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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB 17740-2017

General ruler for earthquake magnitude

地震震级的规定

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1 Scope

GB 17740-2017 is the Chinese national standard on general ruler for earthquake magnitude, in the field of construction materials and building. It carries no /T suffix, which in the Chinese system means compliance is mandatory: a product or a practice within its scope has to meet it to be lawfully made, sold or carried out in China. It was issued on 12 May 2017 by the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China; Standardization Administration of China, and has been in force since 1 December 2017. Classification: ICS 91.120.25, CCS P15. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This standard specifies the method and method of determination of seismic magnitude. This standard applies to earthquake monitoring, earthquake emergency, information

dissemination, scientific popularization, news reports and other work related to earthquake magnitude. This standard does not apply to other types of magnitude used by scientific research institutes.

3 Determination method

3.1 Local magnitude Determination of the local magnitude ML should be used to simulate the maximum amplitude of the S-wave (or Lg wave) recorded horizontally in the DD-1 short-period seismograph, The maximum amplitude should be greater than the interference level of more than 2 times, according to formula (1). ML = lg (A) R (Delta) A = AN AE (1) Where. A

--- maximum amplitude in microns (μm); AN - the maximum amplitude of the S-wave or Lg-wave in the north-south direction, in microns (μm); AE

--- east to west S wave or Lg wave maximum amplitude, in microns (μm); Delta - epicenter, in kilometers (km); R (Delta) - The geometric function of the local magnitude, see Appendix A. The instrument parameters and transfer functions of the DD-1 short-period seismograph are given in Appendix B, B.1.

3.2 surface wave magnitude Determine the surface wave magnitude MS of the shallow earthquakes, the original broad band record should be recorded into the base (SK) long-period seismograph record, the use of water The maximum and its period of the motion of the plane wave surface, calculated according to formula (2). MS = lg ÷ 1.66lg (Delta) 3.5 (2 ° < Delta < 130 °, 3s \u003cT \u003c25s) (2) Where. A - Horizontal plane to the maximum particle motion displacement, take two horizontal to the particle movement displacement vector sum of the model, the unit is micron (μm); Delta - epicenter, in degrees (°); T

--- A corresponds to the cycle, in seconds (s). When measuring the two horizontal components of the maximum particle motion displacement, the same time or period difference should be taken within 1/8 of the cycle. If two points When the periodicity is not consistent, then the weighted sum is given, and T is calculated according to Eq. (3). T = TNAN TEAE AN AE (3) Where. AN - north - south surface wave motion displacement in microns (μm); AE

--- east-west surface wave particle motion displacement in microns (μm); TN

--- AN corresponds to the cycle, in seconds (s); TE

--- The period corresponding to AE, in seconds (s). When measuring the surface wave magnitude MS, the period T of the surface wave is preferably in the range given in Appendix C; the instrument of the long-period seismograph in the base (SK) Refer to B.2 for parameters and transfer functions.

3.3 wide band surface wave magnitude The wide-band surface wave magnitude MS (BB) of

the shallow earthquakes should be measured in the vertical velocity-type wide-band recording. The maximum value, according to formula (4). MS (BB) = lg Vmax 2pi ÷ 1.66lg (Delta) 3.3 (2 ° < Delta < 160 °, 3s \u003cT \u003c60s) (4) Where. Vmax - the maximum value of the velocity of the vertical plane to the surface wave, in microns per second (μm/s); T

--- Vmax corresponds to the cycle, in seconds (s); Delta - epicenter, in degrees (°).

3.4 short cycle body wave magnitude Determination of short-period body wave magnitude mb, should be recorded vertically to the broadband band into a DD-1 short-period seismograph recording, measuring P wave (Including P, pP, sP, and even can be PcP and its tail, generally taken before the PP wave) the maximum displacement of the particle movement, according to formula (5) Calculate. mb = lg ÷ Q (Delta, h), 5 ° < Delta < 100 ° (T < 3s, 0<=h<=700km) (5) Where. A - the maximum value of the motion displacement of the P-wave particles in micrometers (μm); T

--- A corresponds to the cycle, in seconds (s); Delta - epicenter, in degrees (°); h - the depth of the source, in kilometers (km); Q (Delta,

h) - the gauge function of the vertical P-wave wave magnitude, see Appendix D. The instrument parameters and transfer functions of the DD-1 short-period seismograph are given in B.1.

3.5 Broadband body wave magnitude Determine the broadband band magnitudes mB (BB), the P-wave train (including P, pP, sP, etc.) should be measured on the vertical velocity-type wideband recording Can be PcP and its tail, generally taken before the PP wave) the maximum speed of particle motion, calculated according to equation (6). mB (BB) = lg Vmax 2pi ÷ Q (Delta,

4.1 Determination of magnitude

4.1.1 Seismic stations (stations) responsible for day-to-day seismic monitoring shall be used to determine all possible magnitude, including ground, in accordance with the method of Chapter 3 (ML), surface wave magnitude MS, wideband surface wave magnitude MS (BB) and moments Magnitude MW.

4.1.2 The measured magnitude should not be converted from each other.

4.2 Magnitude release

4.2.1 Seismic network in the release of earthquake newsletter information, the timely determination of earthquakes M0 earthquake, should give priority to select the moment magnitude MW for For the release of the magnitude.

4.2.2 Seismic network In the release of seismic information, the earthquake can not be measured in time earthquake M0 earthquake, should be based on the following principles

to determine the external Thickness of cloth.

a) For shallow earthquakes with ML < 4.5, the local magnitude ML should be chosen as the magnitude of the external release;

b) For shallow earthquakes with ML >= 4.5, the wide-band surface wave magnitude MS (BB) should be chosen as the magnitude of the external release;

c) For medium-source and deep-seated earthquakes, it is appropriate to select the short-period bulk wave magnitude mb or the broadband band-wave magnitude mB (BB) for external release Magnitude.

4.2.3 The magnitude of the external release of the application of M said, should not be added "Richter scale" "moment magnitude" and other additional information.

4.2.4 Seismic network In the preparation of seismic catalog, should also list all the measured magnitude and external release of the magnitude. Examples are shown in Table 1. Table

1 Examples of Seismic Representation in Seismic Catalog Serial number Time of shock (UTC) latitude (°) longitude (°) depth km ML MS MS (BB) mb mB (BB) MW M Reference place names 05. 46. 19.0 38.10N 142.50E 20 8.7 8.6 7.3 7.7 9.0

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4.2.5 At all levels of seismic work departments or agencies to issue seismic information, conduct science education and other work, should use the release of the magnitude of M.

4.2.6 The news media such as television stations, radio stations, newspapers, magazines and websites should use the published magnitude M when issuing seismic information.

4.2.7 After the earthquake disaster, the governments at all levels should start the earthquake emergency response according to the published magnitude M to carry out the earthquake emergency work.

5 Appendix A (Normative Appendix) Local Seismic Level Gauges Table

7 Appendix B (normative) Parameters and transfer functions of seismic instruments Appendix C (normative appendix) Seismic surface wave period values for different epicentral distances

12 Appendix D (normative) Q (Delta,

9.0 Japan East coast of the sea 23. 45. 56.5 34.54N 104.21E 15 6.6 6.7 6.5 5.9 6.3

6.5 Minxian County, Gansu Province Table 1 (continued) Serial number Time of shock