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NATIONAL STANDARD

OF THE PEOPLE'S REPUBLIC OF CHINA

中华人民共和国国家标准

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GB 50153-2008

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**Unified Standard for Reliability Design of  
Engineering Structures**

工程结构可靠性设计统一标准

Issued on: November 12, 2008

Implemented on: July 1, 2009

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Jointly Issued by **Ministry of Housing and Urban-Rural Construction of the People's  
Republic of China**

**General Administration of Quality Supervision, Inspection and  
Quarantine of the People's Republic of China**

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Chief Development Department: Ministry of Housing and Urban-rural Development of the People's  
Republic of China

Approval Department: Ministry of Housing and Urban-Rural Development of the People's Republic  
of China

Implementation Date: July 1, 2009

**Beijing 2008**

## **NOTICE**

This standard is written in both Chinese and English with the Chinese version prevailing in case of conflict.

# **Announcement of Ministry of Housing and Urban-Rural Development of the People's Republic of China**

No. 156

## **Announcement of Publishing the National Standard of “Unified Standard for Reliability Design of Engineering Structures”**

“Unified Standard for Reliability Design of Engineering Structures” has been approved as a national standard with a serial number of GB 50153–2008. It will be implemented on July 1, 2009. Therein, Articles 3.2.1 and 3.3.1 are compulsory provisions and must be enforced strictly. The original “Unified Standard for Reliability Design of Engineering Structures” GB 50153–92 shall be abolished simultaneously.

Authorized by the Standard Rating Research Institute of the Ministry of Housing and Urban-Rural Development of the People's Republic of China, this Standard is published by China Architecture & Building Press.

Ministry of Housing and Urban-Rural Development of the People's Republic of China

November 12, 2008

## Foreword

According to the requirements of Document Jian Biao [2003] No. 102 issued by the Ministry of Construction—"Notice on Printing the Development and Revision Plan of National Engineering Construction Standards in 2002 and 2003", China Academy of Building Research made a comprehensive revision for the national standard "Unified Standard for Reliability Design of Engineering Structures" GB 50153-92 jointly with the departments concerned.

This standard was revised by borrowing actively from the international standard ISO 2394:1998 "General Principles for Structural Reliability" issued by International Organization for Standardization (ISO) and the European standard EN 1990:2002 "Bases of Structural Design" approved by European Committee for Standardization (CEN), carrying out the principle of preceding from the actual conditions of China carefully, summing up the practical experience of China's large-scale engineering and carrying through the guiding principle of sustainable development. There have been some significant extensions in this revised new standard over its previous edition. This revised new standard specifies the basic contents on the design basis of engineering structures and is a basic standard for design of engineering structures.

This revised new standard uniformly specifies the fundamentals, basic requirements and basic methods for the design of engineering structures in various civil engineering fields such as architectural engineering, railway engineering, highway engineering, harbor and harbor engineering and water conservancy hydroelectric engineering, in order to make these = engineering fields be provided with consistency and coordination on processing the structural reliability problem and link them up to the world. General requirements for the design of engineering structures in various civil engineering fields are included in the text of this standard, while the specific requirements for special branches and problems are included in the Appendixes. The main contents of this standard are as follows: General Provisions, Terms and Symbols, Basic Provisions, Limit State Design Principles, Actions and Environmental Influence on the Structure, Material and Geotechnical Properties/Geometrical Parameters, Structural Analysis and Test- assisted Design and Partial Factor Design Methods -.

The bold provisions in this standard are compulsory provisions and must be enforced strictly.

Ministry of Housing and Urban-rural Development is in charge of the administration of this standard and the explanation of compulsory provisions. And China Academy of Building Research is responsible for the explanation for the specific technical contents. In order to improve the standard quality, all relevant organizations are kindly requested to sum up and accumulate - experience in practices during the process of implementation of this standard. The relevant opinions and advice, whenever necessary, can be posted or passed on to China Academy of Building Research (Address: No. 30, North Third Ring East Road, Beijing, 100013, China) for future reference.

Chief Development Organization of this standard: China Academy of Building Research

Participating Development Organizations of this standard:

China Academy of Railway Sciences

The Third Railway Survey and Design Institute Group Co., Ltd.

CCCC Highway Consultants Co., Ltd.,

China Communications Water Transportation Planning and Design Institute Co., Ltd..

China Renewable Energy Engineering Institute

Water Resources and Hydropower Planning and Design General Institute, Ministry of Water Resources

Dalian University of Technology

Xi'an University of Architecture and Technology

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# 1 General Provisions

**1.0.1** This standard is established with a view to unifying the fundamentals, basic requirements and basic methods for design of various engineering structures such as buildings, railways, highways, port and harbor structures as well as water conservancy and hydropower, and making the structures meet the sustainable development requirements as well as requirements on safety, economy, state-of-art technology and high quality.

**1.0.2** This standard is applicable to design of the members of the whole structures, their components and the foundations; to the design of structures for construction- and service periods; and to the reliability assessment of the structures.

**1.0.3** Probability-based limit state and partial factor format should be adopted for the design of engineering structures.. The design of structures can be carried out according to engineering experience or necessary experimental investigation if statistical data is insufficient. In some cases, such empirical methods as allowable stress or slumped safety factor can also be used.

**1.0.4** Standards for design of engineering structures and other relevant standards shall comply with the ground rules specified in this standard and establish corresponding specific specifications .

**1.0.5** The design of engineering structures shall not only comply with the specifications specified in this standard, but those in the current relevant national ones.

## **2 Terms and Symbols**

### **2.1 Terms**

#### **2.1.1 Structure**

A system which is composed of various connecting parts and rigid to withstand the actions.

#### **2.1.2 Structural Member**

Part that can be separated physically from the structures.

#### **2.1.3 Structural System**

All the load-bearing members and the way in which these members function together.

#### **2.1.4 Structural Model**

The idealized structural system used for structural analysis and design.

#### **2.1.5 Design Working Life**

The intended period specified in the design, during which the structure and its members can be used as intended purpose with anticipated maintenance but without major repair being necessary.

#### **2.1.6 Design Situations**

A group of design conditions which represent the practical situations in a certain period of time. The structures shall not exceed the related limit state in design under this group of conditions.

**2.1.7 Persistent Design Situation** Design situation that is relevant during a period of the same order as the design working life of the structure.

**2.1.8 Transient Design Situation** Design situation that is relevant during a period much shorter than the design working life of the structure and which has a high probability of occurrence.

#### **2.1.9 Accidental Design Situation**

Design situation involving exceptional conditions of the structure or its exposure

#### **2.1.10 Seismic Design Situation**

The design situation when the structures are exposed in an earthquake.

#### **2.1.11 Load Arrangement**

The reasonable determination for the positions, magnitude and orientation of the free action in structural design.

#### **2.1.12 Load Case**

The compatible load arrangement of the fixed variable actions, permanent actions and free actions as well as deformation and geometrical deviation, which are considered simultaneously for specific verification purposes.

#### **2.1.13 Limit States**



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