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

**GB/T 17742-2020**

Replacing GB/T 17742-2008

**The Chinese seismic intensity scale**

中国地震烈度表

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### 1 Scope

China's national seismic intensity scale - the twelve-degree scale on which the severity of an earthquake at a given place is assessed after it has happened. It specifies the terms, definitions, symbols and abbreviations, the intensity degrees and the categories of building for which intensity is assessed, and the procedure for evaluating seismic intensity. Intensity is not magnitude, and the difference is the reason this document exists. Magnitude is one number for the whole earthquake, computed from instruments, describing the energy released at the source. Intensity is a different number at every location, describing what actually happened there - and it is what determines relief allocation, damage compensation, the revision of the seismic hazard map and the retrospective assessment of building codes. The same magnitude produces wildly different intensities depending on distance, on the depth of the source, on the soil, on the topography and on how the buildings were built. Assessing it means reading evidence: what people felt and how they reacted, how furniture and objects behaved, and above all the pattern of damage across buildings of different construction. That is why the scale is anchored to defined building categories - a wall crack means one intensity in an unreinforced masonry house and quite another in a reinforced concrete frame, and a scale that ignores the distinction gives a false map. The 2020 edition also brings the scale closer to instrumental measurement, providing the correspondence between the intensity degrees and recorded ground motion parameters, so that an intensity map can be drawn quickly from strong-motion records and refined afterwards by field survey. Issued on 21 July 2020 and in force since 1 February 2021, it replaces GB/T 17742-2008.

This standard specifies the seismic intensity level and the category of buildings for evaluating the seismic intensity, as well as the seismic intensity evaluation method. Evaluation indicators include seismic damage to buildings, human feelings, response of utensils, lifeline engineering seismic damage, other seismic damage phenomena and seismic intensity measured by instruments. The evaluation method is a multi-index method

that comprehensively uses macro-survey and instrumental measurement. This standard is applicable to seismic intensity evaluation.

## 2 Terms, definitions, symbols and abbreviations

2.1 Terms and definitions The following terms and definitions apply to this document.

2.1.1 Seismic intensity The magnitude of ground motion caused by an earthquake and its impact.

2.1.2 Damage index A quantitative indicator of the degree of seismic damage to buildings.

Note: A number between

0.00 and

1.00 indicates the degree of damage from light to severe.

2.1.3 Mean damage index The weighted average of the damage index of similar buildings.

Note: The mean damage index is the sum of the product of the proportion of buildings damaged by the earthquake at all levels and the corresponding

b) "Minority" is 10% ~ 45%;

c) "Majority" is 40% ~ 70%;

d) "Most" is 60% ~ 90%;

e) "Overwhelming majority" is more than 80%.

3.3 Types of buildings for assessing intensity The buildings used to assess the intensity include the following five types:

a) Category A1: Civil, brick, stone and wood buildings without seismic fortification;

### 4.1 Evaluation method

4.1.1 The multi-index method of macro-survey and instrument determination can be comprehensively used in the evaluation of seismic intensity:

a) For areas that do not have the conditions for measuring seismic intensity by instruments, macroscopic surveys shall be used to assess seismic intensity.

b) For areas with the conditions for measuring seismic intensity by instruments, the seismic intensity measured by instruments should be used.

4.1.2 Evaluate the seismic intensity according to the seismic intensity levels as classified in Table 1.

## 4.2 Macro-survey for evaluation of seismic intensity

4.2.1 The process of macro-survey for evaluation of seismic intensity includes survey area and route planning, seismic damage investigation and analysis, comprehensive determination of seismic intensity, drawing of seismic intensity map.

4.2.2 The content of the macro-survey includes the seismic damage of buildings, human feelings, reaction of objects, lifeline engineering seismic damage and other seismic damage phenomena. The average damage index shall be calculated for building seismic damage.

4.2.3 According to the survey results, comprehensively considering multiple evaluation indicators, evaluate the seismic intensity according to Table 1.

4.2.4 When evaluating the seismic intensity through a macro-survey:

a) Degree I (degree 1) ~ degree V (degree 5) shall be based on human perception and the reaction of utensils as the main evaluation basis;

b) Degree VI (degree 6) ~ degree X (degree 10) shall be based on the main A.2.1 The site of the observing instrument used to obtain the ground motion record shall refer to the provisions of

4.4 of DB/T 60-2015. A.2.2 The frequency band range of the observing instrument used to obtain the ground motion record shall meet the following requirements: the low-frequency cut-off frequency is not more than

0.1 Hz; the high-frequency cut-off frequency is not less than

10 Hz. A.2.3 Observing instruments used to obtain ground motion records shall be orthogonal three-dimensions; the coordinates shall be converted into east-west, north-south and up-down components. A.3 Baseline correction Baseline correction processing shall be performed on the ground motion records; the recording time process should be used to subtract the arithmetic mean value recorded before the earthquake event. The length of the pre-event recording time should be 10 s. A.4 Record conversion When the ground motion record is acceleration, it shall be converted to obtain the speed record. When the ground motion record is speed, it shall be converted to obtain the acceleration record. A.5 Digital filtering Each component of the ground motion acceleration and velocity records shall be filtered by a digital filter of

0.1 Hz ~

10 Hz. It should use the minimum phase filter. The filter passband ripple shall be less than