

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Railway applications – Rolling stock – Testing of rolling stock on completion of construction and before entry into service

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Applications ferroviaires – Matériel roulant – Essais de matériel roulant après achèvement et avant mise en service

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Railway applications – Rolling stock – Testing of rolling stock on completion of construction and before entry into service

Applications ferroviaires – Matériel roulant – Essais de matériel roulant après achèvement et avant mise en service

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**RAILWAY APPLICATIONS – ROLLING STOCK –
TESTING OF ROLLING STOCK ON COMPLETION OF
CONSTRUCTION AND BEFORE ENTRY INTO SERVICE**

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International Standard IEC 61133 has been prepared by IEC technical committee 9: Electrical equipment and systems for railways.

This standard is derived from EN 50215.

This third edition cancels and replaces the second edition, published in 2006; it constitutes a technical revision.

The main technical changes with regard to the previous edition are as follows:

- References to standards other than international have been removed from the main text so the notes refer solely to Annex B;
- Annex B has been updated with the latest European information, and cross-references between the TSIs and ENs and the clauses of IEC 61133 have been added.

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

FDIS	Report on voting
9/2096/FDIS	9/2132/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

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RAILWAY APPLICATIONS – ROLLING STOCK – TESTING OF ROLLING STOCK ON COMPLETION OF CONSTRUCTION AND BEFORE ENTRY INTO SERVICE

1 Scope

This International Standard specifies general criteria to demonstrate by testing that newly constructed complete railway vehicles conform with standards or other normative documents.

This International Standard, as a whole or in part, applies to all railway vehicles except special purpose vehicles such as track-laying machines, ballast cleaners and personnel carriers. The extent of application of the standard for particular vehicles will be specifically mentioned in the contract, to take account, where necessary, of any legislative requirements.

NOTE 1 The parts of the standard which are applicable will depend on the type of vehicle (e.g. passenger, freight, powered trailer, etc.).

NOTE 2 The scope of this standard excludes railbound and road/rail vehicles for construction and maintenance of railway infrastructure.

NOTE 3 This standard does not deal with tests carried out on components or equipment before fitting to the vehicle.

In so far as this International Standard is applicable, it may be used for the following:

- generator sets mounted on a vehicle provided for auxiliary purposes;
- electrical transmission used on trolley buses or similar vehicles;
- control and auxiliary equipment of vehicles with non-electrical propulsion systems;
- vehicles guided, supported or electrically propelled by systems which do not use the adhesion between wheel and rail.

NOTE 4 Specific technical requirements apply to vehicles which operate on the railways in the European Union. The source of those requirements is given in Annex B. Where a European requirement applies to a given clause, a note has been inserted at the end of the clause.

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 60077 (all parts), *Railway applications – Electric equipment for rolling stock*

IEC 60310:2015, *Railway applications – Traction transformers and inductors on board rolling stock*

IEC 60322:2001, *Railway applications – Electric equipment for rolling stock – Rules for power resistors of open construction*

IEC 60349 (all parts), *Electric traction – Rotating electrical machines for rail and road*

IEC 60494-1:2013, *Railway applications – Rolling stock – Pantographs – Characteristics and tests – Part 1: Pantographs for main line vehicles*

IEC 60494-2:2013, *Railway applications – Rolling stock – Pantographs – Characteristics and tests – Part 2: Pantographs for metros and light rail vehicles*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*

IEC 60571:2012, *Railway applications – Electronic equipment used on rolling stock*

IEC 60850:2014, *Railway applications – Supply voltages of traction systems*

IEC 61287 (all parts), *Railway applications – Power convertors installed on board rolling stock*

IEC 61377-1, *Railway applications – Rolling stock – Part 1: Combined testing of inverter-fed alternating current motors and their control system*

IEC 61377-2, *Railway applications – Rolling stock – Combined testing – Part 2: Chopper-fed direct current traction motors and their control*

IEC 61377-3, *Railway applications – Rolling stock – Part 3: Combined testing of alternating current motors, fed by an indirect converter, and their control system*

