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Bases for design of structures — General principles on seismically isolated structures

Bases du calcul des constructions — Principes généraux des constructions munies d'isolateurs parasismiques

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Foreword

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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.

This document was prepared by Technical Committee ISO/TC 98, Subcommittee SC 2, *Reliability of structures*.

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

Seismically isolated structures have been constructed since the 1970s. Their reduction of the seismic action has been demonstrated in many earthquakes and the usefulness of seismic isolation has been widely recognized. It is difficult for other seismic mitigation strategies to reduce the acceleration acting on the structure as significantly as seismic isolation. With this feature, the seismic force on the structure as well as foundation is dramatically reduced and the vibration perception of occupants is greatly minimized. Seismic isolation also reduces the vibrations and disruption of building contents, such as furniture and equipment. Since the structure can be restored to the original state without damage, it can remain operational during and immediately after the earthquake without essential interruption in operation. Seismic isolation technique also expands architectural design freedom by reducing seismic force and controlling deformation of superstructure. It also minimizes rate of losses, number of injures and improves of peace of mind of occupants against earthquakes. To mitigate future earthquake disasters, widespread of adoption of seismic isolation is advisable.

The structural design process should ensure that the capacity of structural components exceeds the demands imposed by the design load in order to provide both safety and serviceability. In most cases, the load effect is treated as static. In recent years, however, when a structure with seismic isolation devices is designed for earthquake ground motion, the dynamic performance of the entire structure is evaluated. Therefore, it is desirable to specify the principles of dynamic seismic design of seismically isolated structures. In this document, the items to be considered in the design, and design procedures are described. Then the standard structural calculation procedure is shown, and the methods for construction management and maintenance unique to the seismically isolated structure are also described.

Bases for design of structures — General principles on seismically isolated structures

1 Scope

This document specifies the principles regarding the design of seismically isolated structures under earthquake effects.

This document also describes the principles of construction management and maintenance, since proper construction management and maintenance are important for realizing high quality seismic isolation structures.

This document is not applicable to bridges and LNG tanks, although some of the principles can be referred to for the seismic isolation of those structures.

This document is not applicable to seismic isolation structures that reduce the vertical response to earthquake ground motions, since this document mainly specifies seismic isolation structures that attenuate the horizontal response to horizontal earthquake ground motions.

This document is not a legally binding and enforceable code. It can be viewed as a source document that is utilized in the development of codes of practice by the competent authority responsible for issuing structural design regulations.

NOTE This document has been prepared mainly for the seismically isolated structures which have the seismic isolation interface applied between a superstructure and a substructure to reduce the effect of the earthquake ground motion onto the superstructure. In most cases, the substructure refers to the foundation of the structure. However, the substructure in this document consists of a structural system below the isolation interface that has been designed with sufficient rigidity and strength. Examples include locating the isolation interface in a mid-storey of the building or above the bridge piers (see Annex E).

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.

ISO 3010:2017, *Bases for design of structures — Seismic actions on structures*

3 Terms and definitions

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

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1 Terms related to structure

3.1.1
superstructure
portion of the structure above the seismic isolation interface