SLOVENSKI STANDARD
SIST-TS CLC/TS 50537-3:2010

01-april-2010

Železniške naprave - Vgrajeni deli za transformatorje vlečnih tokokrogov in hladilni sistem - 3. del: Vodna črpalka za vlečne pretvornike (konverterje)

Railway applications - Mounted parts of the traction transformer and cooling system - Part 3: Water pump for traction converters

Bahnanwendungen - Anbauteile des Haupttransformators und Kühlsystems - Teil 3: Wasserpumpe für Traktionsumrichter

Applications ferroviaires - Accessoires des transformateurs de traction et systèmes de refroidissement - Partie 3: Pompe à eau pour convertisseurs de puissance

Ta slovenski standard je istoveten z: **CLC/TS 50537-3:2010**

ICS:

29.180	Transformatorji. Dušilke	Transformers. Reactors
45.060.01	Železniška vozila na splošno	Railway rolling stock in general

SIST-TS CLC/TS 50537-3:2010 **en**

TECHNICAL SPECIFICATION

SPÉCIFICATION TECHNIQUE

TECHNISCHE SPEZIFIKATION

CLC/TS 50537-3

February 2010

ICS 29.180; 45.060.10

English version

Railway applications - Mounted parts of the traction transformer and cooling system - Part 3: Water pump for traction converters

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

CENELEC members are required to announce the existence of this TS in the same way as for an EN and to make the TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force.

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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 25 of SC 9XB, Electromechanical material on board 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 2010-01-22.

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 is proposed:

– 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 [1] "*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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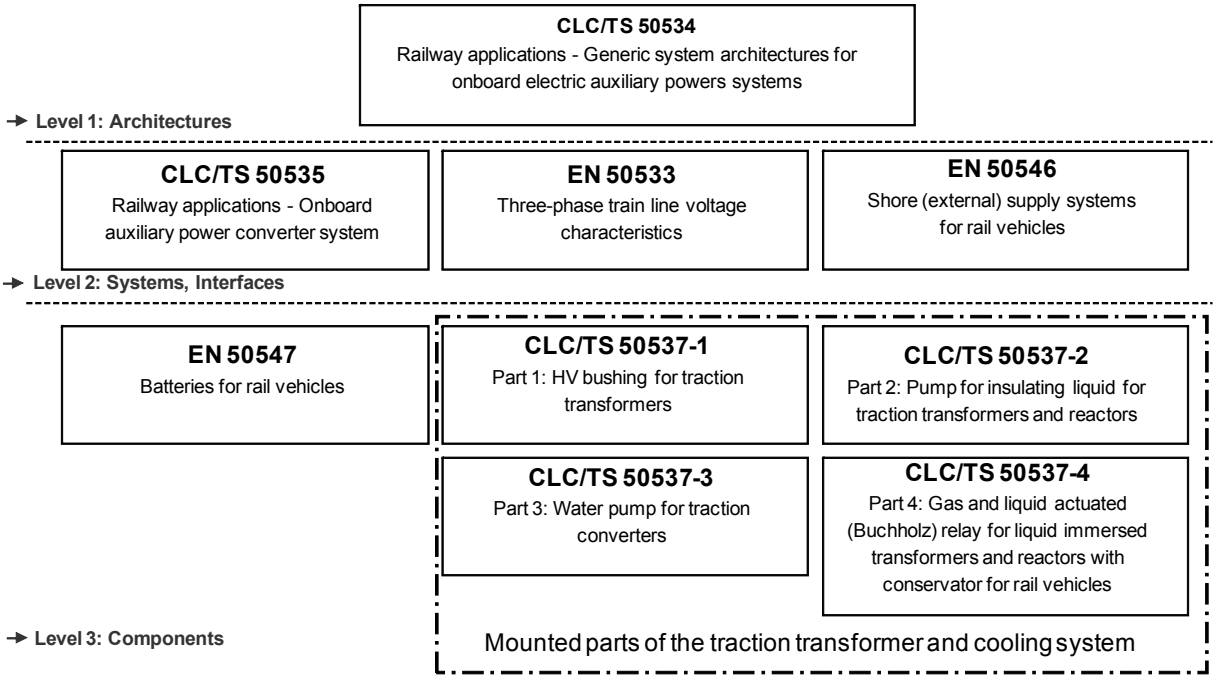
1) Under development.

