
**Railway applications — Concepts and
basic requirements for the planning
of railway operation in the event of
earthquakes**

*Applications ferroviaires — Planification des concepts d'exploitation
en cas de séisme*



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

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Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Modern transportation systems, including the railway, are constructed with the prerequisite of maintaining the functions required for public service under the designed usage conditions and/or when faced with the expected external effects of natural phenomena that were taken into account at the time of their design. Such natural phenomena include earthquakes or extreme weather events. In case of events caused by natural phenomena, functional damage to transportation systems can occur, adversely affecting lives and societies.

There are no predictive signs for many natural phenomena events, especially earthquakes. Earthquakes tend to occur suddenly and without any prior warning which could enable the forecasting of the intensity of ground shaking and the size of the affected area using existing technology. Large earthquakes including aftershocks can affect society for an extended period of time where extensive damage to transportation systems occurs. Compared to other natural phenomena, earthquakes are infrequent. As such, it is difficult to obtain experience-based knowledge for improving information on construction countermeasures for resisting future events reliably.

Because of the nature of earthquakes, it is difficult to predict the scale and timing of damage to transportation systems. Therefore, due to potentially significant effects on society, the planning and implementation of countermeasures to restrict damage and to reduce the risk due to earthquakes is essential for transportation systems.

Railway operators aim to provide a safe and reliable transport service. In doing so, they need to take into account the reliability of the railway service for customers (passengers and consignors) and railway owners. This aim should be achieved as far as possible even under irregular railway operation conditions. One case in which irregular railway operation conditions are expected is that due to earthquake events. This is potentially the case not only for a specific area/country which has experienced a large earthquake event before, but also for other areas/countries without previous experience of significant earthquake events, but for which a risk of exposure to ground shaking exists. For these areas/countries, a significant seismic potential and a significant risk of exposure to ground shaking can be present. Therefore, in order to reduce a customer's risk in relation to earthquakes, the planning of any countermeasures for railway operation becomes an important issue for consideration.

Conversely, the solution to the above issue is hampered by the lack of standards, guidance, or other documentation available to the public. In order to help to reduce the potential risk due to earthquakes, and to thereby improve the reliability of a railway service and to protect the reputation of railway businesses, the establishment of an internationally accepted and publicly available document is essential.

Railway applications — Concepts and basic requirements for the planning of railway operation in the event of earthquakes

1 Scope

This document specifies the concepts and basic requirements for the planning of railway operation in order to reduce risk in the event of earthquakes. This excludes regions where the consequences of seismic hazard for railway operation are low or non-existent. The definition of such regions is out of the scope of this document.

NOTE The stages defined for consideration of the countermeasures necessary for the safe management of the seismic hazards can also be relevant for dealing with other natural phenomena.

This document includes only operational measures and excludes any infrastructure measures. Furthermore, this document does not include specific measures which ensure, without fail, passenger safety or which provide protection against railway-operational damage caused by earthquakes. Therefore, residual risk can remain.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

railway operation

control and management of the railway service

Note 1 to entry: In this context, railway operation includes responsibility for managing and maintaining railway infrastructure, traffic management and signalling, provision and maintenance of rolling stock, and services for the transport of goods and/or passengers by rail. In countries where these responsibilities are provided by different parties, the tasks defined in this document should be divided accordingly.

3.2

operator

party responsible for *railway operation* (3.1)

3.3

operational restriction

application of a speed restriction or an operation suspension to trains according to relevant operational procedures in order to improve the safety of the trains or to reduce the risk