



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB 50144-2019

**Standard for appraisal of reliability of industrial buildings and
structures**

工业建筑可靠性鉴定标准

(English Translation)

Issued on: June 19, 2019

Implemented on: December 1, 2019

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

Table of Contents

Foreword	4
1 General provisions	8
2 Terms and symbols	8
2.1 Terms	8
2.2 Symbols	10
3 Basic requirements	11
3.1 General requirements	11
3.2 Procedure and content for appraisal	12
3.3 Rating standards for appraisal	15
4 Investigation and inspection	19
4.1 Investigation and inspection of using environment	19
4.2 Investigation and inspection of industrial buildings and structures	22
5 Structural analysis and check	25
6 Appraisal rating for structure members	26
6.1 General requirements	26
6.2 Concrete structure members	27
6.3 Steel structure members	32
6.4 Masonry structure members	35
7 Appraisal rating for structure system	38
7.1 General requirements	38
7.2 Foundation	39
7.3 Bearing substructure	41
7.4 Envelope structure system	45
8 Appraisal rating for industrial buildings	47
9 Appraisal rating for industrial structures	48
9.1 General requirements	48
9.2 Chimney	49
9.3 Concrete cooling tower	52
9.4 Silo	54
9.5 Gallery	56
9.6 Pipe support	57
9.7 Pond structure	58

9.8 Boiler steel structure	59
9.9 Duster structure	61
10 Appraisal report	64
Annex A Determination method for single member atmospheric environment	67
B.1 General requirements atmospheric environment	68
Annex C Detection of corrosion of steel members	76
Annex D Fatigue performance evaluation of steel crane girders	78
Annex E Evaluation of residual fatigue life of steel crane girders	80
Annex F Appraisal of vibration impact on the superstructure	82
Annex G Monitoring and evaluation of structural work condition	85
Annex H Table of appraisal rating for industrial buildings and structures.....	87
Explanation of wording in this Standard	88
List of quoted standards	89

1 General provisions

1.0.1

This Standard is formulated in order to standardize the appraisal of reliability of industrial buildings, ensure the quality of appraisal, and strengthen the safety management of industrial buildings.

1.0.2

This Standard applies to the reliability appraisal of the following existing industrial buildings and structures:

1. Industrial buildings such as single-story and multi-story factory buildings with concrete structures, steel structures, and masonry structures as load-bearing structures;
2. Industrial structures such as smoke, reinforced concrete cooling towers, storage bins, corridors, pipe supports, pools, boiler steel structure supports, dust collector structures, etc.

1.0.3

The appraisal of reliability of industrial buildings and structures shall not only implement this Standard, but also comply with the current relevant national standards.

2.1 Terms

2.1.1

existing industrial buildings and structures

Built buildings and structures that serve industrial production.

2.1.2

existing structure

Various types of members and their combinations that have been built.

2.1.3

appraisal of reliability

Technical activities such as investigation, inspection, analysis checking calculation and assessment of the safety and serviceability of existing industrial buildings and structures.

Safety includes bearing capacity and overall stability, etc. Serviceability includes applicability and durability.

Appraisal units subdivided according to the different functions of the building structure in the appraisal unit. Generally, industrial buildings can be divided into three structure systems according to the basement foundation, upper load-bearing structure, and envelope structure. For industrial structures, it also includes their special functional structure systems.

2.1.14

member

A basic appraisal unit further subdivided in the structure system. It refers to a single structure member that bears various actions, or an integral part of a load-bearing structure.

2.1.15

member assemblage

A collection of homogeneous members. It is divided into important member assemblage and less important assemblage.

2.1.16

items of assessment

Items for assessing the reliability of buildings and structures as well as their components.

2.1.17

important member

A member whose failure will cause other members to fail and endanger the safety of the load-bearing structure system, or a member that directly affects the operation of production equipment.

2.1.18

less important member

A member that its own failure is an isolated event, which will not cause failure of other members and does not directly affect the operation of production equipment.

2.2.1 Structural properties and effects

h - Height of the frame floor or the floor height of the multi-storey factory building.

H - Total height from the top of the foundation to the top of the column.

l₀ - Calculated span or calculated length of member.

R - Resistance of structures or members.

S - Effects of structures or members.

- Structural importance coefficient.

2.2.2 Appraisal rating

a, b, c, d - assessment rating for member.

A, B, C, D - assessment rating for structure system.

I, II, III, IV - assessment rating for appraisal unit.

3.1 General requirements

3.1.1

Appraisal of reliability shall be carried out for industrial buildings and structures under the following circumstances:

1. When the designed service life is reached and intended to continue to be used.
2. When the purpose of use or the environment changes.
3. When structural renovations or extensions are carried out.
4. After a disaster or accident.
5. When there are serious quality defects or serious corrosion, damage or deformation.

3.1.2

Appraisal of reliability shall be carried out for industrial buildings and structures under the following circumstances:

1. When routine inspection identification is required during use and maintenance.
2. When large-scale maintenance is required.
3. In other situations where the grade of structural reliability needs to be mastered.