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 centrifugal and peripheral electric pumps which generate the circulation of cooling liquid in converters of rail vehicles and their associated cooling system.

The pumps covered in this Technical Specification are rotodynamic pumps driven by canned motors or magnetically coupled motors.

CLC/TS 50537-3 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, EN 733 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 [2]	Railway applications - Fire protection on railway vehicles
CLC/TS 50467	Railway applications - Rolling stock - Electrical connectors, requirements and test methods
CLC/TS 50534 [3]	Railway applications - Generic system architecture for onboard electric auxiliary power systems
EN 733:1995	End-suction centrifugal pumps, rating with 10 bar with bearing bracket - Nominal duty point, main dimensions, designation system
EN 1092-1:2001 [4]	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 1561:1997	Founding - Grey cast irons
EN 1563:1997	Founding - Spheroidal graphite cast irons
EN 1706:1998	Aluminium and aluminium alloys - Castings - Chemical composition and mechanical properties
EN 10283:1998	Corrosion resistant steel castings
EN 12162	Liquid pumps - Safety requirements - Procedure for hydrostatic testing
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

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2) Part 5 is of CENELEC origin – Other parts are from CEN.

3) Under development.

4) Superseded by EN 1092-1:2007.

EN 50347:2001	General purpose three-phase induction motors having standard dimensions and outputs - Frame numbers 56 to 315 and flange numbers 65 to 740
EN 50533 [3)]	Three-phase train line voltage characteristics
EN 60034-1:2004	Rotating electrical machines - Part 1: Rating and performance (IEC 60034-1:2004)
EN 60034-7:1993 + A1:2001	Rotating electrical machines - Part 7: Classification of types of construction, mounting arrangements and terminal box position (IM Code) (IEC 60034-7:1992 + A1:2000)
EN 60034-9:2005 + A1:2007	Rotating electrical machines - Part 9: Noise limits (IEC 60034-9:2003, mod. + A1:2007)
EN 60085:2004 [5)]	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)
EN ISO 15783	Seal-less rotodynamic pumps - Class II - Specification (ISO 15783)
ISO 281:2007	Rolling bearings - Dynamic load ratings and rating life
SAE J 518:1993	Hydraulic Flanged Tube, Pipe, and Hose Connections, Four-Bolt split flange Type

3 Terms and definitions

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

3.1
centrifugal pump
pump where the axis of the impeller is the same as the rotation axis of the pump motor, typically fitted with a radial impeller. A typical centrifugal pump is a pump with suction and discharge nozzle pointing in perpendicular direction.

Centrifugal pumps within the scope of this Technical Specification are leakage free and driven by canned motors

3.2
peripheral pump
pump with a peripheral impeller, typically laid out with radial symmetric impellers. The axis of the impeller is the same as the rotation axis of the pump motor. The suction and discharge nozzle typically point in the same direction.

Peripheral pumps within the scope of this Technical Specification are leakage free and driven by magnetically coupled motors

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5) Superseded by EN 60085:2008.

3.3
inline-pump
pump with the suction and delivery flanges lying on the same axis

3.4
canned motor
liquid-filled asynchronous squirrel-cage rotor motor with a rotor and bearings immersed and operating in the fluid pumped by the pump. The stator winding is sealed off against the fluid in the rotor compartment by a high-grade steel tube or can

3.5
magnetically coupled pump
pump where the motor and the impeller each have a separate shaft. The transmission of RPM / torque is carried out with a magnetic coupling, the outer part of which rests on the motor shaft. The inner part of the magnetic coupling rests on the same shaft as the impeller. The inner and outer part of the magnetic coupling are separated by a separating can

4 Operating conditions

4.1 General

The water pump is used for the cooling of converters on rail vehicles. The operation of the water pump may be affected by the conditions that occur under normal train service conditions, e.g. corrosive gases, carbon dust and other matter from brake shoes and pads or vibration stress.

