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Railway applications – Urban guided transport management and command/control systems – Part 1: System principles and fundamental concepts

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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RAILWAY APPLICATIONS – URBAN GUIDED TRANSPORT MANAGEMENT AND COMMAND/CONTROL SYSTEMS –

Part 1: System principles and fundamental concepts

FOREWORD

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8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 62290-1:2014. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

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The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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- reconfirmed,
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- revised.

INTRODUCTION

The IEC 62290 series specifies the functional, system and interface requirements for the command, control, and management systems intended to be used on urban, guided passenger transport lines and networks. ~~This series does not apply to lines that are operated under specific railway regulations, unless otherwise specified by the authority having jurisdiction.~~

These systems are designated herein as urban guided transport management and command/control systems (UGTMS). UGTMS cover a wide range of operations needs from non-automated (GOA1) to unattended (GOA4) operation. A line may be equipped with UGTMS on its full length or only partly equipped.

The IEC 62290 series does not specifically address security issues. However, aspects of safety requirements may apply to ensuring security within the urban guided transit system.

~~The main objective of this series is to achieve interoperability, interchangeability and compatibility.~~

The main objectives of this series are as follows:

- to provide a baseline system description and functional requirements specification for a transport authority to use in a request for proposal,
- to provide recommendations for those transport authorities wishing to acquire an interoperable or interchangeable system.

~~This series is a recommendation for those transport authorities wishing to introduce interoperable, interchangeable and compatible equipment.~~

It is the responsibility of the transport authority concerned ~~in accordance with the authority having jurisdiction~~ to decide on how to apply the IEC 62290 series and to take into account their particular needs.

The IEC 62290 series is also intended to support applications for upgrading existing signalling and command control systems. In this case, interchangeability and compatibility could be ensured only for the additional UGTMS equipment. Checking the possibility for upgrading existing equipment and the level of interoperability is the responsibility of the transport authority concerned.

Application of the series should take into account the differences between the various networks operated in different nations. Those differences include operational and regulatory requirements as well as different safety cultures.

The IEC 62290 series defines a catalogue of UGTMS requirements split into mandatory and optional functions. The functions used are based on the given grade of automation. Most of the functions characterized as mandatory are considered with no condition. Some specific functions have a condition to be mandatory (this condition being generally related to the use of an external equipment by UGTMS). By fulfilling the requirements, a supplier can create one or more generic applications including all mandatory functions and all or a subset of optional functions. A generic application will achieve interoperability within the defined specific application conditions. Customising a generic application will create a specific application taking into account of local conditions like track layout and headway requirements. It is the choice of supplier and transport authority to add additional functions to a generic or specific application. These additional functions are not described in the IEC 62290 series.

According to IEC 62278, it is the responsibility of the transport authority~~, in agreement with the authority having jurisdiction,~~ to decide, taking into account their risk acceptance principles, to conduct specific hazard and risk analysis for each specific application. The safety levels for the functions of each specific application ~~have to be~~ are determined by a specific risk analysis.

Terms such as "safety-related command", "safety conditions", "safe station departure" are mentioned without having performed any hazard analysis.

The IEC 62290 series is intended to consist of four parts:

- IEC 62290-1, "System principles and fundamental concepts", provides an introduction to the IEC 62290 series and deals with the main concepts, the system definition, the principles and the main basic functions of UGTMS.

The three other parts correspond to the three steps (see Figure 1) required in the process of specifying UGTMS and are used accordingly.

- IEC 62290-2, "Functional requirements specification", specifies the functional requirements associated to the basic functions provided by IEC 62290-1, within the system boundaries and interfaces as defined in Figure 3.

  The FRS (functional requirements specification) identifies and defines the functions that are necessary to operate an urban guided transport system. Two types of functions are distinguished for a given grade of automation: mandatory functions (e.g. train detection) and optional functions (e.g. ~~interfaces to passenger information and passenger surveillance systems~~ manage stabling). Requirements of functions have the same allocation, unless they are marked otherwise.

