PD CLC/TS 50546:2013

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Railway applications — Rolling stock — 3-phase shore (external) supply system for rail vehicles

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee GEL/9/2, Railway Electrotechnical Applications - Rolling stock.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Railway applications - Rolling stock - 3-phase shore (external) supply system for rail vehicles

Applications ferroviaires - Matériel roulant - Systèmes d'alimentation triphasée (externe) de quai pour les véhicules ferroviaires

Bahnanwendungen - Fahrzeuge - Dreiphasige Fremdeinspeisung für Eisenbahnfahrzeuge

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CENELEC

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

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Foreword

This document (CLC/TS 50546:2013) has been prepared by Working Group 19 of SC 9XB "Electromechanical material on board of rolling stock", of Technical Committee CLC/TC 9X, "Electrical and electronic applications for railways".

There is no appropriate European standard dealing with shore supply systems published. This System Technical Specification documents three power levels for 3AC 400 V / 50 Hz shore supply systems as set out below:

- 400kW - High Power System;
- 86kW – Medium Power System;
- 44kW – Low Power system.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Introduction

This standardization project was derived from the EU-funded Research project MODTRAIN (MODPOWER). It is part of a series of standards, referring to each other. The hierarchy of the standards is intended to be as follows:

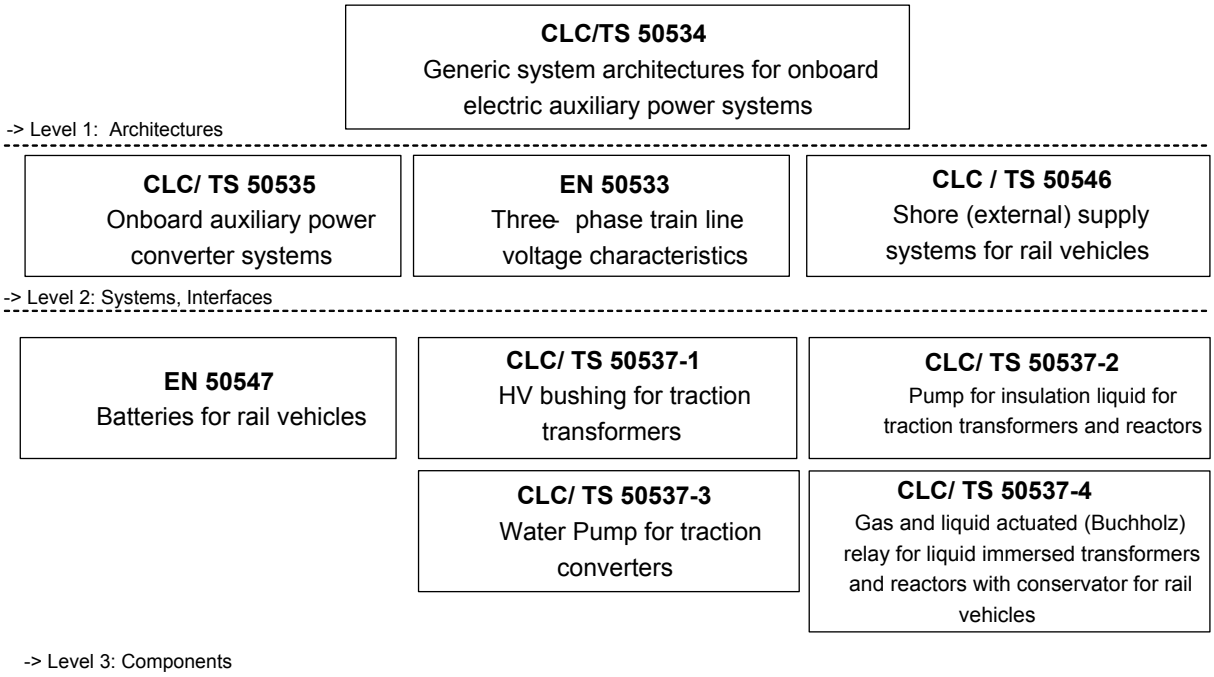

Figure 1 – Overview on the technical framework CLC/TS 50534 defines the basis for other depending standards

1 Scope

This Technical Specification provides the requirements for compatibility of systems defined and good practice for three phase AC 400 V/50 Hz shore (external) supply systems. It focuses on describing the defined interfaces regarding electrical power supply in stations, depots/workshops and stabling points into the rail vehicle.

