

**Railway applications -  
Mounted parts of the traction transformer and cooling system -  
Part 2: Pump for insulating liquid for traction transformers and reactors**

Applications ferroviaires -  
Accessoires des transformateurs  
de traction et systèmes  
de refroidissement -  
Partie 2: Pompe pour liquide isolant  
des transformateurs principaux  
et bobines d'inductance

Bahnanwendungen -  
Anbauteile des Haupttransformators  
und Kühlsystems -  
Part 2: Pumpe für Isolierflüssigkeiten  
für Haupttransformatoren  
und Drosselspulen

This Technical Specification was approved by CENELEC on 2010-01-22.

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**CENELEC**

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

**Central Secretariat: Avenue Marnix 17, B - 1000 Brussels**

## Foreword

This Technical Specification was prepared by Working Group 24 of SC 9XB, Electromechanical material on board of rolling stock, of Technical Committee CENELEC TC 9X, Electrical and electronic applications for railways.

It was circulated for voting in accordance with the Internal Regulations, Part 2, Subclause 11.3.3.3 and was accepted as a CENELEC Technical Specification on 2009-12-11.

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

The following date was fixed:

- latest date by which the existence of the CLC/TS  
has to be announced at national level (doa) 2010-07-22

The CLC/TS 50537 series "*Railway applications – Mounted parts of the traction transformer and cooling system*" consists of four different parts:

- Part 1: HV bushing for traction transformers;
- Part 2: Pump for insulating liquid for traction transformers and reactors;
- Part 3: Water pump for traction converters;
- Part 4: Gas and liquid actuated (Buchholz) relay for liquid immersed transformers and reactors with conservator for rail vehicles.

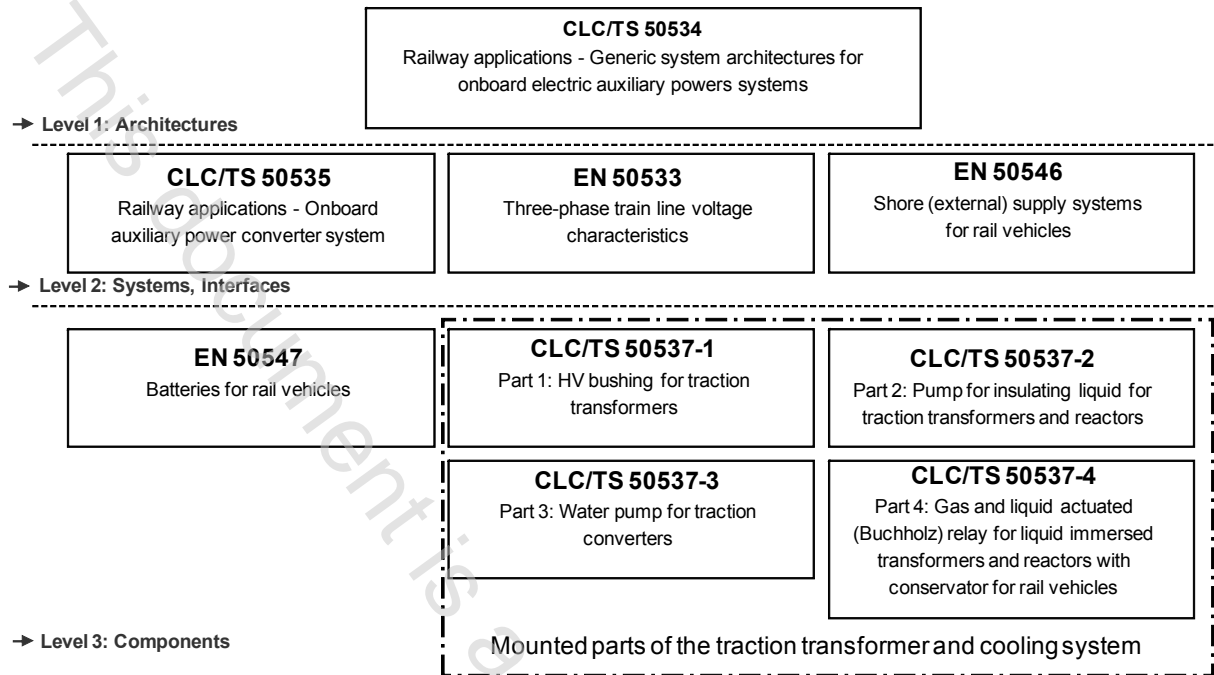
The CLC/TS 50537 series shall be read in conjunction with CLC/TS 50534 <sup>1)</sup> "*Railway applications – Generic system architectures for onboard electric auxiliary power systems*".

