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Cleanrooms and associated controlled environments -

**General technical requirements
of combined envelope structure**

洁净室及相关受控环境

组合式围护结构通用技术要求

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Cleanrooms and associated controlled environments -

General technical requirements

of combined envelope structure

1 Scope

This Standard specifies technical requirements and testing methods for combined envelope structure of cleanrooms and associated controlled environments.

This Standard is applicable to the combined envelope structure not higher than 4m in cleanrooms and associated controlled environments.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 228.1, *Metallic materials - Tensile testing - Part 1: Method of test at room temperature*

GB/T 232, *Metallic materials - Bend test*

GB/T 2423.3, *Basic environmental testing procedures for electric and electronic products - Test Ca: Damp heat, steady state*

GB/T 2423.22, *Environmental testing - Part 2: Tests methods - Test N: Change of temperature*

GB/T 7314, *Metallic materials - Compression test method at room temperature*

GB/T 8478, *Aluminum Windows and Doors*

GB 8624-2012, *Classification for burning behavior of building materials and products*

GB/T 14522, *Artificial weathering test method for plastics, coating and rubber materials used for machinery industrial products - Fluorescent UV lamps*

Component tip slope	-	-15'
Surface	-	Smooth and flat, uniform color, no obvious scratches

4.3 Interior panel

4.3.1 Meet the requirements of GB/T 29468.

4.3.2 Shall be cement, gypsum panel, metal or resin sheet, etc. The interior panel shall be of non-combustible materials with a non-combustible performance of at least grade B1 and shall comply with the requirements of GB/T 29468.

4.3.3 The surface shall not produce cold bridges and condensation during use. The heat transfer coefficient shall meet the requirements of GB/T 29468.

4.3.4 The surface shall be resistant to weak acid and alkali corrosion. After being treated by the test method of 5.4.2, the surface of the interior panel shall be intact, no discoloration, no obvious damage.

4.3.5 Can withstand the cleaning agents and disinfectants recommended by the manufacturer. After cleaning and disinfection, the surface of the interior panel shall be intact, no discoloration, no obvious damage.

4.3.6 Can be applied in a certain humidity environment. After treatment according to the test method of 5.4.4, the surface of the interior panel shall be intact, no discoloration, no obvious damage.

4.3.7 Can adapt to high and low temperature environment. After treatment according to the test method of 5.4.5, the surface of the interior panel shall be intact, no discoloration, no obvious damage.

4.3.8 Have a certain resistance to ultraviolet radiation. After treatment according to the test method of 5.4.6, the surface of the interior panel shall be intact, no discoloration, no obvious damage.

4.3.9 Have a certain impact resistance. After treatment according to the test method of 5.4.7, the surface of the interior panel shall be intact, no discoloration, no obvious damage.

4.4 Connectors and adapters

4.4.1 Adapters and connectors for enclosures shall have sufficient reliability and bearing capacity.

4.4.2 The junction between the wall and the roof, between the walls, between the tops shall have a reasonable structure to ensure the seal and prevent cracks.

bonding according to the methods specified in 12.8.10 and 12.9 of JGJ 16-2008.

4.8 Grounding

The metal frame, wire and pipe, gas pipe and metal junction box of the distribution decoration in the clean room area of the combined maintenance structure shall be grounded. Grounding resistance shall be less than or equal to 4Ω .

4.9 Antistatic performance

Exposed parts of the envelope structure that may be subjected to impact are not suitable to use aluminum, magnesium, titanium and their alloys because it generates a frictional spark when it is subjected to an impact, and it is possible to ignite a combustible gas mixture.

5 Testing methods

5.1 Inspection of basic requirements

5.1.1 Inspection of building area, envelope structure, interface cuts, and device position shall be carried out according to visual inspection, magnifying glass or straight steel ruler, Vernier caliper, etc.

5.1.2 Air quality is inspected in accordance with GB/T 18883 and GB/T 25915.3.

5.2 Frame performances

5.2.1 The tensile strength inspection is carried out according to GB/T 228.1.

5.2.2 The inspection of compressive strength is carried out according to GB/T 7314.

5.2.3 The inspection of bending strength is carried out according to GB/T 232.

5.2.4 The deformation of the frame component is carried out according to GB/T 8478.

5.2.5 Frame appearance quality

In the case of bright light, visually observe it, if necessary, use a magnifying glass to view. Observe that the surface of the frame is flat, clean, uniform in color, and record the observed defects.

5.3 Size deviation

5.3.1 Measuring tools

Steel tape

Precision of 1mm

5.4.7 Interior panel impact resistance

5.4.7.1 Sample

The sample is prepared in the same processing process as the product material, or the test piece of 610mm×610mm is directly cut out from the product, and the quantity is 3 pieces.

5.4.7.2 Test devices

The test devices include a device capable of freely dropping the steel ball from a prescribed height, or a ball throwing device capable of generating a ball equivalent to a free fall and a sample holder. The sample holder meets the requirements specified in Annex B of GB/T 15763.3-2009.

5.4.7.3 Steel ball

The steel ball shall meet the requirements of GB/T 308, the mass is (500 ± 5) g, and the diameter is (50 ± 1) mm.

5.4.7.4 Test procedures

The impact resistance test of the interior panel shall be carried out as follows:

- a) before the test, the sample shall be placed at a temperature of $(20\pm 5)^{\circ}\text{C}$, a relative humidity of 40%~60% for at least 4h;
- b) place the sample on the sample holder; the impact surface of the sample shall be perpendicular to the incident method of the steel ball; the tolerance is within 3° ;
- c) place the steel ball at a height of 500mm from the surface of the sample; the impact point after free fall is at the center of the geometric center of the sample, and the radius is 25mm; observe whether the three samples meet the requirements of 4.3.9; it shall be determined as unqualified as long as one fail.

5.5 Seal

5.5.1 Smoke detection shall be used to detect sealing. Establish a pressure difference of not less than 25Pa inside and outside the tested part by air supply or exhaust. At the interface between the pipeline, the line and the enclosure, a visual flow field is generated by an artificial smoke source (such as a smoke pipe, a water mist oscillator, etc.), and the rigor of the detected position is determined according to the direction of the smoke flow. If the smoke does not flow from a high pressure to a low pressure, but is naturally floating, the seal is considered to meet the requirements.

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