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Train control system using radio communication — Part 1 : General requirement and functional requirement

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Land, Infrastructure, Transport and Tourism through deliberations at the Japanese Industrial Standards Committee as the result of proposal for establishment of Japanese Industrial Standard submitted by Japan Railway Electrical Engineering Association (JREEA)/ Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12, Clause 1 of the Industrial Standardization Law.

This JIS document is protected by the Copyright Law.

Compliance with this Standard may involve the use of the following patents.

Title of invention : Automatic Train Control Equipment Using Radio

Registration date : April 5, 1995

Title of invention : Level Crossing Operation Equipment

Registration date : October 17, 1995

Title of invention : Interlock Control System for Railway Signals

Registration date : January 11, 1996

Title of invention : Train Control Equipment

Registration date : July 18, 2003

Title of invention : Train Separation Control System for Radio Trains

Registration date : July 16, 2004

This statement does not affect the validity or scope of the patents above.

The holders of the patents above guarantee to the Japanese Industrial Standards Committee their intention to license the patents to any person under non-discriminatory and reasonable conditions.

Attention is drawn to the possibility that some part of this standard may conflict with a patent right, application for a patent after opening to the public, utility model right, or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right, or application for registration of utility model after opening to the public which have the said technical properties.

JIS E 3801 series consists of the following 3 parts under the general title “*Train control system using radio communication*” :

— *Part 1 : General requirements and functional requirements*

— *Part 2 : System requirements (tentative)*

— *Part 3 : Interface requirements (tentative)*

Train control system using radio communication —

Part 1: General requirement and functional requirement

1 Scope

This Japanese Industrial Standard specifies the general requirements and functional requirements of a train control system using radio communication (Japan Radio Train Control system, JRTC) that transmits control information related to safety on railways between the wayside and train using radio communication.

However, this Standard may also be applied to specialized railways such as guide-rail system railway.

Functions of the train control system that ensure safe movement of trains or car (hereafter referred to as “trains, etc.”) are divided into the following five functions :

- a) Ensure safe route to prevent derailment or collision of trains, etc. at crossings, turnouts, or other locations.
- b) Ensure safe separation of trains to prevent trains from moving outside safe route and colliding with each other.
- c) Ensure safe speeds to prevent derailment of trains due to excessive speed or to keep safe separation of trains.
- d) Ensure safe movement of trains passing through level crossings.
- e) Ensure safe movement of trains against obstacles on the track, etc.

This Standard applies to a system with automated four functions other than the e). However, it does not apply to automatic train operation with operation staff ¹⁾ and automatic train operation without onboard staff.

Furthermore, this Standard also applies to systems that perform automatic operation regarding acceleration, coasting, and deceleration between stations and stopping within constraints of the above functions.

Note ¹⁾ Operation staff means onboard staff responsible for train protection, braking or making required signs for train operation.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards indicated below (including amendments) shall be applied.

JIS C 60068-1 *Environmental testing Part 1: General and guidance*

JIS E 3013 : 2001 *Glossary of terms of railway signalling*

IEC 62236-1 : *Railway applications — Electromagnetic compatibility — Part 1 : General*

IEC 62236-2 : *Railway applications — Electromagnetic compatibility — Part 2 : Emission of the whole railway system to the outside world*

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

IEC 62236-3-2 : *Railway applications — Electromagnetic compatibility — Part 3-2 : Rolling stock — **Apparatus***

IEC 62236-4 : *Railway applications — Electromagnetic compatibility — Part 4 : Emission and immunity of the signalling and telecommunications apparatus*

IEC 62236-5 : *Railway applications — Electromagnetic compatibility — Part 5 : Emission and immunity of fixed power supply installations and apparatus*

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

IEC 62279 : *Railway applications — Communications, signalling and processing systems — Software for railway control and protection systems*

IEC 62280-1 : *Railway applications — Communication, signalling and processing systems — Part 1 : Safety-related communication in closed transmission systems*

IEC 62280-2 : *Railway applications — Communication, signalling and processing systems — Part 2 : Safety-related communication in open transmission systems*

IEC 62425 : *Railway applications — Communication, signalling and processing systems — Safety-related electronic systems for signaling*

IEC 62427 : *Railway applications — Compatibility between rolling stock and train detection systems*

3 Terms and definitions²

For the purpose of this Standard, the terms and definitions given in JIS E 3013 and the following apply.

3.1 route

preset path for movement of train, etc.

3.2 flank protection

measure to prevent intrusion into vehicle gauge limit of other trains, etc. when setting a route, and also, measure to prevent a route from being set when there is a possibility of intrusion into the vehicle gauge of other trains, etc.

3.3 route element

section defined as a route or points and other equipment related to that route

3.4 limits of safe route

position of limit where it is absolutely mandatory to stop a train for safety reasons

3.5 safety margin

margin required in train protection to absorb location or speed detection uncertainties and brake control uncertainties

3.6 train protection profile

a curve that expresses the relation of distance and running speed for stop control and deceleration control

3.7 system component

basic components(such as switches), the aggregate of components, and complete assembly or subassembly of equipment that are incorporated in or are planned to be incorporated in JRTC

3.8 OCC equipment

equipment that is installed in OCC for JRTC

3.9 data communication equipment

communications equipment, including wayside and onboard radio transmission for JRTC

3.10 wayside equipment

equipment that is installed for JRTC on the wayside, excluding OCC equipment and data communication equipment

3.11 onboard control equipment

equipment that are installed for JRTC on trains etc., excluding data communication equipment

3.12 timetable

a train's operation plan expressed as the relationship of the train position on the line and time

NOTE : This is the base data for route control and train tracking.

3.13 train number

a unique number assigned to each train in the timetable

3.14 train tracking