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:

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<sup>1)</sup> Under development.

**Overview on the technical framework**  
**CLC/TS 50534 defines the basis for other depending standards**



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## 1 Scope

This Technical Specification covers requirements for electric pumps which generate the circulation of insulation liquid in traction transformers and reactors of rail vehicles and their associated cooling system.

The pumps covered by this Technical Specification are rotodynamic pumps driven by a squirrel cage induction motor which is immersed in the insulating liquid.

CLC/TS 50537-2 gives consideration to both technical and normative requirements of the railway environment and restricts the variety provided by industry-wide standards for pumps (for example EN 50216-7 and EN ISO 9906). It determines requirements and tests enabling the interchangeability especially regarding electrical, mechanical and hydraulic interfaces. Furthermore, service conditions are described.

## 2 Normative references

The following referenced documents are indispensable for the application 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.

TS 45545 (series):2009 <sup>2)</sup>	Railway applications – Fire protection on railway vehicles
CLC/TS 50467	Railway applications – Rolling stock – Electrical connectors, requirements and test methods
CLC/TS 50534 <sup>3)</sup>	Railway applications – Generic system architecture for onboard electric auxiliary power systems
EN 1092-1:2001 <sup>4)</sup>	Flanges and their joints – Circular flanges for pipes, valves, fittings and accessories, PN designated – Part 1: Steel flanges
EN 1092-2:1997	Flanges and their joints – Circular flanges for pipes, valves, fittings and accessories, PN designated – Part 2: Cast iron flanges
EN 1092-4:2002	Flanges and their joints – Circular flanges for pipes, valves, fittings and accessories, PN designated – Part 4: Aluminium alloy flanges
EN 1561	Founding – Grey cast irons
EN 1563	Founding – Spheroidal graphite cast irons
EN 1706:1998	Aluminium and aluminium alloys – Castings – Chemical composition and mechanical properties
EN 50125-1:1999	Railway applications – Environmental conditions for equipment – Part 1: Equipment on board rolling stock
EN 50216-7:2002	Power transformer and reactor fittings – Part 7: Electric pumps for transformer oil
EN 50533 <sup>3)</sup>	Three-phase train line voltage characteristics

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<sup>2)</sup> Part 5 is of CENELEC origin – Other parts are from CEN.

<sup>3)</sup> Under development.

<sup>4)</sup> Superseded by EN 1092-1:2007.

EN 60034-1:2004	Rotating electrical machines – Part 1: Rating and performance (IEC 60034-1:2004)
EN 60034-9:2005	Rotating electrical machines – Part 9: Noise limits (IEC 60034-9:2003, mod.)
EN 60085:2004 <sup>5)</sup>	Electrical insulation – Thermal classification (IEC 60085:2004)
EN 60349-2:2001	Railway applications – Rotating electrical machines for rail and road vehicles – Part 2: Electronic converter-fed alternating current motors (IEC 60349-2:1993, mod.)
EN 60529:1991 + A1:2000	Degrees of protection provided by enclosures (IP code) (IEC 60529:1989 + A1:1999)
EN 60721-3-5:1997	Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Section 5: Ground vehicle installations (IEC 60721-3-5:1997)
EN 61373:1999	Railway applications – Rolling stock equipment – Shock and vibration tests (IEC 61373:1999)
EN ISO 9906:1999 + corr. Dec. 2004	Rotodynamic pumps – Hydraulic performance acceptance tests – Grades 1 and 2 (ISO 9906:1999)
ISO 281:2007	Rolling bearings – Dynamic load ratings and rating life
ISO 4406:1999	Hydraulic fluid power – Fluids – Methods for coding level of contamination by solid particles

### 3 Terms and definitions

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

#### 3.1

##### **rotodynamic pump**

pumps based on bladed impellers which rotate within the fluid to impart a tangential acceleration to the fluid and a consequent increase in the energy of the fluid. The purpose of the pump is to convert this energy into pressure energy of the fluid to be used in the associated piping system.

In-line pumps and radial pumps are rotodynamic pumps

#### 3.2

##### **in-line pump (axial flow pump)**

pump with the suction and delivery flow being on the same axis. In the case of transformer pumps, the axis of the flanges is usually the same as the axis of rotation of the pump rotor

#### 3.3

##### **radial flow pump**

pump with the suction and delivery flow pointing in perpendicular direction. For transformer pumps the axis of the delivery flange is usually perpendicular to the rotation of the motor

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<sup>5)</sup> Superseded by EN 60085:2008.