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# Järnvägsanläggningar – Automatiserad spårbunden passagerartrafik i stadsmiljö (AUGT) – Säkerhetsfordringar

*Railway applications – Automated urban guided transport (AUGT) – Safety requirements*

Som svensk standard gäller europastandarden EN 62267:2009. Den svenska standarden innehåller den officiella engelska språkversionen av EN 62267:2009.

**Nationellt förord**

Europastandarden EN 62267:2009

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC

– **IEC 62267, First edition, 2009 - Railway applications - Automated urban guided transport (AUGT) - Safety requirements**

utarbetad inom International Electrotechnical Commission, IEC.

ICS 45.060

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EUROPEAN STANDARD

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# EN 62267

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# Railway applications - Automated urban guided transport (AUGT) - Safety requirements

(IEC 62267:2009)

Applications ferroviaires - Transports guidés urbains automatiques (AUGT) - Exigences de sécurité (CEI 62267:2009)

Bahnanwendungen - Automatischer städtischer schienengebundener Personennahverkehr (AUGT) - Sicherheitsanforderungen (IEC 62267:2009)



CENELEC

European Committee for Electrotechnical Standardization
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Europäisches Komitee für Elektrotechnische Normung

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## Foreword

The text of document 9/1261/FDIS, future edition 1 of IEC 62267, prepared by IEC TC 9, Electrical equipment and systems for railways, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 62267 on 2009-10-01.

The following dates were fixed:

| | | |
|---|---|---|
| – latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2010-07-01 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2012-10-01 |

Annex ZA has been added by CENELEC.

## Endorsement notice

The text of the International Standard IEC 62267:2009 was approved by CENELEC as a European Standard without any modification.

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

| | | |
|---|---|---|
| IEC 61508 | NOTE | Harmonized in EN 61508 series (not modified). |
| IEC 62128-1 | NOTE | Identical to EN 50122-1:1997. |
| IEC 62236 | NOTE | In Europe, the series EN 50121 applies. |
| IEC 62279 | NOTE | In Europe, EN 50128 applies. |

# Annex ZA
(normative)

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

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.

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

NOTE 2 Where a standard cited below belongs to the EN 50000 series, this European Standard applies instead of the relevant International Standard.

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC 62278 | 2002 | Railway applications - Specification and demonstration of reliability, availability, maintainability and safety (RAMS) | EN 50126-1<br>+ corr. May | 1999<br>2006 |
| IEC 62290-1 | -[1)] | Railway applications - Urban guided transport management and command/control systems - Part 1: System principles and fundamental concepts | EN 62290-1 | 2006[2)] |
| IEC 62425 | -[1)] | Railway applications - Communication, signalling and processing systems - Safety related electronic systems for signalling | EN 50129 | 2003[2)] |

[1)] Undated reference.

[2)] Valid edition at date of issue.

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# INTRODUCTION

This International Standard is a generic guideline providing recommendations to assist railway authorities and safety regulatory authorities to define safety requirements appropriate to AUGT systems. The generic requirements recommended in this standard are based on the experience gained from AUGT systems already in operation. Safety requirements for each specific application, however, can only be defined from the results of a risk analysis, taking into consideration the conditions in which the AUGT system is to be set up and based on the risk acceptance principles prevailing in the local environment. The standard applicable for conducting a mandatory and comprehensive risk analysis of an AUGT system is IEC 62278 (RAMS).

In view of the diversity of the technical solutions that may be adopted for new AUGT systems and the diversity of operational conditions, the list of generic hazardous situations considered in this standard should be regarded as a minimum list. The requirements for a safeguard as described in this standard are intended as minimum requirements in case a specific safeguard is applied to mitigate the related hazardous situation. However, the specific risk analysis may show that some requirements of a chosen safeguard should be modified to take into account some specific conditions. Each specific design of the new AUGT system and each aspect of the specific topographic, environmental, social or legal environment of the new AUGT system can also generate new hazards and therefore may require additional safety requirements. A specific hazard analysis to identify additional requirements or requirements to be modified is therefore always a necessity.

This standard, therefore, does not and could not prescribe any specific means that could, without a fail, mitigate risks arising from hazardous situations. Rather, it identifies a list of foreseeable hazardous situations, derived from the elementary consideration that functions assumed by the driver and staff in conventional systems are replaced in AUGT systems by automated functions or other safeguards. It is the purpose of this standard that this list of hazardous situations should be carefully considered during the risk analysis carried out for any new AUGT system.

In addition to generic hazardous situations, this standard also describes possible and widely implemented safeguards that the specific risk analysis may well show to be adapted to the specific application.

It should be noted that not all hazardous situations identified in the context of one or other of the large number of different AUGT systems already in operation in the world have necessarily been covered in this standard. Nor would it have been necessarily helpful. Neither could this standard describe all the possible safeguards demanded by each and every specific application.