- IEC 62290-3 ~~(under consideration)~~, "System requirements specification", deals with the architecture of the system and the allocation of the requirements and functions identified in IEC 62290-2 to ~~architecture constituents~~ UGTMS equipment.

  The SRS (system requirements specification) specifies the architecture of a UGTMS system, with mandatory and optional ~~constituents~~ UGTMS equipment.

- IEC 62290-4 ~~(under consideration)~~[1], "Interface specifications", deals with the definition of the interfaces, as well as the data exchanged by them (FIS and FFFIS), for the interoperable and interchangeable ~~constituents~~ UGTMS equipment identified in IEC 62290-3.

  For interfaces between UGTMS ~~constituents~~ equipment, the logical interface or FIS (functional interface specification) ~~and/~~or the physical and logical interface or FFFIS (form fit functional interface specification) will be considered.

  NOTE The specific structure of ~~part 3 and~~ IEC 62290-4 will be established ~~following completion of part 2~~ to accommodate optional and mandatory ~~constituents~~ UGTMS equipment, and to reflect local conditions. In principle, only one FIS or ~~/and~~ FFFIS will be defined for the same interface. However, when justified in some cases, several FISs or several FFFISs will be defined for the same interface.

[1] Under consideration.

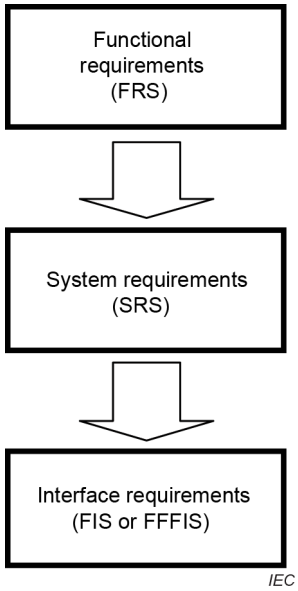

Figure 1 – Three-step process followed by the UGTMS series

Requirements are those necessary to fulfil all operational needs for safe and orderly operation requested by transport authorities without regard to technical solutions.

The chosen level of detail in describing requirements enables customers as well as transport authorities ~~having jurisdiction~~ to be assured that generic applications delivered by different suppliers will cover at least the same functionality as specified in this document.

Requirements which are established by the IEC 62290 series are indicated clearly with a requirement identification number related to the function to be covered.

RAILWAY APPLICATIONS – URBAN GUIDED TRANSPORT MANAGEMENT AND COMMAND/CONTROL SYSTEMS –

Part 1: System principles and fundamental concepts

1 Scope

This part of IEC 62290 provides an introduction to the IEC 62290 series and deals with the main concepts, the system definition, the principles and the basic functions of UGTMS (urban guided transport management and command/control systems) for use in urban guided passenger transport lines and networks. This document is applicable for new lines or ~~for upgrading existing signalling and command control systems~~ resignalling of existing lines.

This document is applicable to applications using

- continuous data transmission,
- continuous supervision of train movements by train protection profile, and
- localisation of trains by ~~external wayside equipment or reporting trains~~ onboard UGTMS equipment (reporting trains), and optionally by external wayside (and optionally onboard) device.

~~This standard is not applicable to existing command and control systems or projects in progress prior to the effective date of this standard.~~

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

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

IEC 62290-1

Edition 3.0 2025-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Railway applications – Urban guided transport management and command/control systems – Part 1: System principles and fundamental concepts

Applications ferroviaires – Systèmes de contrôle/commande et de gestion des transports guidés urbains – Partie 1: Principes système et concepts fondamentaux

IEC 62290-1:2025-04(en-fr)

