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$PM_{2.5}$ protective mask

$PM_{2.5}$ 防护口罩

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This standard was proposed by China Textile Commerce Association.

This standard shall be under the jurisdiction of the China Textile Commerce Association Safety & Health Protective Products Committee.

The main drafting organizations of this standard: Chinese Academy of Sciences Urban Environment Study Institute, CAS-Best (Xiamen) Environmental Technology Co., Ltd., Jiande Chaomei Daily Chemicals Co., Ltd, Zhejiang State Inspection Technology (Jiangsu) Co., Ltd. Shanghai Gangkai Purifying Products Co., Ltd., Jingzhou Strong Science and Technology Development Co., Ltd, Guangzhou Powecom Safety Goods Manufacturing Co., Ltd, Guangzhou City Guanhua Labor Protection Products Co., Ltd., Xiamen High-tech Anti-static Equipment Co., Ltd., Hubei Xianwanli Protective Products Co., Ltd.

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$PM_{2.5}$ protective mask

1 Scope

This standard specifies the terms and definitions, classification, grading and marking, technical requirements, testing methods, product descriptions and packaging of $PM_{2.5}$ protective masks.

This standard applies to the mask used in daily life by the public to prevent $PM_{2.5}$ inhalation.

This standard neither apply to the masks used for protection of harmful gases and steam inhalation, nor apply to the masks used in anoxic environment, escape, fire, medical and other occupational purposes.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this Standard.

GBZ 1-2010 Hygienic standards for the design of industrial enterprises

GB 2626-2006 Respiratory protective equipment - Non-powered air-purifying particle respirator

GB/T 2912.1 Textiles - Determination of formaldehyde - Part 1: Free and hydrolyzed formaldehyde (water extraction method)

GB 3095-2012 Ambient air quality standard

GB/T 5703 Anthropometric basic items for technical design

GB/T 7573 Textiles - Determination of pH of aqueous extract

GB 15979 Hygienic standard for disposable sanitary products

GB/T 17592 Textiles - Determination of banned azo colourants

GB/T 18664-2002 Selection, use and maintenance of respiratory protective equipment

GB/T 23344 Textiles - Determination of 4-aminoazobenzene

HJ 633-2012 Technical regulation on ambient air quality index (on trial)

HJ 653-2013 Specifications and test procedures for ambient air quality continuous automated monitoring system for PM10 and PM2.5

3 Terms and definitions

The following terms and definitions apply to this document.

3.1

Mist

It refers to the tiny droplets suspended in the air.

[GB/T 18664-2002, definition 3.1.18]

3.2

Haze

It refers to a kind of weather formed by the smoke suspended in the air.

3.3

Aerodynamic diameter

It refers to the diameter of the sphere of the unit density (ρ_0 = 1 g/cm^3) reaching to the final settlement velocity same as the actual particle when it is in low Reynolds movement in the static air.

[HJ 653-2013, definition 3.1]

3.4

$PM_{2.5}$

It refers to the particle in the ambient air for which the aerodynamic equivalent diameter is less than or equal to 2.5 μm, AND it is also known as fine particle.

[GB 3095-2012, definition 3.4]

3.5

[GB 2626-2006, definition 3.16]

3.11

Total inward leakage

It refers to the ratio of simulated agent concentration leaked into the mask from all mask components including the filter element when the person under test inhales to the simulated agent concentration in the inhaled air under the lab specified testing conditions, expressed as a percentage.

[GB 2626-2006, definition 3.17]

3.12

Dead space

It refers to the volume of the re-inhaled gas from the previous exhalation, expressed by the volume fraction of carbon dioxide in the inhaled gas.

3.13

Face mask belt

It refers to the belt used to fix the mask to the head and face.

4 Classification, grading and marking

4.1 Classification

Based on structures, the products are divided into disposable masks and replaceable masks. Based on size, the products are divided into large (L), medium (M) and small (S).

4.2 Grading

Based on the filtration efficiency, the products are divided into: grade 1 F95 ≥ 95%; grade 2 F90 ≥ 90%.

4.3 Marking

The masks produced in accordance with this standard shall be marked with the grade, in the form of the combination of this standard number, year, and grade, wherein “F” is the first letter from the Pinyin “Fang”.