This standard does not require that a safeguard be put in place for every generic hazardous situation identified. This is because often, the risk associated with a hazardous situation may be assessed as tolerable without the need for a safeguard. According to IEC 62278, it is the responsibility of the railway authority, in agreement with the Safety Regulatory Authority having jurisdiction, to decide on the tolerability of each risk and on the necessity of a specific safeguard, taking into account their specific risk acceptance criteria and legal requirements that are applicable for the specific AUGT application.

# RAILWAY APPLICATIONS – AUTOMATED URBAN GUIDED TRANSPORT (AUGT) – SAFETY REQUIREMENTS

## 1 Scope

This International Standard covers high-level safety requirements applicable to automated urban guided transport systems, with driverless or unattended self-propelled trains, operating on an exclusive guideway.

This standard only deals with the safety requirements needed to compensate for the absence of a driver or attendant staff who would otherwise be responsible for some or all of train operation functions (see Table 1), depending on the level of automation of the system (see shaded areas in Table 1 and see 3.1 for a definition of the different grades of automation).

The requirements of this standard are restricted to transports systems as defined in Clause 5 and to DTO and UTO as defined in 3.1.4 and 3.1.20, respectively (see the shaded areas in Table 1).

**Table 1 – Grades of automation**

| Basic functions of train operation | | On-sight train operation<br>TOS | Non-automated train operation<br>NTO | Semi-automated train operation<br>STO | Driverless train operation<br>DTO | Unattended train operation<br>UTO |
|---|---|---|---|---|---|---|
| | | GOA0 | GOA1 | GOA2 | GOA3 | GOA4 |
| Ensuring safe movement of trains | Ensure safe route | X (points command/ control in system) | S | S | S | S |
| | Ensure safe separation of trains | X | S | S | S | S |
| | Ensure safe speed | X | X (partly supervised by system) | S | S | S |
| Driving | Control acceleration and braking | X | X | S | S | S |
| Supervising guideway | Prevent collision with obstacles | X | X | X | S | S |
| | Prevent collision with persons | X | X | X | S | S |
| Supervising passenger transfer | Control passengers doors | X | X | X | X or S | S |
| | Prevent injuries to persons between cars or between platform and train | X | X | X | X or S | S |
| | Ensure safe starting conditions | X | X | X | X or S | S |
| Operating a train | Put in or take out of operation | X | X | X | X | S |
| | Supervise the status of the train | X | X | X | X | S |
| Ensuring detection and management of emergency situations | Perform train diagnostic, detect fire/smoke and detect derailment, handle emergency situations (call/evacuation, supervision) | X | X | X | X | S and/or staff in OCC |

NOTE

X = responsibility of operations staff (may be realised by technical system).

S = realised by technical system.

This standard does not specifically look at security issues. However, aspects of safety requirements may apply to assuring security within the transport system.

NOTE The definitions of “security” and “safety” are given by IEC 62278.

Application of this standard is subsidiary to the responsibility of the transport authority and the safety regulatory authority (see IEC 62278) and to the specific laws and decrees applicable within the prevailing environment (economic, social, political, etc.) where the transport system is located, taking into account:

- social risk acceptance in different cultures or different national legal regulations (e.g. SHOREI, BOStrab) or principles (e.g. GAME, ALARP);
- laws and decrees in different states;
- special or different requirements specified by the safety regulatory authority or by an independent assessor in charge of the specific application;

- the responsibility for ”safe operation“ by the transport authority.

This standard does not apply to the following types of transport systems, unless specifically required by the Transport Authority:

- APMs (Automated People Movers) operating entirely inside a privileged environment such as an airport, a commercial centre or a leisure resort;
- amusement rides and roller-coasters, generally featuring a single station so that passengers board and alight the system at the same location;
- intercity and mainline train services, generally operating in a rural environment on part of their routes;
- cable-driven systems;
- systems featuring electronically guided vehicles with optical sensors, magnetic sensors, or similar devices/systems.

This standard is not concerned with risks arising during works for construction, installation, modification and dismantling of a system.

This standard is not concerned with pre-existing DTO or UTO systems (see definitions in 3.1) that were designed before this standard took effect.

In the case of upgrading an existing transport system to a DTO or UTO system, the risks associated with the existing system are outside the scope of this standard. However, this standard and the risk analysis process described are relevant for the additional subsystems and possibly for the transition process itself. Therefore, the application of the standard is at the discretion of the safety regulatory authority.

In the case of extending or modifying an existing DTO or UTO system in operation, this standard applies only if the change is significant as determined by the safety regulatory authority. However, the risks due to the relationship with the unchanged parts of existing systems (e.g. rolling stock, traction power supply, signalling and platforms) should be taken into account.

## 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.

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

IEC 62290-1, *Railway applications – Urban guided transport management and command/control systems – Part 1: System principles and fundamental concepts*

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