERNATIONALE

ICS 45.060

ISBN 978-2-8322-2837-1

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# RAILWAY APPLICATIONS – RADIO REMOTE CONTROL SYSTEM OF TRACTION VEHICLES FOR SHUNTING APPLICATION

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International Standard IEC 62845 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 |
|---|---|
| 9/2044/FDIS | 9/2069/RVD |

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

The French version of this standard has not been voted upon.

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

This standard has been derived from EN 50239:1999 (see also Introduction).

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

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- replaced by a revised edition, or
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# INTRODUCTION

This International Standard is prompted to offer a minimum set of requirements for the application of remote control of traction vehicles by means of radio communication, operated by ground personnel during shunting. The minimum set of requirements is considered with reference to the following aspects:

– operational requirements of the use of radio remote control system;

– functional requirements of the radio remote control system;

– technical requirements of the radio remote control system.

This standard uses the following IEC standards for guidance:

– IEC 60571 Railway applications – Electronic equipment used on rolling stock

– IEC 62278 Railway applications – The specification and demonstration of Reliability, Availability, Maintainability and Safety (RAMS)

This International Standard is based on EN 50239:1999. The main changes with regard to EN 50239:1999 are listed below:

a) contents related to Safety Integrity Level (SIL) are deleted, in particular Annex A with all its examples of EN 50239:1999;

b) the text of this International Standard is considering only shunting application;

c) the title is replaced by "Railway applications – Radio remote control system of traction vehicles for shunting application".

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# RAILWAY APPLICATIONS – RADIO REMOTE CONTROL SYSTEM OF TRACTION VEHICLES FOR SHUNTING APPLICATION

## 1 Scope

This International Standard covers the application requirements relevant to the radio remote control of a traction unit for shunting application, operated by personnel not physically located at the controls within the vehicle cab.

Specification requirements of radio means and wireless protocols, as well as specification requirements of wireless communication between elements of the train, are not covered by this standard.

This international standard is applicable to newly manufactured vehicles or as retrofit on existing vehicles.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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IEC 60571:2012, *Railway applications – Electronic equipment used on rolling stock*

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IEC 62278, *Railway applications – Specification and demonstration of reliability, availability, maintainability and safety (RAMS)*

IEC 62279, *Railway applications – Communication, signalling and processing systems – Software for railway control and protection systems*

IEC 62425, *Railway applications – Communication, signalling and processing systems – Safety related electronic systems for signalling*

IEC 62498-1:2010, *Railway applications – Environmental conditions for equipment – Part 1: Equipment on board rolling stock*

ISO 14118, *Safety of machinery – Prevention of unexpected start-up*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

**3.1**
**addressing**
set of rules that allows only the designated transmitter to address the corresponding receiver

**3.2**
**anti-skid device**
device which limits skidding/blocking of any wheels during braking

**3.3**
**anti-slip device**
device which corrects slipping of driving wheels during traction

[SOURCE: IEC 60050-811:1991, 811-07-03]

**3.4**
**command signal**
signal from the transmitter or from the manual control device to the traction vehicle to perform the specified task

**3.5**
**direct acting brake**
braking system of the traction vehicle

**3.6**
**dynamic brake**
braking system that operates on the traction vehicle independently of the direct or indirect acting brake in an electrical or hydrokinetical mode

**3.7**
**indirect acting brake**
braking system of the train

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**3.8**
**manual control mode**
operation of traction vehicle by using local controls from within the vehicle cabin by the operator

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**3.9**
**multiple use of a radio frequency carrier system**
system which allows, with one radio frequency carrier, multiple transmission of messages in a network of several transmitters and receivers

**3.10**
**operation condition**
situation under which a system will satisfy a set of operational requirements

**3.11**
**operator**
person who drives the radio remote controlled traction vehicle

**3.12**
**operator vigilance device in remote control mode**
device, usually in the transmitter, which monitors the vigilance of the operator in the radio control mode and initiates a stop signal if no command is given within a preset time

**3.13**
**radio signal**
information transmitted on a radio frequency carrier

**3.14**
**radio transmission path**
path followed by radio signals between a transmitter and a receiver

**3.15**
**receiver**
part of the radio remote control system that converts transmitted radio signals into desired form of output signals

**3.16**
**remote control mode**
mode in which the traction vehicle is operated by the radio remote control system

**3.17**
**shunting**
moving vehicles for all purposes during the transportation other than arriving, departure and running

**3.18**
**start up**
change from the rest to the motion of the traction vehicle

**3.19**
**tilt switch device**
safety device in the transmitter to initiate a stop signal to the receiver if the transmitter is inadvertently tilted for longer than a preset time

**3.20**
**traction vehicle**
rail guided motorized vehicle

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**3.21**
**traction vehicle control unit**
device located on the traction vehicle to transform the output signals from the radio control receiver, or from the manual controls located on the traction vehicle, into commands and control signals for valves and monitoring functions, etc.

