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Standards

Irish Standard  
I.S. EN 60310:2016&AC:2018-03

## Railway applications - Traction transformers and inductors on board rolling Stock

I.S. EN 60310:2016&AC:2018-03

*Incorporating amendments/corrigenda/National Annexes issued since publication:*

EN 60310:2016/AC:2018-03

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## National Foreword

I.S. EN 60310:2016&AC:2018-03 is the adopted Irish version of the European Document EN 60310:2016, Railway applications - Traction transformers and inductors on board rolling Stock

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EUROPEAN STANDARD

**EN 60310:2016/AC:2018-03**

NORME EUROPÉENNE  
EUROPÄISCHE NORM

March 2018

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English Version

Railway applications - Traction transformers and inductors on  
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Applications ferroviaires - Transformateurs de traction et  
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(IEC 60310:2016/COR1:2018)

Bahnwendungen - Transformatoren und Drosselspulen  
auf Schienenfahrzeugen  
(IEC 60310:2016/COR1:2018)

This corrigendum becomes effective on 30 March 2018 for incorporation in the English language version of the EN.



European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
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### **Endorsement notice**

The text of the corrigendum IEC 60310:2016/COR1:2018 was approved by CENELEC as EN 60310:2016/AC:2018-03 without any modification.

INTERNATIONAL ELECTROTECHNICAL COMMISSION  
COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

IEC 60310  
Edition 4.0 2016-01

# **RAILWAY APPLICATIONS – TRACTION TRANSFORMERS AND INDUCTORS ON BOARD ROLLING STOCK**

IEC 60310  
Édition 4.0 2016-01

# APPLICATIONS FERROVIAIRES – TRANSFORMATEURS DE TRACTION ET BOBINES D'INDUCTANCE À BORD DU MATÉRIEL ROULANT

## CORRIGENDUM 1

### **13.2.9.1 General**

**13.2.11 General**

*In the second paragraph, replace reference to 13.2.8.1 by 13.2.5.*

**Table 8 – Dielectric test voltage**

*In the second column of the table header, replace:  
“(up to and excluding)” by  
“(up to and including)”.  
Table 3 – Discrete test strings*

### **13.2.9.1 Généralités**

*Dans le deuxième alinéa, remplacer la référence à 13.2.8.1 par 13.2.5.*

#### **Tableau 8 – Tension d'essai diélectrique**

*Dans la deuxième colonne de l'en-tête de tableau, remplacer:  
 "(inférieur strictement)" par  
 "(inférieure ou égale à)".*

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EUROPEAN STANDARD

**EN 60310**

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**Railway applications - Traction transformers and inductors on  
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Applications ferroviaires - Transformateurs de traction et  
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(IEC 60310:2016)

Bahnwendungen - Transformatoren und Drosselspulen  
auf Bahndrehzeugen  
(IEC 60310:2016)

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**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

## **EN 60310:2016**

### **European foreword**

The text of document 9/2080/FDIS, future edition 4 of IEC 60310, prepared by IEC/TC 9 "Electrical equipment and systems for railways" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60310:2016.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2016-12-02
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2019-03-02

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In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60216-1	NOTE	Harmonized as EN 60216-1.
IEC 60216-5	NOTE	Harmonized as EN 60216-5.
IEC 60505	NOTE	Harmonized as EN 60505.
IEC 61287-1	NOTE	Harmonized as EN 61287-1.

**Annex ZA**  
(normative)

**Normative references to international publications  
with their corresponding European publications**

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.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here:  
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<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-811	-	International electrotechnical vocabulary (IEV) - Chapter 811: Electric traction	-	-
IEC 60060-1	-	High-voltage test techniques - Part 1: General definitions and test requirements	EN 60060-1	-
IEC 60060-2	-	High-voltage test techniques - Part 2: Measuring systems	EN 60060-2	-
IEC 60076-1	2011	Power transformers - Part 1: General	EN 60076-1	2011
IEC 60076-2	-	Power transformers - Part 2: Temperature rise for liquid-immersed transformers	EN 60076-2	-
IEC 60076-3	-	Power transformers - Part 3: Insulation levels, dielectric tests and external clearances in air	EN 60076-3	-
IEC 60076-4	-	Power transformers - Part 4: Guide to the lightning impulse and switching impulse testing - Power transformers and reactors	EN 60076-4	-
IEC 60076-5	-	Power transformers - Part 5: Ability to withstand short circuit	EN 60076-5	-
IEC 60076-6	2007	Power transformers - Part 6: Reactors	EN 60076-6	2008
IEC 60076-7	-	Power transformers - Part 7: Loading guide for oil-immersed power transformers	-	-
IEC 60076-10	-	Power transformers - Part 10: Determination of sound levels	EN 60076-10	-
IEC 60076-11	-	Power transformers - Part 11: Dry-type transformers	EN 60076-11	-
IEC 60076-12	2008	Power transformers - Part 12: Loading guide for dry-type power transformers	-	-
IEC 60076-14	-	Power transformers - Part 14: Liquid-immersed power transformers using high-temperature insulation materials	EN 60076-14	-