CONTENTS

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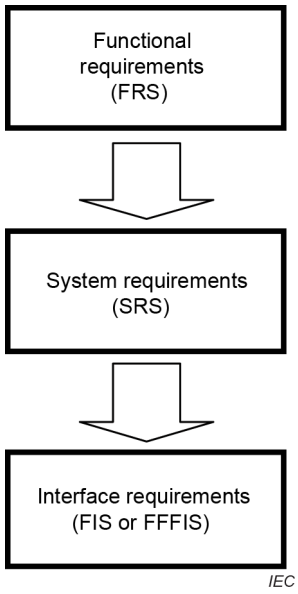

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IEC 62425, *Railway applications – Communication, signalling and processing systems – Safety related electronic systems for signalling*

SOMMAIRE

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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APPLICATIONS FERROVIAIRES – SYSTÈMES DE CONTRÔLE/COMMANDE ET DE GESTION DES TRANSPORTS GUIDÉS URBAINS –

Partie 1: Principes système et concepts fondamentaux

AVANT-PROPOS

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L'IEC 62290-1 a été établie par le comité d'études 9 de l'IEC: Matériels et systèmes électriques ferroviaires. Il s'agit d'une Norme internationale.

Cette troisième édition annule et remplace la deuxième édition parue en 2014, dont elle constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

a) la Figure 3 donnant l'environnement système d'UGTMS a été remise à jour pour refléter l'adaptation de celui-ci;
b) les équipements externes pour lesquels aucune exigence n'est décrite dans la série ont été retirés;
c) les nouveaux équipements externes ayant de telles exigences (comme la machine à laver) ont été ajoutés.

Le texte de cette norme est issu des documents suivants:

Projet	Rapport de vote
9/3166/FDIS	9/3197/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette norme.

La langue utilisée pour l'élaboration de cette Norme internationale est l'anglais.

Cette publication a été rédigée selon les Directives ISO/IEC, Partie 2, et élaborée selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles à l'adresse suivante www.iec.ch/members_experts/refdocs. Les principaux types de documents élaborés par l'IEC sont décrits plus en détail sur le site internet: www.iec.ch/publications.

Une liste de toutes les parties de la série IEC 62290, publiées sous le titre général *Applications ferroviaires – Systèmes de contrôle/commande et de gestion des transports guidés urbains*, peut être consultée sur le site web de l'IEC.

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- reconduite,
- supprimée, ou
- révisée.

INTRODUCTION

La série IEC 62290 spécifie les exigences fonctionnelles, système et d'interface des systèmes de contrôle/commande et de gestion destinés à être utilisés sur les lignes et les réseaux de transport guidé urbain de voyageurs.

Ces systèmes sont identifiés ici par «systèmes de contrôle/commande et de gestion des transports guidés urbains» (UGTMS – Urban Guided Transport Management and Command/Control Systems). Les systèmes UGTMS recouvrent de fait une large gamme de besoins d'exploitation depuis l'exploitation non automatisée des trains (GOA1) jusqu'à l'exploitation sans personnel à bord des trains (GOA4). Une ligne peut être équipée avec UGTMS sur toute sa longueur ou seulement sur une partie.

La présente série ne traite pas de façon spécifique les problèmes de sécurité publique. Toutefois, certains aspects des exigences de sécurité technique peuvent s'appliquer pour contribuer à la garantie de la sécurité publique à l'intérieur des transports guidés urbains.

Les objectifs principaux de la présente série sont les suivants:

- fournir une description de base du système et une spécification des exigences fonctionnelles qu'une autorité en charge du transport pourra utiliser dans un appel d'offres,
- fournir des recommandations à ces autorités en charge du transport qui souhaitent acquérir un système interopérable ou interchangeable.

Il est de la responsabilité des autorités concernées en charge du transport de décider de la manière d'appliquer la présente série et de prendre en compte leurs besoins spécifiques.

La série IEC 62290 a aussi pour objet de fournir un support aux applications qui sont des évolutions de systèmes existants de signalisation et de contrôle/commande. Dans ce cas, l'interchangeabilité et la compatibilité peuvent n'être réalisées que pour les équipements additionnels UGTMS. Il est de la responsabilité de l'autorité concernée en charge du transport de vérifier la possibilité de faire évoluer les équipements existants et de choisir le degré d'interopérabilité.

