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BSI Standards Publication

Cranes — Principles for seismically resistant design

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National foreword

This British Standard is the UK implementation of ISO 11031:2016.

The UK participation in its preparation was entrusted to Technical Committee MHE/3/1, Crane design.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Foreword

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The committee responsible for this document is ISO/TC 96, *Cranes*, Subcommittee SC 10, *Design principles and requirements*.

Introduction

An economically acceptable protection against the effects of earthquake is usually based on two design limit states which specify the required crane response to a moderate and a severe earthquake and which are expressed in terms of serviceability and ultimate limit states.

— Serviceability limit state (SLS) imposes that the crane should withstand moderate earthquake ground motions which may occur at the site during its service life. The resulting stresses would remain within the accepted limits.

— Ultimate limit state (ULS) imposes that the crane structure should not collapse nor experience similar forms of structural failure due to severe earthquake ground motions, the suspended load, or any part of the crane should not fall and the safety of the public, operators and workers should be safe guarded. The crane is not expected to remain operational after the earthquake. However, in the case of a failure in the main load path, it is still possible to lower the load to the ground after the earthquake.

Cranes — Principles for seismically resistant design

1 Scope

This International Standard establishes general methods for calculating seismic loads to be used as defined in the ISO 8686 series and for proof of competence as defined in ISO 20332, for the structure and mechanical components of cranes as defined in ISO 4306.

This International Standard evaluates dynamic response behaviour of a crane subjected to seismic excitation as a function of the dynamic characteristics of the crane and of its supporting structure.

The evaluation takes into account dynamic effects both of regional seismic conditions and of the local conditions on the surface of the ground at the crane location.

The operational conditions of the crane and the risks resulting from seismic damage to the crane are also taken into account.

This International Standard is restricted to the serviceability limit state (SLS), maintaining stresses within the elastic range in accordance with ISO 20332.

The present edition does not extend to proofs of competence which include plastic deformations. When these are permitted by agreement between crane supplier and customer, other standards or relevant literature taking them into account can be used.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4306 (all parts), *Lifting appliances — Vocabulary*

ISO 8686 (all parts), *Cranes — Design principles for loads and load combinations*

ISO 20332, *Cranes — Proof of competence of steel structures*

3 Symbols

The main symbols used in this International Standard are given in Table 1.

Table 1 — Main symbols

Symbol	Description
K_H	Horizontal seismic design coefficient
K_V	Vertical seismic design coefficient
A_{bg}	Normalized basic acceleration
A_{sg}	Normalized acceleration at ground surface
f_{con}	Conversion factor
f_{rec}	Recurrence factor
β_2	Subsoil amplification factor
β_3	Acceleration response factor