IEC 61991:2000, *Railway applications – Rolling stock – Protective provisions against electrical hazards*

IEC 62236-3-1:2008, *Railway applications – Electromagnetic compatibility – Part 3-1: Rolling stock – Train and complete vehicle*

IEC 62236-3-2:2008, *Railway applications – Electromagnetic compatibility – Part 3-2: Rolling stock – Apparatus*

IEC 62278:2002, *Railway applications – Specification and demonstration of reliability, availability, maintainability and safety (RAMS)*

IEC 62313:2009, *Railway applications – Power supply and rolling stock – Technical criteria for the coordination between power supply (substation) and rolling stock*

IEC 62425, *Railway applications – Communication, signalling and processing systems – Safety related electronic systems for signalling*

IEC 62427:2007, *Railway applications – Compatibility between rolling stock and train detection systems*

IEC 62845, *Railway applications – Radio remote control system of traction vehicles for shunting application*

IEC 62846, *Railway applications – Current collection systems – Requirements for and validation of measurements of the dynamic interaction between pantograph and overhead contact line¹*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

¹ To be published.

ISO 3095, *Acoustics – Railway applications – Measurement of noise emitted by railbound vehicles*

ISO 3381, *Railway applications – Acoustics – Measurement of noise inside railbound vehicles*

ISO 9001:2015, *Quality management systems – Requirements*

NOTE For applications in the European Union, see also the references in Annex B.

3 Terms, definitions and abbreviations

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

3.1

a.c.

alternating current

3.2

approval authority

any body other than the purchaser with the legal right to require tests to be performed on vehicles within the scope of this standard and to whom compliance verification is demonstrated

Note 1 to entry: These bodies can be different in each country and can include national or international regulatory bodies, national safety authorities, infrastructure managers, and, in Europe, Notified Bodies (see Annex B).

3.3

contract

all the component parts of the technical specifications agreed between manufacturer and purchaser, consisting of purchaser's technical specifications, manufacturer's technical responses, minutes of meetings, and any other formal contract documents

3.4

d.c.

direct current

3.5

EMC

electromagnetic compatibility

3.6

infrastructure manager

organisation which manages the railway infrastructure, including, for example, track, signalling, communications and structures

3.7

IP

ingress Protection

3.8

manufacturer

organisation which has the technical responsibility for the supply of the vehicle system

Note 1 to entry: There can be more than one manufacturer where the contract for the vehicle is split in two or more parts.

**3.9
manufacturer's works**

location where the assembly of the vehicles is completed and where static tests are generally performed

**3.10
modification level**

definition of equipment modification status for which the test results are valid

**3.11
purchaser**

organisation which orders and will own the vehicle

Note 1 to entry: The purchaser can have the responsibility for direct negotiations with the manufacturer, unless that responsibility is delegated to the user, a main contractor or a consultant.

**3.12
quality plan**

document specifying which procedures and associated resources are applied by whom and when to a specific project, product, process or contract (ISO 9000)

**3.13
routine test**

test to which each vehicle is subjected to during or after manufacture to ascertain whether it complies with the specified criteria

**3.14
safety-related**

carries responsibility for safety

**3.15
supplier**

organisation which has the responsibility for the supply of individual items of equipment or groups of equipment to the manufacturer

**3.16
supplier's works**

location where individual items of equipment or groups of equipment are manufactured

**3.17
test plan**

plan of the tests to be undertaken by the manufacturer as presented within its quality plan, including all supporting information on the conduct of the tests

Note 1 to entry: In the context of this standard, the test plan includes all subordinate test specifications.

**3.18
type test**

test of one or more devices, system or complete vehicle to show that the design meets the required specifications and the relevant standards

**3.19
UIC**

Union Internationale des Chemins de Fer (International Union of Railways)

**3.20
user**

organisation which will use the vehicle

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Note 1 to entry: The user will be a train operator and can be the purchaser, or another party who uses the vehicle on behalf of the purchaser through, for example, a leasing arrangement.

