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Replacing GB/T 18314-2009

**Specifications for survey and measurement of global
navigation satellite system**

全球导航卫星系统（GNSS）测量规范

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Table of Contents

1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Basic requirements	2
5 Class division and measurement accuracy	3
5.1 Class division	3
5.2 Uses	3
5.3 Measurement accuracy	3
6 Layout of the GNSS network	4
6.1 Basic requirements for the layout	4
6.2 Design requirements	4
6.3 Naming of GNSS points	5
6.4 Technical design	5
7 Point selection	5
7.1 Preparation for point selection	5
7.2 Basic requirements for the point position	5
7.3 Auxiliary points and azimuth points	6
7.4 Point selection work	6
7.5 Material to be handed over after point selection	6
8 Monument setting	6
8.1 Monuments	6
8.2 Monument setting work	6
8.3 External finishing of the monument	7
8.4 Control of the key operations	7
8.5 Material to be handed over after monument setting	7
9 Instruments	7
9.1 Selection of the receiver	7
9.2 Inspection of the instruments	8
9.3 Maintenance of the instruments	8
10 Observation	8
10.1 Basic technical requirements	8
10.2 Division of the observation area	9

10.3 Observation plan	9
10.4 Preparation before observation	9
10.5 Requirements for the observation work	9
11 Field records	10
11.1 Field records of the class A GNSS network	10
11.2 Field records of the class B, C, D and E GNSS networks	10
11.3 Arrangement of the observation material	11
12 Data processing	11
12.1 Basic requirements	11
12.2 Quality check of the field data	11
12.3 Baseline vector solution	12
12.4 Quality check of the baseline processing results of the class A and B GNSS networks	13
12.5 Re-observation and supplementary observation	14
12.6 Adjustment of the GNSS network	15
12.7 Arrangement of the data processing results and writing of the technical summary ...	15
13 Acceptance of the results and material to be handed over	16
13.1 Checking and acceptance of the results	16
13.2 Material to be submitted	16
Annex A (informative) Definition of the China Geodetic Coordinate System 2000 and earth ellipsoid parameters	17
Annex B (normative) Point selection and monument setting material and its explanation	18
B.1 Point description	18
B.2 Sky view diagram of the GNSS point	20
B.3 Monument type drawings	20
Annex C (normative) Main technical requirements for the meteorological instruments	25
C.1 Main technical requirements for the ventilated psychrometer and its use	25
C.2 Main technical requirements for the aneroid barometer and its use	25
Annex D (normative) Survey booklet records and related requirements	26
D.1 Survey booklet	26
D.2 Content of the survey booklet records and requirements	28
D.3 Methods and requirements for measuring the antenna height	29
Annex E (informative) Determination and calculation of the centring elements	30
E.1 GNSS triangulation method	30
E.2 Pure GNSS method	30

E.3 Triangulation connection method	30
Annex F (normative) Checking of the synchronous observation loop	31

4 Basic requirements

4.1 GNSS survey results shall adopt the China Geodetic Coordinate System 2000; the definition of that system and its reference ellipsoid parameters are given in Annex A.

4.2 A unified time system shall be adopted when GNSS data are processed.

4.3 Instruments used for GNSS network survey of any class shall be verified or calibrated by an authorized verification and calibration body, and shall be used within the period of validity of that verification.

4.4 GNSS network survey of any class shall use the mean square error as the technical indicator of accuracy, and twice the mean square error as the limit error.

5 Class division and measurement accuracy

5.1 GNSS survey is divided into classes A, B, C, D and E according to its use and its measurement accuracy.

5.2.1 Class A GNSS survey is used to establish the national first-order geodetic control network and to carry out global geodynamic research, crustal deformation measurement and precise orbit determination.

5.2.2 Class B GNSS survey is used to establish the national second-order geodetic control network, to establish local or urban coordinate reference frames, and for regional geodynamic research, crustal deformation measurement, local deformation monitoring and precise engineering surveys.

5.2.3 Class C GNSS survey is used to establish the third-order geodetic control network and the basic control networks of regions, cities and engineering projects.

5.2.4 Class D and E GNSS survey is used to establish the fourth-order geodetic control network and the control surveys of medium and small cities and towns, and of mapping, cadastre, land information, real estate, geophysical prospecting, exploration and building construction; such work may be carried out by the network RTK method of the satellite navigation positioning reference station network and shall meet the requirements of the corresponding accuracy class of GB/T 39616.

5.3.1 The class A GNSS network is formed by satellite navigation positioning reference stations. According to Table 1 the mean square error of the annual variation rate of the coordinates shall not exceed 2 mm/a for the horizontal component and 3 mm/a for the vertical component, the relative accuracy shall not exceed 1×10^{-8} , and

the annual average mean square error of each geocentric coordinate component shall not exceed 0.5 mm.

5.3.2 According to Table 2, for class B the point position mean square error shall not exceed 5 mm horizontally and 10 mm vertically, the baseline component mean square error between adjacent points shall not exceed 5 mm horizontally and 10 mm vertically, and the average distance between adjacent points is 50 km; for class C the corresponding values are 10 mm, 15 mm, 10 mm, 20 mm and 15 km; for class D they are 15 mm, 30 mm, 20 mm, 40 mm and 5 km; for class E they are 15 mm, 30 mm, 20 mm, 40 mm and 2 km.

5.3.3 For GNSS survey used to establish the national second-order geodetic control network and the third and fourth-order geodetic control networks, and in addition to the class B, C and D accuracy of 5.3.2, the relative accuracy shall be not lower than 1×10 to the power minus 7, minus 6 and minus 5 respectively.

5.3.4 The accuracy of the GNSS geodetic height difference between adjacent points of a network of any class shall not exceed the requirement for the vertical component of the baseline between adjacent points laid down for that class in Table 1 and Table 2.

6 Layout of the GNSS network

6.1.1 A GNSS network should as a rule be laid out class by class; where the requirements for accuracy and density are met, a class may be skipped.

6.1.2 The layout shall follow the principle of optimum design, taking into account the aim of the project, the accuracy required, the material already available for the survey area, and its terrain and transport conditions. The layout of the class A network follows GB/T 28588.

6.1.3 According to Table 3 the number of sides of an independent loop of the class B, C, D and E GNSS networks shall not exceed 6, 6, 8 and 10 respectively.

6.2.1 Points of a network of any class shall be evenly distributed; the distance between adjacent points should not be longer than twice the average point spacing of that network, nor shorter than two thirds of it.

6.2.3 A newly laid out GNSS network shall be connected to the higher class national GNSS points nearby, and the number of connected points shall not be fewer than 3. Where there are satellite navigation positioning reference stations nearby, they should be used first.

6.2.5 Every point of a class A network shall be connected by levelling to a height. Every point of a class B network within 5 km of a national first or second-order levelling line shall be connected by levelling. Points of a class C network shall be connected according to the requirements of the refinement of the regional quasi-geoid, and points of class D and E networks may be connected as circumstances allow.

6.2.6 The accuracy of the height connection shall be not lower than that of second-order