

User Manual for Meteorological Balloon

I. Overview

The meteorological balloon is made by processing latex with an appropriate amount of coordinating agents. Before use, a certain amount of hydrogen/helium gas is filled into the sphere, and then the buoyancy in the air is utilized to detect different heights of meteorological elements or carry a radiosonde to measure upper air elements.

It is mainly suitable for high-altitude stations, high-altitude weather stations, sounding stations, and meteorological instruments/equipment used in conjunction with meteorological balloons.

II. Rules for Use

1. In winter, the balloon should be placed in a room not less than 10°C for more than 24 hours before use. The storage temperature of the balloon should not exceed 35°C, and the relative humidity of the storage environment should not be greater than 70%.
2. The balloon should be inflated 0.5~1.0 hours before release. Before inflation, squeeze the air out of the balloon and tie the balloon neck tightly to the inflation nozzle. Slowly fill with hydrogen/helium gas. Stop inflating when the balloon is upright. Carefully check for air leaks and appearance defects such as sand eyes before continuing to inflate to the required net lifting force.
3. The ground of the inflation room must be cleaned before inflation, and the balloon should not be placed directly on the sandy ground for inflation. The ground should have a cover or be placed on a dedicated inflation stand. Do not allow the balloon skin to come into contact with rough, sharp or claw-like objects (such as metal, stones, soil, rough surfaces, etc.), and do not expose the balloon to strong sunlight.
4. The balloon skin should not be pulled or compressed arbitrarily before use/inflation. It should be gently placed on the ground cover/inflation stand.
5. The operator must wear rubber/yarn gloves to prevent damage to the balloon skin by fingernails or oil stains when inflating.
6. The balloon should be inflated slowly at the beginning, and the inflation flow

rate should not be too high (generally around 20 minutes for a 700g/750g balloon) to avoid severe friction between the balloon skin and the ground cover/contact object. After inflation, it should be released promptly and not left for more than 30 minutes.

7. Moisture and debris must be prevented from mixing in during inflation (hydrogen should generally be produced by electrolysis, and the purity of hydrogen gas should be as high as possible, above 99%). The temperature of the hydrogen gas should not exceed 40°C.

8. Adjust the net lifting force and total lifting force according to the weather conditions before release. The net lifting force should be as close as possible to the specified indicators (see the attached table) (special circumstances can be adjusted according to local experience). Inflate the balloon until it is 20cm above the ground, with an average ascent speed (related to net lifting force and weather conditions) controlled at around 340~360m/min. The specific calculation method is as follows:

Total lifting force = balloon weight + balance weight (commonly known as inflation nozzle) + weight of the weight bag

Net lifting force = total lifting force - balloon weight - radiosonde weight - rope weight

That is, Net lifting force = balance weight + weight of the weight bag - radiosonde weight - suspension rope weight

In this way, the weight of the weight bag required can be calculated.

Net lifting force should not be too high, because the relationship curve between net lifting force and ascent speed is close to a logarithmic relationship. After reaching a certain net lifting force, the ascent speed is not easy to increase.

Increasing net lifting force results in only a slight increase in ascent speed, and excessive inflation of the balloon severely affects the release height. Therefore, the net lifting force should not be too high. Each region should determine the appropriate net lifting force based on local experience to ensure a higher release height.

III : Transportation and storage rules:

1. The finished product box must have a cover during transportation, and must

not be exposed to wind, rain, or sun.

2. During transportation and storage, it must be placed in a dry place, and contact/storage with acids, alkalis, oils, flammable metals such as copper and manganese, or other substances harmful to rubber is prohibited.

3. The balloon should be stored in a well-ventilated, cool, and dry warehouse.

4. The balloon should be placed on a shelf that is at least 20 cm above the ground. Stacking should not be too high, and there should be appropriate distance between stacks to maintain good ventilation.

5. The place where the balloon is placed should be at least 1 meter away from heat sources.

6. During storage, the boxes containing the products should be flipped every 3 months.

7. The recommended storage period is 18 months.