Il convient que l'application de la série tienne compte des différences entre les divers réseaux exploités dans différents pays. Ces différences incluent des exigences opérationnelles et réglementaires spécifiques et des différences de culture dans le domaine de la sécurité.

La présente série définit un catalogue d'exigences UGTMS, divisé en fonctions obligatoires et fonctions optionnelles. Les fonctions mises en œuvre dépendent du niveau d'automatisation. La plupart des fonctions décrites comme obligatoires sont à prendre en compte sans condition. Des fonctions spécifiques s'appuient sur une condition pour être obligatoire (cette condition étant généralement liée à l'usage d'un équipement externe par UGTMS). Tout en satisfaisant aux exigences, un fournisseur peut créer une ou plusieurs applications génériques comprenant toutes les fonctions obligatoires et tout ou partie des fonctions optionnelles. Une application générique réalise l'interopérabilité dans la limite des conditions spécifiques prédéfinies pour l'application. L'adaptation d'une application générique crée une application spécifique conforme aux conditions locales telles que les exigences en matière de plans de voies et d'intervalle requis entre les trains. Les fournisseurs et les autorités en charge du transport conservent la possibilité d'ajouter des fonctions à une application générique ou à une application spécifique. Ces fonctions additionnelles ne sont pas décrites dans la présente série.

Conformément à l'IEC 62278, il est de la responsabilité des autorités en charge du transport de décider de procéder à une analyse des dangers et risques spécifiques pour chaque application en fonction de leurs principes d'acceptation des risques. Les niveaux de sécurité des fonctions de toute application spécifique sont à déterminer par une analyse des risques spécifique.

Les termes comme «commande de sécurité», «conditions de sécurité», «départ de la station en sécurité» sont mentionnés sans qu'il ait été effectué d'analyse des dangers.

Il est prévu que la série IEC 62290 se compose de quatre parties:

- IEC 62290-1 «Principes système et concepts fondamentaux» fournit une introduction à la série de normes IEC 62290, une présentation des concepts principaux, une définition du système, les principes et les fonctions de base principales d'UGTMS (systèmes de contrôle/commande et de gestion des transports guidés urbains).

Les trois autres parties correspondent aux trois étapes (voir Figure 1) requises pour la spécification d'un système UGTMS et sont à utiliser en conséquence.

- IEC 62290-2 «Spécification des exigences fonctionnelles» spécifie les exigences fonctionnelles associées aux fonctions de base fournies dans IEC 62290-1, dans les limites et interfaces du système définies dans la Figure 3 de IEC 62290-1.

  La FRS (Functional Requirements Specification – Spécification des exigences fonctionnelles) identifie et définit les fonctions qui sont nécessaires pour exploiter un système de transport guidé urbain. Deux types de fonctions sont distingués pour un niveau donné d'automatisation: les fonctions obligatoires (par exemple, la détection des trains) et les fonctions optionnelles (par exemple, la gestion du stationnement des trains). Les exigences des fonctions ont la même allocation, sauf indication contraire.

- IEC 62290-3 «Spécification des exigences système» concerne l'architecture du système et l'allocation aux équipements UGTMS des exigences et des fonctions identifiées dans la Partie 2.

  La SRS (System Requirements Specification – Spécification des exigences système) spécifie l'architecture du système UGTMS avec les équipements UGTMS obligatoires et optionnels.

- IEC 62290-4[1] «Spécification d'interfaces» concerne la définition des interfaces et des données échangées à leur niveau (FIS et FFFIS) pour les équipements UGTMS interopérables et interchangeables identifiés dans la Partie 3.