## **EN 60310:2016**

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60076-18	-	Power transformers - Part 18: Measurement of frequency response	EN 60076-18	-
IEC 60077-1	-	Railway applications - Electric equipment for rolling stock - Part 1: General service conditions and general rules	EN 60077-1	-
IEC 60085	-	Electrical insulation - Thermal evaluation and designation	EN 60085	-
IEC 60270	-	High-voltage test techniques - Partial discharge measurements	EN 60270	-
IEC 60296	-	Fluids for electrotechnical applications - Unused mineral insulating oils for transformers and switchgear	EN 60296	-
IEC 60836	-	Specifications for unused silicone insulating liquids for electrotechnical purposes	EN 60836	-
IEC 60850	-	Railway applications - Supply voltages of traction systems	-	-
IEC 61039	-	Classification of insulating liquids	EN 61039	-
IEC 61099	-	Insulating liquids - Specifications for unused synthetic organic esters for electrical purposes	EN 61099	-
IEC 61373	2010	Railway applications - Rolling stock equipment - Shock and vibration tests	EN 61373	2010
IEC 61378-1	2011	Convertor transformers - Part 1: Transformers for industrial applications	EN 61378-1	2011
IEC 62497-1	-	Railway applications - Insulation coordination - Part 1: Basic requirements - Clearances and creepage distances for all electrical and electronic equipment	-	-
IEC 62498-1	-	Railway applications - Environmental conditions for equipment - Part 1: Equipment on board rolling stock	-	-
ISO 3746	-	Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Survey method using an enveloping measurement surface over a reflecting plane	EN ISO 3746	-
ISO 9614-1	-	Acoustics - Determination of sound power levels of noise sources using sound intensity - Part 1: Measurement at discrete points	EN ISO 9614-1	-
ISO 9614-2	-	Acoustics - Determination of sound power levels of noise sources using sound intensity - Part-2: Measurement by scanning	EN ISO 9614-2	-



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# **INTERNATIONAL STANDARD**

## **NORME INTERNATIONALE**



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**Railway applications – Traction transformers and inductors on board rolling stock**

**Applications ferroviaires – Transformateurs de traction et bobines d'inductance à bord du matériel roulant**





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# **INTERNATIONAL STANDARD**

# **NORME INTERNATIONALE**



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**Railway applications – Traction transformers and inductors on board rolling stock**

**Applications ferroviaires – Transformateurs de traction et bobines d'inductance à bord du matériel roulant**

INTERNATIONAL  
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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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### **RAILWAY APPLICATIONS – TRACTION TRANSFORMERS AND INDUCTORS ON BOARD ROLLING STOCK**

#### **FOREWORD**

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International Standard IEC 60310 has been prepared by IEC technical committee 9: Electrical equipment and systems for railways.

This fourth edition cancels and replaces the third edition issued in 2004 and constitutes a technical revision.

This edition takes into account the new generic railway standards, more specifically general service conditions referring to IEC 62498-1 and shock and vibration considerations referring to IEC 61373. It also includes the following significant technical changes with regard to the previous edition:

- temperature limits;
- temperature-rise test;
- dielectric tests;
- partial discharge test;

- inductance measurement methods;
- voltage between terminals withstand test;
- thermal ageing and insulation lifetime (informative);
- examples of thermal endurance calculation (informative);
- wet dielectric tests (informative);
- load profiles (informative).

The text of this standard is based on the following documents:

FDIS	Report on voting
9/2080/FDIS	9/2117/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.

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

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

## **RAILWAY APPLICATIONS – TRACTION TRANSFORMERS AND INDUCTORS ON BOARD ROLLING STOCK**

### **1 Scope**

This International Standard applies to traction and auxiliary power transformers installed on board rolling stock and to the various types of power inductors inserted in the traction and auxiliary circuits of rolling stock, of dry or liquid-immersed design.

**NOTE** The requirements of IEC 60076 (all parts) are applicable to transformers and inductors where they do not conflict with this standard, or with the specialized IEC publications dealing with traction applications.

This standard can also be applied, after agreement between purchaser and manufacturer, to the traction transformers of three-phase a.c. line-side powered vehicles and to the transformers inserted in the single-phase or poly-phase auxiliary circuits of vehicles, except instrument transformers and transformers of a rated output below 1 kVA single-phase or 5 kVA poly-phase.

This standard does not cover accessories such as tap changers, resistors, heat exchangers, fans, etc., intended for mounting on the transformers or inductors, which are tested separately according to relevant rules.

### **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.

IEC 60050-811, *International Electrotechnical Vocabulary (IEV) – Chapter 811: Electric traction*

IEC 60060-1, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60060-2, *High-voltage test techniques – Part 2: Measuring systems*

IEC 60076-1:2011, *Power transformers – Part 1: General*

IEC 60076-2, *Power transformers – Part 2: Temperature rise for liquid-immersed transformers*

IEC 60076-3: *Power transformers – Part 3: Insulation levels, dielectric tests and external clearances in air*

IEC 60076-4, *Power transformers – Part 4: Guide to the lightning impulse and switching impulse testing – Power transformers and reactors*

IEC 60076-5, *Power transformers – Part 5: Ability to withstand short circuit*

IEC 60076-6:2007, *Power transformers – Part 6: Reactors*

IEC 60076-7, *Power transformers – Part 7: Loading guide for oil-immersed power transformers*



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