3.21

validation documentation

documented evidence that a product, process or service is in conformance with specified requirements or other normative documents

3.22

voluntary test

any additional test (either type or routine) added to the test plan by agreement between the manufacturer and the purchaser

3.23

WSP

wheelslide protection

4 Requirements

4.1 General

The manufacturer shall exercise control over all activities affecting the quality of the products to ensure that the requirements of the standards or other normative documents to which the declaration refers are met.

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For this purpose the manufacturer shall have at his disposal all necessary means for carrying out this control at all levels (for example raw materials, supplies, production, finished products or packing). Information on the manufacturer's quality system and the results of tests as appropriate shall be available.

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The manufacturer shall establish and maintain a quality system. This shall include auditable procedures covering the final inspection and test operations, including workmanship standards, test specifications, test records, calibration of test instruments and equipment, document control, control of non-conforming products and personnel training.

It is recommended that manufacturers operate a quality system in accordance with ISO 9001.

The quality plan for the design, production, inspection and testing of the product shall include a test plan defining how the manufacturer will demonstrate conformance to the specified requirements.

The configuration (type numbers, serial numbers, modification status) of key components, including revisions of software, shall be recorded as a "quality" record.

The contract shall define the various tests to be undertaken on completed vehicles and before entry into service to assure the purchaser that:

- the vehicles comply with the technical requirements of the contract (type tests, 3.18, see also 5.3.1);
- every vehicle conforms to the design standard proved in the type tests (routine tests, 3.13, see also 5.3.2);
- the vehicles comply with the appropriate legislation (national or regional);
- the vehicles are compatible with the railway system on which they are intended to run as defined in writing by the infrastructure manager.

Inspection of the vehicle, including equipment installation, piping and wiring, and all component type and routine tests shall be successfully completed according to the relevant standards and specifications, except as permitted by 6.1, before the tests within the scope of

this standard are commenced. The tests covered by this standard are to demonstrate correct interfacing with the functions of the vehicle.

This standard does not cover the following types of testing:

- endurance and reliability,
- development,
- investigative (except for guidance only),
- system test, such as subassembly or system combined test.

NOTE The European requirements for product verification and tests are specified in Annex B.

4.2 Third party test facilities

If it is intended to use third party test facilities this shall be declared and agreed with details, the test facilities required and the accreditation expected included in the test plan (see 4.3).

This shall of necessity apply to:

- static tests necessitating the vehicle to be moved to a specialised test centre not belonging to either the manufacturer or the purchaser;
- dynamic tests on another system not belonging to either the manufacturer or the user.

It is recommended that third party test facilities are accredited to ISO/IEC 17025.

The purchaser or the approval authority of the country concerned may require tests to be carried out by an accredited test facility independent of the manufacturer.

4.3 Test plan

IEC 61133:2016

<https://standards.iteh.ai/catalog/standards/sist/33ba595f-05d4-4851-9b0b-757119902af7/iec-61133-2016>

The various tests to be undertaken shall be presented by the manufacturer within its quality plan as a test plan which shall detail the following:

- a) the test programme;
- b) the component and equipment type tests to be completed before undertaking each vehicle test;
- c) the test facilities to be used, including, as appropriate, their accreditation and competence details, and their level of independence from the manufacturer;
- d) the test methods;
- e) the vehicle loading conditions for each test;
- f) the environmental conditions for each test;
- g) the limits and tolerances of any test measuring methods;
- h) the success criteria for each test;
- i) the validation documentation.

The test plan may include referenced test specifications to include some of the details above.

Where the contract requires validation of certain tests or documents by the purchaser or any approval authorities, these shall be identified in the test plan. In the case where the contract or the approval authorities require evidence to be kept, the requirement shall be included in the test plan and the purchaser shall agree the test specification.

Where the contract requires safety to be demonstrated by a series of tests derived from a safety or risk assessment performed in accordance with IEC 62278, or as required by an external Approval Authority, then these tests shall be included in the test programme and