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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

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Specification for meteorological observing environment protection - Meteorological satellite ground station

气象探测环境保护规范 气象卫星地面站

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Table of Contents

Note Note on the printed English title

On the title page of the copy used here the English title breaks off after the word ground, the last word of the line being lost in the extraction. The Chinese title ends in the two characters that mean ground station, and the full form Meteorological satellite ground station is used above.

0 Introduction

The introduction states that in meteorological observing the satellite ground station is responsible for acquiring the observation data of meteorological satellites and can also carry out their tracking and control, and that the electromagnetic, clearance and vibration environments of the station bear directly on the quality of the data received and on the control of the satellite. The document was drawn up to protect that environment and to set down the content of the protection work, the parameters involved and the methods used.

3 Terms and definitions

3.1 national meteorological satellite ground station: the hub through which commands and data are exchanged between a meteorological satellite and the ground system. A note explains that it is part of the ground system, that it sends operational telecommands to the satellite, directs the work of the payload, receives and stores the Earth observation data returned by the satellite and passes them to the data processing centre, receives the observation reports of data collection platforms, and, with the main and subsidiary stations working together, determines the position of the satellite. Marked as taken from GB/T 39094-2020, 2.12.

3.2 meteorological satellite user station: the system that receives and processes the direct broadcast data of meteorological satellites and generates regional products for users. Marked as taken from GB/T 39094-2020, 2.13.

3.3 electromagnetic environment: the totality of the electromagnetic phenomena existing at a given place, with a note that it usually depends on time and that its description may call for statistical methods. Marked as taken from GB/T 4365-2003, 2.1.

3.4 vibration environment: the totality of the vibration phenomena at a given place, indoors and outdoors, caused by the various vibration pollution sources at a particular time.

3.5 radio interference: the effect on the sending and receiving of information by the antenna and other receiving equipment of a satellite ground station of unwanted energy produced by one or more emissions, radiations or inductions or by a combination of them, which can degrade the performance of the system or cause errors or loss of information.

3.6 interference source: the general name for the bodies that affect the transmission or reception of satellite radio signals by a satellite ground station. A note lists the common ones: co-channel, harmonic and spurious emission interference from radar, broadcasting, television, mobile communication, microwave communication and other radio transmitting installations; electromagnetic radiation interference from industrial and scientific equipment; and vibration interference from high-speed railways and metro lines. Marked as adapted from GB 31222-2014, 3.4.

3.7 clearance environment: the working environment in which the antenna is not blocked when working at its lowest elevation. Marked as adapted from GB/T 37411-2019, 3.1.

3.8 obstacle: trees, chimneys, towers and poles, buildings, stockpiles, metal objects and other bodies that rise above the lowest point of the lower edge of the antenna when the antenna is placed horizontally and that affect the electrical characteristics of the antenna. Marked as adapted from GB 31221-2014, 2.8.

3.9 block elevation angle: with the aperture of the antenna at rest and perpendicular to the ground, the angle between the horizontal and the line of sight drawn from the lowest point of the aperture to the highest visible point of the obstacle.

3.10 antenna: the equipment used to receive the downlink signal of a meteorological satellite and to transmit the uplink signal.

4 Protection requirements and test methods

4.1 states that the protection covers the observing environment of both national meteorological satellite ground stations and meteorological satellite user stations.

4.2.1 lists the frequency ranges to be protected. The uplink bands include 401.1 MHz to 401.4 MHz, 402 MHz to 402.1 MHz, 460 MHz to 470 MHz, 2025 MHz to 2110 MHz and 8175 MHz to 8215 MHz. The downlink bands include 1675 MHz to 1710 MHz, 2200 MHz to 2290 MHz, 7450 MHz to 7550 MHz, 7750 MHz to 7900 MHz, 8025 MHz to 8400 MHz, 18.1 GHz to 18.4 GHz and 25.5 GHz to 27.0 GHz. The permitted interference values and the corresponding test methods are referred to GB 13615-2009. In the copy used here the unit

of the fourth downlink band is printed inconsistently, as MH for the lower figure and MHZ for the upper.

4.2.2 requires radio coordination with the ground station whenever a new terrestrial radio transmitting station is set up around it, or a new microwave link whose line of sight passes through it.

4.2.3 requires the protection distance between a typical interference source and the site of a national station to meet Table 1 when a new airport, overhead high-voltage transmission line, high-voltage substation or electrified railway appears around the station. A note defines the protection distance as the smallest distance between antenna and antenna, between antenna and electromagnetic interference source and between antenna and obstacle that is laid down so that the antenna of a national station can work normally.

Table 1 has three columns, interference source, minimum protection distance in kilometres and remark, and its rows reconcile. Overhead high-voltage transmission lines: 500 kV, 1.00; 220 kV to 330 kV, 0.80; 110 kV, 0.70. High-voltage substations: 500 kV, 1.20; 220 kV to 330 kV, 0.80; 110 kV, 0.70. Electrified railway with electric locomotives, 0.70. Non-electrified railway, 0.50. Motor roads: motorway and first class, 0.70; second class, 0.70. High-frequency welding machine, 1.20, measured from the workshop. Large airport, 2.00. High-frequency furnace, 0.50, for a shielded workshop and measured from the workshop. Industrial electric welding, 0.50. Ultra-high-frequency physiotherapy equipment, 1.00, measured from the treatment room. Agricultural electrical equipment, 0.50.

4.3.1 requires the clearance environment of the station to be free of trees, chimneys, towers and poles, buildings, stockpiles, metal objects and other obstacles, and provides that where a new air route is set up around a national station it is not to cross the satellite to ground line of sight of that station. The block elevation angle is calculated according to Annex A.

4.3.2 fixes the limits for national stations: for polar-orbiting meteorological satellites and other non-geostationary satellites the block elevation angle is not to be greater than 4 degrees, and the height of an obstacle is to satisfy formula (1), whose legend reads the height of the obstacle in metres, the smallest height below the outer edge of the antenna when the antenna is at its minimum working angle in metres, and the horizontal distance from the obstacle to the antenna in metres. For geostationary meteorological satellites the block elevation angle is not to be greater than 5 degrees. Notes explain that a polar-orbiting meteorological satellite is one running in a polar orbit and a geostationary meteorological satellite one running in a geosynchronous orbit.

4.3.3 fixes the limits for user stations: for a user station inside the meteorological sector the block elevation angle is not to be greater than 12 degrees, the obstacle height satisfying formula (2) with the same legend as formula (1); for a user station outside the meteorological sector it is not to be greater than 8 degrees.

4.4 fixes the vibration environment. The standard value of the vertical Z vibration level is 65

dB for a national station; for a user station it is 72 dB at night and 75 dB by day. Measurement follows GB 10071, the maximum value being allowed to exceed the standard value by not more than 10 dB by day and 3 dB at night.

A Annex A (normative) Definition and calculation of the block elevation angle

Annex A shows the block elevation angle of an obstacle with respect to the antenna in Figure A.1 and gives formula (A.1) for it. The printed equation is broken by the extraction and is not reproduced here; its legend reads: the height of the obstacle; the smallest height below the outer edge of the antenna when the antenna is at its minimum working angle; the horizontal distance from the obstacle to the antenna; and the block elevation angle of the obstacle with respect to the antenna.