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General specifications for walk-through metal detector

通过式金属探测门通用技术规范

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General specifications for walk-through metal detector

1 Scope

This Standard specifies technical requirements, test methods, inspection rules, identifications, marks, labels and packaging, accompanying technical documents of walk-through metal detector.

This Standard is applicable to the walk-through metal detector that detects metal weapons and metal prohibited goods. The walk-through metal detectors for other usages may refer to this Standard.

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 2423.1-2008, *Environmental testing - Part 2: Test methods - Tests A: Cold*

GB/T 2423.2-2008, *Environmental testing - Part 2: Test methods - Tests B: Dry heat*

GB/T 2423.3-2016, *Environmental testing - Part 2: Testing method - Test Cab: Damp heat, steady state*

GB/T 2423.5-1995, *Environmental testing for electric and electronic products Part 2: Test methods Test Ea and guidance: Shock*

GB/T 2423.10-2008, *Environmental testing for electric and electronic products - Part 2: Tests methods - Test Fc: Vibration (sinusoidal)*

GB/T 4208-2017, *Degrees of protection provided by enclosure (IP code)*

GB 4793.1-2007, *Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements*

GB/T 6587-2012, *General specification for electronic measuring instruments*

GB 16796-2009, *Safety requirements and test methods for security*

metal detector.

3.9 detector position

The position selected in the detector plane through which 12 test objects shall pass. These positions are based on the average height setting of an adult man. They are respectively located on ankles, legs, crotch, hands, chest, double armpits, head and head top. In the coordinate system, they are the points defined by the x and z values.

3.10 auto-test system

An automatic testing equipment that simulates the process of the human body carrying the test object through the detector plane, the test object can be clamped to perform linear translation movement in the X, Y, Z three-axis coordinate system.

3.11 standard tester

A human being with a height of 1.55m~1.85m, a weight of 50kg~90kg, who does not carry any metal or conductive objects, magnetic materials, or any metal inserts in the body.

4 Classification

According to the detection class, the walk-through metal detector (hereinafter referred to as "metal detector") is divided into class I, class II, class III and mixed class:

- Class I: the metal detector that can detect half-piece razor blades;
- Class II: the metal detector that can detect screwdriver, non-magnetic stainless-steel dagger, and has no alarm for metal pen;
- Class III: the metal detector that can detect magnetic stainless-steel daggers and aluminum knives, while not alarming stainless-steel keys;
- Mixed type: the metal detector that through parameter adjustment, the detection capability can reach two or three of Class I, Class II, and Class III.

5 Technical requirements

5.1 Appearance

The appearance of metal detector shall meet the following technical

b) The grounding is stable and shall be able to resist normal impact without sliding imbalance;

c) For the metal detector with foot pedal at the bottom, the gap between the foot pedal and the main structure of the metal detector shall be less than or equal to 10mm; there shall be no obvious collapse, twisting, warping or displacement when the foot pedal carries 120kg.

5.2.4 Enclosure protection level

Indoor working type: in accordance with relevant technical requirements of IP41 in GB/T 4208-2017.

Outdoor working type (with shield): in accordance with relevant technical requirements of IP53 in GB/T 4208-2017.

5.3 Operational control

5.3.1 Operational authorization

Devices and parameters that affect detection performance shall be protected to prevent unauthorized changes.

5.3.2 Buttons and control devices

Buttons and control devices shall be flexible, clear in touch, and reliable in function. For the metal detector equipped with remote control, the remote-control distance shall be greater than or equal to 2m.

5.3.3 Parameter storage

The metal detector shall have the ability to store the set parameters. The parameters shall not be changed when power is turned on again after power off.

5.3.4 Remote control

If centralized control via remote computer or network is allowed, corresponding control procedures shall be provided. And it shall have the function of remote parameter adjustment, remote diagnosis and alarm related data storage. When the remote control is interrupted for any reason, the metal detector shall be able to automatically restore local control.

5.4 Power adaptability

The power adaptability of the metal detector shall meet the following requirements:

a) The metal detector that uses AC power supply shall be able to work

The metal detector alarm sound shall meet the following requirements:

a) It is different from non-alarm sound, and the alarm indicator does not produce any sound when it is non-alarm;

b) The tone can be adjusted so that the alarms of two adjacent metal detectors can be clearly distinguished;

c) It can be adjusted from mute to maximum sound intensity. At 0.8m away from the metal detector, the maximum sound intensity is greater than or equal to 85dB.

5.8.2.2 Alarm display

The metal detector alarm display shall meet the following requirements:

a) The color is red, and it is different from the non-alarm display;

b) If there is a partition detection function, the partition positioning can be seen at a glance and the position shall be accurate;

c) In 6000lx bright environment and 25lx dim environment, it can be clearly seen when it is 3m away from the alarm display.

5.9 Anti-interference

With an outer edge pitch greater than or equal to 0.5m, when multiple metal detectors are placed side by side, each metal detector shall be able to work normally and meet the requirements of 5.7.2.