This Technical Specification provides recommended characteristics of power supply and its connectors.

The electrical characteristics relate to 3 AC 400 V/50 Hz.

Sensing of phase rotation is outside the scope of this Technical Specification but it is assumed that phase sequence between the external supply and the railway vehicle is synchronised.

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.

EN 50467, *Railway applications — Rolling Stock — Electrical connectors, requirements and test methods*

EN 50533:2011, *Railway applications — Three-phase train line voltage characteristics*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

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

3.1.1
infeed point
in use connector on a vehicle

3.1.2
shore connector
connector, fitted to cables fed from the external source

3.1.3
vehicle connector
fixed connector, installed in a railway vehicle, which accepts an electrical power supply via the shore connector

3.2 Abbreviations

For the purposes of this document, the following abbreviations apply.

AC Alternating Current

EMC Electro Magnetic Compatibility

Hz Hertz

kW Kilowatt

A Amps

V Volts

4 System requirements

4.1 Applicability

Shore supply systems that feed auxiliary electrical equipment on board railway vehicles from an external power source.

4.2 Functional description

4.2.1 General

Shore supply systems have the following main functions:

- feed the auxiliary electrical equipment on board railway vehicles from an external power source;
- ensure safety during operation of shore supply systems;
- ensure that the connecting and disconnecting operations take place under conditions of zero current;
- ensure that movement of the train is not possible when the shore (external) power supply is physically connected.

4.2.2 Supply voltages for shore supply systems

Supply voltage range is:

3 AC 400 V/50 Hz voltage range ± 10 %

4.2.3 Power limitation

The maximum external supply power for one infeed point is limited to the values specified in Table 1.

Table 1 – Specification of rated operating current

Type of Socket	Rated operating current (continuous load at an ambient temperature of 20 °C)	Remarks
3 AC 400 V/50 Hz	600 A per phase	400 kW High power system
3 AC 400 V/50 Hz	125 A per phase	86 kW Medium power system
3 AC 400 V/50 Hz	63 A per phase	44 kW Low power system

4.2.4 Additional requirements

All shore (external) supply systems shall be equipped with a clearly visible and readily identifiable emergency tripping device to disconnect the power supply. This tripping device shall be coloured red.

An earth fault system shall be provided to ensure that:

- the shore supply system shall be prevented from being energised when a ground fault is already present;
- if energised the shore supply system shall trip on detection of a ground fault.

It is assumed that the railway vehicle auxiliary system complies with Clause 5 of EN 50533:2011.

NOTE Due to leakage currents caused by EMC-filters a ground fault can be detected in some cases. Therefore, an adaptive residual current circuit breaker or a short-time suppression of the ground fault detection can be used to avoid this operational condition.

The vehicle connector shall not be energised from the onboard auxiliary electrical supply.

Electrical parts of the shore connector shall be de-energised when the shore (external) supply system is not in use.

The system has to be designed to prevent the disconnection of the railway vehicle from the shore (external) power supply under any load.

Overload protection shall be provided on the shore (external) power supply that takes into account the inrush current and starting characteristics of the railway vehicle auxiliary loads, particularly on high power auxiliary systems.

A system shall be provided to ensure that movement of the train is not possible when the shore (external) power supply is physically connected.

4.2.5 Environmental conditions

The design of the external shore supply system shall be such that it is capable of withstanding the environmental conditions in which it is to be installed according to EN 50467.

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