**3.22**
**transmitter**
part of radio remote control system that is used for converting operator given commands into radio transmission signals

## 4 The radio remote control system and its components

A radio remote control system shall comprise as a minimum:

- transmitter;
- receiver;
- remote control portable device;
- remote control stationary device;
- remote control onboard device.

NOTE For more details, refer to Figure A.1.

## 5 General operational requirements

**5.1** The use of the radio remote control shall not limit the safe and normal operational use of the traction vehicles.

**5.2** If the traction vehicle operates in radio remote control mode, all the command signals used in manual control mode shall be ineffective except the emergency stop command. If required, the warning signal, sanding, application of brake, decrease of power and motor stop commands may also be effective in radio remote control mode.

**5.3** The traction vehicle shall be equipped with an interlock feature to prevent simultaneous activation of manual control and radio remote control modes. Switching from manual control mode to radio remote control mode, and vice versa, shall be done only when the traction vehicle is at a standstill. Otherwise the brakes are automatically applied and power is decreased to minimum.

**5.4** The radio remote control system shall prevent an inadvertent initiation of the function – release of automatic shunting coupling. This shall be prevented by design and manufacture, e.g. applying two switches or single switch with a released lock, etc.

**5.5** Before putting the radio remote control system into operation the operator shall ensure that the correctly assigned transmitter for the traction vehicle is being used. The operator shall check that the safety-related control functions operate precisely as defined by operational instructions.

**5.6** As long as the traction vehicle is operating in radio remote control mode the operator shall be in charge of the transmitter at all times.

## 6 Radio remote control command signals

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### 6.1 Basic command signals

The radio remote control system shall be capable of giving the following command signals:

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– manual stop;
– automatic stop caused by tilt switch;
– forward direction;
– reverse direction;
– increase of power;
– decrease of power;
– application of direct acting brake;
– release of direct acting brake;
– tilt switch override;
– warning signal;
– sanding.

If an indirect acting brake is installed:

– application of indirect acting brake;
– release of indirect acting brake.

### 6.2 Additional command signals

If necessary, the radio remote control system shall be required to perform additional command signals depending on the traction vehicle type, equipment and operational conditions such as the following:

– release of the automatic shunting coupling;
– bell signal;
– operator vigilance in the radio remote control mode;

– uphill start;
– connection of pantograph to overhead line;
– release of pantograph from overhead line;
– application of dynamic brake;
– release of dynamic brake;
– filling stroke;
– engage transmission;
– disengage transmission;
– preset speed;
– radio remote reset;
– release of authority to command;
– demand of authority to command.

## 7 Stop functions

**7.1** The radio remote controlled traction vehicle includes safety related functions and they can be capable of automatically and immediately braking the traction vehicle to avoid potentially hazardous situations.

The stop function of the radio remote control system shall operate as follows:

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a) **manual stop**: The transmitter shall include a separate and clearly identifiable means of initiating the manual stop function of the traction vehicle and also for all motions that can cause a hazardous condition;

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b) **automatic stop**: the automatic stop shall be initiated when one of the following conditions occurs:

1) if a fault is detected in the system;

2) when the tilt switch device is operated for longer than a preset time.

   A contact bypass override switch can be fitted to prolong the preset time of operation of the device. This allows the operator to bend over in order to couple/decouple wagons. If a contact bypass override switch is set, an interlock shall be provided to avoid increase of power and release of the brakes and consequential movement of the traction vehicle;

3) when a valid signal on the radio transmission path has not been detected within preset time, e.g. loss of communication or interference (valid signals also include command signals and signals which confirm that the communication is established and maintained);

4) if fitted, an operator vigilance device in remote control mode (see 3.12) has not operated within a preset time.

**7.2** The transmitter shall be equipped with a tilt switch device and the tilt switch shall be omni-directional.

**7.3** After initiation of manual stop the minimum effect shall be to:

– apply rapid braking in the shortest possible time;
– decrease traction power to minimum.

In the case of automatic stop (see 7.1b) 1) to 4)), rapid braking shall be applied. Dependent on national and local operation conditions (e.g. operator aboard the train) in the event of 7.1b) 1) and 3) controlled braking shall be applied or a warning signal shall be given before rapid braking is applied.