5.10 Resistance to static metal objects

5.10.1 Resistance to surrounding static metal objects

The detection performance of the metal detector shall not be affected by the large static metal objects beyond 1m around the detector body.

5.10.2 Resistance to influence of internal metal structure on the ground

The detection performance of the metal detector shall not be affected by the metal structure below 0.1m above the ground.

5.11 Anti-interference of surrounding metal objects

The metal detector shall not generate an alarm signal for moving metal objects beyond 1.5m around the detector.

5.12 Electrical safety

setting parameters are not lost. The test level shall not be lower than the requirements of level 2 in Table 1 of GB/T 17626.3-2016.

5.14.3 Surge (impact) voltage immunity

For the metal detector that uses AC power supply, when the power supply port is disturbed by external surge (impact) voltage, allow the performance of the metal detector to temporarily decline, but it shall be able to resume normal work on its own, and the saved setting parameters are not lost. The test level shall not be lower than the requirements of level 2 in Table 1 of GB/T 17626.5-2008.

6 Test methods

6.1 General test conditions

6.1.1 Environmental conditions

Except for tests that specifically declare environmental conditions, the rest tests shall be conducted under the following environmental conditions:

a) Temperature: 15°C~35°C;

b) Relative humidity: 15%~75%;

c) Atmospheric pressure: 86kPa~106kPa;

d) Moving metal objects: 1.5m away from any part of the detector;

e) Static metal objects: 1.0m away from the detector, 0.5m above the top, 0.1m above the bottom;

f) No strong electromagnetic interference.

6.1.2 Default setting

Except for tests that specifically declare working parameters, the rest tests shall be conducted under the following conditions:

a) Sensitivity: set as the sensitivity gear recommended by the manufacturer, and satisfy a detection class;

b) Walking-through speed: if there is a choice of walking-through speed parameters, set it to a parameter that covers 1m/s speed;

c) Alarm recovery: if there is an alarm recovery method to choose, set it to the automatic recovery method;

d) Proximity switch: If there is a proximity switch to prevent false alarms,

cotton yarn or silk cloth to repeatedly wipe to ensure that the position shall not hook the clothing.

6.4 Mechanical structure and layout test

6.4.1 Detector structure layout

Visually inspect the layout.

6.4.2 Pedestrian crossing

Visually inspect and measure the pedestrian crossing.

6.4.3 Structural stability

Choose a flat, solid site for metal detector. Test the structural stability according to the following methods:

a) Gently shake the detector to see if it falls smoothly and the mechanical connections and components are firm;

b) Apply a torque of 200N · m separately on the top four sides of the detector. Determine the test result of any side;

c) If the metal detector is designed with a foot pedal, measure the gap between the foot pedal and the main structure of the metal detector main body. Two testers with a total weight of about 120kg stand on the foot pedal. Visually inspect the foot pedal.

6.4.4 Enclosure protection level test

Test according to the requirements of Clause 11, Clause 12 and Clause 13 of GB/T 4208-2017.

6.5 Operational control test

Visually inspect and operate according to the product user manual.

6.6 Power adaptability test

a) The metal detector of AC power supply shall be tested according to the following methods:

- Set the adjustable power output frequency to 50Hz. Respectively test for 15min at 3 voltage points of 187V, 220V and 242V. Verify basic detection function in 5.6;

- Set the adjustable power output frequency to 47.5Hz. Respectively test for 15min at 3 voltage points of 187V, 220V and 242V. Verify basic

The test shall use the auto-test system. For each detection class that the product can reach, all the contents of the corresponding detection class listed in Table 1 shall be tested.

The test shall be based on all test objects corresponding to one detection class in Table 1. Put it in the detector position of Annex B with the motion posture of Annex C. Go through the metal detector at a speed of 1.0m/s. The moving distance shall be at least the length of the detection area plus 0.5m before and after. The second test returns along the same path. The time interval between the two tests shall be greater than or equal to 3s. The same test shall be performed 10 times at each position (5 round trips). Each test object to be alarmed shall be carried out in 12 positions, 3 postures for each position. 10 times are for per position, 360 tests in total. Each test object that shall not alarm shall be carried out in 12 positions. 10 times are for per posture per position, 120 tests in total.

6.9.3 Walking-through speed

The test shall use auto-test system. For each detection class that the product can achieve, it shall select one corresponding test object that shall be alarmed in Table 1 to test.

Select a test object from Table 1 according to the detection class. Put it in the detector position of Annex B with the motion posture of Annex C. Pass through the metal detector at two speeds of 0.2m/s and 2.0m/s, respectively. The moving distance is at least the length of the detector region plus 0.5m before and after. The second test returns along the same path. The time interval between two tests shall be greater than or equal to 3s. The same test shall be performed at least 10 times in each position (5 round trips). Two speeds shall be used for each test object. Perform at 12 positions, 3 postures for each position. 10 times are for per position per posture, 720 tests in total.

