



# SLOVENSKI STANDARD SIST-TP CLC/TR 50452:2007

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Railway applications - Radio remote control system of traction vehicle for freight traffic in multiple traction operation

Bahnanwendungen — Funkfernsteuerung von Triebfahrzeugen für Güterbahnen im Multitraktionsbetrieb

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Applications ferroviaires - Systeme de radiocommande a distance des locomotives et locotracteurs affectés au trafic fret en exploitation en traction multiple

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English version

**Railway applications –  
Radio remote control system of traction vehicle for freight traffic  
in multiple traction operation**

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Système de radiocommande à distance  
des locomotives et locotracteurs affectés  
au trafic Fret en exploitation en traction  
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Funkfernsteuerung von Triebfahrzeugen  
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This Technical Report was approved by CENELEC on 2006-02-18.

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**CENELEC**

European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

## Foreword

This Technical Report was prepared by SC 9XA, Communication, signalling and processing systems, of Technical Committee CENELEC TC 9X, Electrical and electronic applications for railways.

The text of the draft was circulated for vote in accordance with the Internal Regulations, Part 2, Subclause 11.4.3.3 and was approved by CENELEC as CLC/TR 50452 on 2006-02-18.

This Technical Report supersedes R009-005:2001.

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## Introduction

The purpose of this Technical Report is to serve as a guideline for the application of radio remote control system of traction vehicles for multitraction operation.

The European Standard EN 50239 is applicable for the radio remote control system of traction vehicles for freight traffic. This standard sets out 14 application examples. It does not include an example of multitraction operation; it only includes an example whereby a traction vehicle is controlled by an appropriate driving trailer in a train consist (example 13 of EN 50239).

This Technical Report is based on EN 50239 and provides an indication of the additional requirements relevant for the multitraction application.

### 1 General

Multitraction is used whenever

- the tractive effort of the traction vehicle is not sufficient for the particular operational application,
- different independent trains are linked together to form a longer train consist.

In a train consist with more than one traction vehicle, one of the traction vehicles is always the Leading Traction Vehicle (LTV). The other traction vehicles contained in the overall train consist are controlled and monitored by the LTV. This arrangement means that communication between the different traction vehicles is necessary.

Communication can be achieved by means of a cable link or a radio link. A radio link is for example necessary whenever there are wagons between the traction vehicles and whenever these wagons do not have any communication cables with appropriate infrastructure.

Commands are generally sent by the operating personnel only to the LTV.

If there are wagons between the traction vehicles, the effect of longitudinal dynamic effort and braking behaviour must be taken into consideration during risk analysis. This is applicable particularly when the overall train consist or individual train segments are very long and/or heavy.

It should be possible for every traction vehicle to be used as a LTV or as a Guided Traction Vehicle (GTV) in the train consist.

In all circumstances the operator should have a clear view of the track in the direction of travel.

With a radio link, particular attention should as a minimum be given to the following points:

- **Allocation of traction vehicles in the train consist**

- location and address of the GTV and LTV in the train consist;
- definition of direction of travel for each traction vehicle;
- it should be impossible for any LTV to control any GTV from another train consist at any time.

- **Consideration of special aspects of a radio link**

- maximum number of all traction vehicles in a radio system:
  - unique address for each traction vehicle,
  - address stock,
  - number of traction vehicles or trains that can be simultaneously operated in the area of coverage,
  - response time;
- radio response times;
- radio interference/radio interruption:
  - local infrastructure (e.g. stationary repeaters),
  - train consist equipment (e.g. multiple receivers and repeaters on the train),
- radio transmission system (see 9.2.4 of EN 50239):
  - EN 50159-1 closed transmission system, or
  - EN 50159-2 open transmission system;
- area of application;
- consideration given to regulations in the country of use;
- availability of the radio channel:
  - exclusive or non-exclusive frequencies in the area of application,
  - guaranteed time for connection establishment or command transmission depending on the assigned frequency channel.

- **Response after radio interruption**

(by the operator and/or automatically by the train consist)

- depending on the train length and weight involved;
- depending on whether the Brake Pipe (BP) is segmented or unsegmented;
- depending on the train speed;
- depending on the duration of radio interruption;
- depending on the local topography (e.g. tunnels).

## 2 Typical examples in multiple traction applications

The following fundamental distinctions are made for applications:

- segmented or unsegmented BP;
- operation of LTV
  - by means of portable transmitter outside the train consist,
  - on a driving trailer,
  - on the LTV;
- braking via BP only from the LTV or from several points in the train consist;
- two or more traction vehicles in the train consist.

Five typical combination examples are set out AnnexA.

### 3 Information for risk analysis

Example 13 of EN 50239 describes a situation in which one traction vehicle is controlled by means of radio remote control from an appropriate cabin.

The conditions specified for the equipment of the drivers cab are also applicable as minimum requirements for multitraction operation.

The safety level as defined in EN 50239 is based on unsegmented BP over the complete train consist. If a segmented BP is used additional measures shall be taken to maintain the same safety level as a minimum.

For the special situation in which a multitraction train consist is controlled by means of a portable remote control transmitter outside the driver's cab, the risk considerations of examples 1-12 detailed in EN 50239 can also be taken into consideration.

However, the safety-relevant functions detailed in Tables A.1 – A.4 of EN 50239 should be extended to include the following safety-relevant functions for multitraction operation:

1) Coordination of power/throttle and brake control

If an error occurs in the coordination of the power/throttle and brake control between the traction vehicles this may result in a dangerous situation.

If coordination is no longer possible (e.g. as a result of the radio link being interrupted), risk reduction measures are carried out, particularly with respect to ensuring compliance with the braking distances and ensuring protection against derailing. These measures can be carried out by the operator and/or by means of an automatic system response.

2) Unintended train separation

If a segmented BP is used the integrity of the train consist (i.e.no loss of vehicles or wagons) shall be monitored with additional measures.

### 4 Track infrastructure

In general, due consideration should be given to the local circumstances and the regulations of the countries of use with respect to existing track infrastructure, e.g.:

- signal or block section lengths;
- length of siding(overtaking) tracks.