Among all service conditions described in this part, malfunction of the pump shall not occur.

4.2 Environmental conditions

The pump shall ensure appropriate functioning under the given conditions:

Temperature range:	
• Environmental temperature:	-25 °C ... 80 °C Other values may be agreed between customer and supplier.
• Transport and storage:	-50 °C ... 80 °C Condensation shall be avoided. See also 4.4.
Altitude:	up to 1 400 m (EN 50125-1:1999, class A1)
Humidity:	0 % ... 100 %
Climate class:	EN 60721-3-5:1997, 5K2
Biological classification:	EN 60721-3-5:1997, 5B2
Chemical classification:	EN 60721-3-5:1997, 5C3
Contamination:	EN 60721-3-5:1997, 5F3
Mechanical-active matters:	EN 60721-3-5:1997, 5S3
Rain:	EN 60721-3-5:1997, 5K3
Solar radiation:	EN 60721-3-5:1997, 5K3
Shock and vibration:	The pump shall be able to withstand vibration and shock as stated in EN 61373. See also 14.3.14

4.3 Cooling liquid

The cooling liquid shall be a mixture of water (drinking water according to national regulations) and anti-freeze. It shall be qualified for the intended use as a heat transfer medium within the temperature range according to 4.2. Adequate corrosion protection shall also be taken into account.

The following characteristics of the anti-freeze shall be agreed between customer and manufacturer:

- type. In case of no agreement in the contract, Antifrogen N or identical shall be assumed;
- mixing ratio water – anti-freeze. Unless otherwise agreed in the contract, a mixing ratio of 56:44 shall be assumed;
- maximum size of suspended solids. Unless otherwise agreed in the contract, a size of < 100 µm shall be assumed;
- maximum content of solids. Unless otherwise agreed in the contract, a value of 340 mg/l shall be assumed;
- maximum hardness of solids. Unless otherwise agreed in the contract, a value of ≤ 4 on the Mohs scale shall be assumed;
- permanent usage temperatures. Unless otherwise agreed in the contract, a temperature range from -25 °C up to 95 °C shall be assumed.

Canned motor cooling and plain bearing lubrication shall be effected by circulation of the liquid being pumped.

The pump manufacturer shall make sure that under these conditions malfunction of the pump will not occur.

4.4 Storage and transport conditions

As far as possible, the pumps shall be delivered ready to be installed.

Before storage or transport, it shall be ensured that the pumps are clean and free of all foreign matter and contamination.

Covers shall be provided and securely attached to the pump flanges during transport and/or storage and appropriate steps taken to ensure that there is no deterioration caused by condensation. Suitable packaging shall be chosen depending on the place and method of delivery. To prevent any possible damage resulting from long-term storage (e.g. on bearings, sealings), the manufacturer shall specify the way and orientation in which the pump shall preferably be stored.

The interior of the water pump shall be protected against corrosion by an appropriate, water removable preservative. The preservative shall be environmentally friendly.

If oils or solvents are used, the maximum volume of the preservative shall not be more than 0,2 % of the pump volume.

5 Electrical requirements

5.1 Power supply

The preferred value and the characteristics of the supply voltage are defined in EN 50533. Other values shall be agreed between manufacturer and customer.

The pumps shall be qualified for direct switch on within the defined operating range of voltage and frequency.

Additionally, the pump shall be able to start between 90 % and 110 % rated voltage within the temperature range defined in 4.2 while using the cooling liquid given in 4.3 without excessive heating.

The manufacturer shall specify the permanent current at rated voltage which the motor is able to withstand without being damaged.

A terminal for PE shall be provided (see Figure 1).

5.2 Electrical connection with three-phase train line

Figure 4 shows how the pump is typically connected to the three-phase train line.