  Pour les interfaces entre les équipements UGTMS, l'interface logique FIS (Functional Interface Specification, Spécification d'interfaces fonctionnelles) ou l'interface physique et logique FFFIS (Form Fit Functional Interface Specification, Spécifications d'interfaces fonctionnelles et physiques) seront considérées.

  NOTE La structure de la Partie 4 sera établie pour s'adapter aux équipements UGTMS obligatoires et optionnels, et pour tenir compte des conditions locales. En principe, une seule FIS ou FFFIS sera définie pour chaque interface. Toutefois, quand cela sera justifié dans certains cas, plusieurs FIS ou plusieurs FFFIS seront définies pour la même interface.

[1] A l'étude

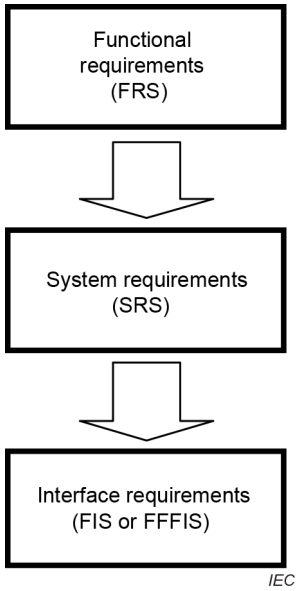

Figure 1 – Processus en trois étapes suivi par la série UGTMS

Les exigences sont celles qui sont nécessaires pour répondre à tous les besoins de l'exploitation pour le bon déroulement et la sécurité de l'exploitation demandée par les autorités en charge du transport quelles que soient les solutions techniques choisies.

Le niveau de détail choisi pour la description des exigences permet aux clients et aux autorités en charge du transport de s’assurer que les applications génériques délivrées par différents fournisseurs couvrent au moins les mêmes fonctionnalités que celles spécifiées dans le présent document.

Les exigences établies par la présente série sont clairement indiquées avec le numéro d’identification correspondant lié à la fonction couverte.

APPLICATIONS FERROVIAIRES – SYSTÈMES DE CONTRÔLE/COMMANDE ET DE GESTION DES TRANSPORTS GUIDÉS URBAINS –

Partie 1: Principes système et concepts fondamentaux

1 Domaine d'application

Ce document fournit une introduction à la série IEC 62290, une présentation des concepts principaux, une définition du système, les principes et les fonctions de base des UGTMS (systèmes de contrôle/commande et de gestion des transports guidés urbains) utilisés par les lignes et les réseaux de transport guidé urbain de voyageurs. Cette norme est applicable aux lignes nouvelles ou à la modernisation de la signalisation de lignes existantes.

Ce document est applicable aux applications utilisant:

- une transmission continue de données,
- une supervision continue du mouvement des trains par courbe de contrôle de vitesse,
- une localisation des trains par l'équipement embarqué UGTMS (trains communicants), et optionnellement par un dispositif externe au sol (et en option au bord).

2 Références normatives

Les documents suivants sont cités en référence de manière normative, en intégralité ou en partie, dans le présent document et sont indispensables pour son application. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 62236 (toutes les parties), *Applications ferroviaires – Compatibilité électromagnétique*

IEC 62278, *Applications ferroviaires – Spécification et démonstration de la fiabilité, de la disponibilité, de la maintenabilité et de la sécurité (FDMS)*

IEC 62279, *Applications ferroviaires – Systèmes de signalisation, de télécommunication et de traitement – Logiciels pour systèmes de commande et de protection ferroviaire*

IEC 62280, *Applications ferroviaires – Systèmes de signalisation, de télécommunication et de traitement – Communication de sécurité dans les systèmes de transmission*

IEC 62290-2, *Applications ferroviaires – Systèmes de contrôle/commande et de gestion des transports guidés urbains – Partie 2: Spécification des exigences fonctionnelles*

IEC 62425, *Applications ferroviaires – Systèmes de signalisation, de télécommunications et de traitement – Systèmes électroniques de sécurité pour la signalisation*