6.9.4 Alarm response time

According to the detection class that the product can reach, select one of the test objects corresponding to the alarm in Table 1 for testing. Place the test object in the detector position 5 with posture 1. Go through the metal detector at a speed of 1.0m/s. The moving distance is at least the length of the detector region plus 0.5m before and after. Record the time from the front end of the test object entering the detector region to the start of the alarm sound, as well as the time from the end of the test object leaving the detector region to the end of the alarm sound.

6.9.5 Stable working time

Place the metal detector in a suitable working environment. Make it in the most sensitive detection class attainable. Continuously work 24h. During the working

6.12.2 Resistance to influence of internal metal structure on the ground

Spread the test object T0 on level ground. Place a wooden, metal-free bracket with a thickness of 100mm on it. The metal detector is placed on the bracket and located in the middle of T0 (see Figure 3).

Perform detection sensitivity test according to detection class.

6.13 Anti-interference of surrounding metal objects

Set the metal detector according to the parameters provided in the product user manual. It shall at least meet one detection class. After the metal detector enters the working state, place the test object T0 perpendicular to the ground and with a height of 1m from the center to the outer side of the metal detector in parallel. Keep a spacing of 1.5m. Move T0 back and forth in a direction parallel to the outer side of the metal detector at a speed of 0.2m/s and move it back and forth for 0.5m each. Determine whether the result meets the requirements of 5.11. Carry out the same test to the rest three sides of metal detector.

6.14 Electrical safety test

Test according to the following methods. Determine whether the result meets the requirements of 5.12.

a) Electrical strength: the test method is carried out according to 5.4.3 in GB 16796-2009;

b) Insulation resistance: the test method is carried out according to 5.4.4 in GB 16796-2009;

c) Protective grounding: the test method is carried out according to 5.4.5 in GB 16796-2009;

d) Leakage current: the test method is carried out according to 5.4.6 in GB 16796-2009.

6.15 Environmental adaptability test

6.15.1 Working environment

See Table 2 for working environment and humidity test.

During the test, the basic functions of the detector shall be tested according to the test method specified in 6.8.

After the test, the appearance shall be inspected according to the test method of 6.3.

When the environmental adaptability of the whole machine is not available, the

7.3 Defect determination and classification

According to the degree of impact of defects on the performance of metal detector, it is divided into the following 3 types:

- Fatal defects: defects that pose a danger to personal safety or seriously damage the basic functions of metal detector;

- Severe defects: defects that exceed the prescribed limit, partial function failure or defects that impede the normal operation of the metal detector;

- Minor defects: defects that do not hinder the overall situation or can maintain the basic function of the metal detector by simple adjustment.

7.4 Sampling of inspection samples and determination of conformity

Sampling and conformity determination are conducted according to the relevant requirements in Clause 6 of GB/T 6587-2012. AQL value range shall not be greater than 6.5.

8 Identification, marks, labels and packaging

8.1 Identification

Product identification shall meet the following requirements:

- Mark the rated supply voltage of the power supply near the power supply terminal, or the model and connection polarity of the battery used;

- The on-off of switch, the function of button, the cables of various field connections and the installation of optional parts are clearly and specifically marked;

- If there are replaceable fuses, indicate their model and rating near the fuse;

- The symbols or logos represented by graphics meet the requirements of Table 1 of GB 4793.1-2007;

- The content that needs to be represented in text shall be written in Chinese;

- Under normal use and the cleaning method specified by the manufacturer, it can be kept clear and firm for a long time.

8.2 Marks and labels

The product marks and labels shall meet the following requirements:

Annex A

(informative)

Code, material and dimensions of test object

A.1 Class I non-alarm test object

Code is T1, standard tester.

A.2 Class I alarm test object

Analog razor blade: code is T2, material is δ=0.08mm refined stainless steel plate (9Cr18), can be modified by breaking double-sided razor blade.

Dimensions: rectangular, 37mm × 10mm (length × width).

A.3 Class II non-alarm test object

Analog metal-containing pen: code is T3, material is δ=1.5mm semi-hard brass plate (H62-Y).

Dimensions: rectangular, 40mm × 4mm (length × width).

A.4 Class II alarm test object

Analog screwdriver: code is T4-1, material is tool steel (45#).

Dimensions: cylindrical, Φ6×50mm.

Analog dagger: code is T4-2, material is δ=1.5mm stainless-steel plate (06Cr19Ni10).

Dimensions: rectangular, 80mm × 20mm (length × width).

A.5 Class III non-alarm test object

Analog key: code is T5, material is δ=1.5mm ordinary stainless-steel plate (2Cr13).

Dimensions: rectangular, 50mm × 10mm (length × width).

A.6 Class III alarm test object

Analog dagger: code is T6-1, material is δ=1.5mm ordinary stainless-steel plate (2Cr13).

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