F95 masks are marked as TAJ 1001-2015-F95;

FOLLOW the provisions of 6.4 in GB 2626-2006. TAKE 10 disposable masks or replaceable masks, including 5 untreated samples and 5 temperature and humidity pretreatment samples. If the test sample has a different number, each number has at least two samples. SELECT 10 persons whose whiskers are shaved (5 males and 5 females), AND their face types shall be representative of the product, excluding those with obvious facial features; the main dimensions of the face shall make reference to the appendix B, the main size of the test head mold requirements, which is divided into large, medium and small. It shall select appropriate person for test based on the model size as indicated on the tested mask. In accordance with the requirements of GB/T 5703, MEASURE and RECORD the shape face length and width of the person under test.

The total inward leakage of the pertinent population is used as the assessment criteria; AND the total inward leakage of at least 8 out of 10 persons shall comply with the criteria.

6.9 Respiratory resistance

Testing equipment shall comply with the requirements of 6.5.2 in GB 2626-2006. As for the inspiratory resistance and expiratory resistance, respectively TAKE 4 samples, including 2 untreated samples and 2 temperature and humidity pretreatment samples. The main dimensions of the test head mold shall refer to the requirements of Appendix B, which is divided into large, medium and small. It shall select appropriate head mold for test based on the model size as indicated on the tested mask.

WEAR the mask on the head mold, CHECK the air tightness and working condition of the device, SET the system resistance at 0, and RE-ADJUST the ventilation to (85 ± 2) L/min. MEASURE and RECORD the inspiratory resistance. The size of the head mold shall be specified.

The respiratory resistance test method is same as the inspiratory resistance test method. MAKE the ventilation of (85 ± 2) L/min pass through the sample in the reverse direction, AND the recorded resistance is the respiratory resistance.

Loaded respiratory resistance test: CONDUCT the loading test under the conditions of air flow rate (85 ± 2) L/min, until the particle accumulation on the mask surface reaches to (30 ± 1) mg. TAKE off the loaded mask; TEST the loaded respiratory resistance based on the respiratory and inspiratory resistance test methods.

6.10 Connection force between mask lace and main part

FOLLOW the provisions of 6.11 in GB 2626-2006. TAKE 2 samples including one untreated sample and one temperature and humidity pretreatment sample.

6.11 Dead space

FOLLOW the provisions of 6.9 in GB 2626-2006. TAKE 3 samples which are not pre-treated.

7 Product description and packaging

7.1 Product description

The product description shall provide information that the user must know, including:

a) The name of the product;

b) The name and address of the manufacturer;

c) Product standard number;

d) The date of manufacture and recommended use time;

e) The scope of use and restrictions;

f) As for the replaceable parts, the method description of use together with the mask main part;

g) Wear method and wear tightness check method;

h) Storage methods;

i) The warnings and precautions for problems that may be encountered in use, such as:

1) Suitability;

2) Facial hair may cause mask leakage;

3) Ambient air pollution, such as harmful gases, lack of oxygen, etc.

7.2 Packaging

7.2.1 The sales packaging shall protect the product against mechanical damage and contamination prior to use;

Appendix A

(Informative)

Guidance for selection and use

A.1 Select in accordance with ambient air quality

a) When $PM_{2.5}$ air quality index level is light and moderate pollution, i.e. $PM_{2.5}$ air quality index (IAQI) is between 100 ~ 200, that is, the average concentration of $PM_{2.5}$ for 24 hour is between 75 ~ 150μg/m^3, it is recommended to use F90 $PM_{2.5}$ protective masks;

b) When the PM2.5 air quality index level is severe and heavy pollution, i.e. $PM_{2.5}$ air quality index (IAQI) is between 200 ~ 500, that is, the average concentration of $PM_{2.5}$ for 24 hour is between 150 ~ 500μg/m^3, it is recommended to use F95 $PM_{2.5}$ protective masks;

c) When the average concentration of fine particulate matter in air is greater than 500μg/m^3 for 24 hours, it is recommended to avoid outdoor activities.

A.2 Recommendations for use

a) Check the appearance of the mask before use, if damaged or contaminated, it shall not be used;

b) Correctly wear and insist to wear, AND only remove the mask after leaving from the air pollution area;

c) If the used mask can be used again, it shall be kept properly and maintain clean and hygiene;

d) When the mask has been contaminated or increased of resistance, causing un-smooth breathing, it shall be discarded. The discarded mask shall not be abandoned arbitrarily BUT be placed in the designated bins.

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