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General technical requirements of parking service mobile robot

停车服务移动机器人通用技术条件

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General technical requirements of parking service mobile robot

1 Scope

This standard specifies the classification, technical requirements, general safety requirements, use environment requirements, test methods, inspection rules, markings, instructions for use, packaging, transportation and storage of parking service mobile robots (hereinafter referred to as "parking robots").

This standard applies to comb type, pallet type, wheel-clamp parking robots. Other types of parking robots can be implemented with reference to this standard.

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) is applicable to this standard.

GB/T 191 Packaging - Pictorial marking for handling of goods

GB/T 3811 Design rules for cranes

GB/T 9174 General specification for transport packages of general cargo

GB/T 9969 General principles for preparation of instructions for use of industrial products

GB/T 14436 General principles of industrial product guarantee documents

GB/T 16754 Machinery safety - Emergency stop - Design principle

GB/T 18209.1-2010 Electrical safety of machinery - Indication, marking and actuation - Part 1: Requirements for visual, acoustic and tactile signals

GB/T 20721-2006 General specifications of automatic guided vehicles

GB/T 26559-2011 Mechanical parking system - Classification

GB/T 30029-2013 Automated guided vehicle (AGV) - General rule of design

The linear velocity the parking service mobile robot at the motion reference point under the controllable motion state.

3.7

Guidance deviation accuracy

The maximum deviation between the actual running trajectory of the parking service mobile robot and the theoretical trajectory.

3.8

Position deviation accuracy

The maximum deviation between the actual position and the theoretical position of the parking service mobile robot during positioning.

4 Categories

Parking robots can be divided into the following three categories according to their structure:

a) Comb parking service mobile robot;

b) Pallet parking service mobile robot;

c) Wheel-clamp parking service mobile robot.

5 Technical requirements

5.1 Performance requirements

5.1.1 Design load requirements

According to the provisions of Chapter 5 in GB/T 26559-2011, cars are divided into 6 major groups: X (small), Z (medium), D (large), T (extra-large), C (ultra-large), K (bus). According to different application requirements, the designated group of cars is used as the applicable parking robot group of the parking robot. The design load of the parking robot shall be greater than or equal to 1.1 times the maximum mass of the applicable parking robot group.

5.1.2 Travel function

The parking robot shall be able to achieve all or part of the following omnidirectional motion functions:

a) Moving forward, the parking robot moves forward along the longitudinal

The electrical design of the parking robot shall comply with the provisions of 6.7.7.3 in GB/T 30029-2013.

6 General safety requirements

6.1 Requirements for contact buffer protection and non-contact protection

6.1.1 Overview

In the main running direction of the parking robot, it shall have either a contact buffer protection function or a non-contact protection function, to protect the safety of personnel and the parking robot.

6.1.2 Requirements for contact buffer protection

The contact buffer protection is mainly used when the parking robot is running at low speed, if the parking robot is traveling at a speed of not more than 0.3 m/s, the parking robot shall immediately stop moving and alarm when it hits the buffer. The parking distance shall be within the buffer range of the buffer.

6.1.3 Requirements for non-contact protection

The detection range of non-contact protection shall be larger than the maximum contour range of the robot and the car when the parking robot is carrying the car. When the parking robot detects a person or obstacle in the direction of travel, it shall automatically slow down and stop. The safety distance between the car and the obstacle at the final parking position shall be greater than 50 mm; when the person or obstacle is removed, the parking robot is required to issue a restart audible and visual alarm (3 s or more) before it can restart. When the parking robot is in motion, the detection function of the motion direction must not be turned off.

6.2 Anti-overlap automatic detection

In order to avoid parking the car into the parking space of the parked car, the parking robot shall be equipped with one or more detection devices of sound, light, electricity to detect the status of the parking space (there are no cars, car-carrying pallet or other objects that affect the parking), or take other anti-overlapping measures.

6.3 Emergency stop button

The design of the emergency stop function shall meet the requirements of GB/T 16754.

6.4 Manual mode requirements

c) Air: No dust, flammable, explosive and corrosive gas.

7.2 Ground requirements

The parking robot's requirements for ground conditions shall meet the requirements of 5.1.5.

8 Test method

8.1 Performance requirements test

8.1.1 Load

The comprehensive performance test of the parking robot under the design load is as follows:

Randomly choose 5 parking spaces; simulate the position of the front and rear wheels of the car on the parking robot; apply the load according to the design load ratio of 6:4; complete 5 cycles of entry and exit. Each mechanism shall operate normally, without obvious deformation and abnormal noise; there is no damage to parking robots and cars; the position deviation accuracy meets the requirements of 5.1.3.

8.1.2 Traveling

Use manual mode to control the parking robot, to test whether the parking robot can complete all or part of moving forward, moving backward, moving lateralward, turning around, spinning actions as expected.

8.1.3 Guidance and position deviation accuracy

Guidance deviation accuracy test: When the parking robot's motion reference point is at point P_1, the parking robot starts from point P_1 and travels straightly to point P_2. The distance between point P_1 and point P_2 is not less than 5 m. Take the line connecting point P_1 and P_2 as the approximate theoretical straight-line running trajectory of the parking robot; according to the running trajectory and the contour size of the parking robot, mark the contour envelope edge of the parking robot running from point P_1 to point P_2 on the ground. As shown in Figure 1, put the cylindrical columns which have a diameter of 50 mm and a height of 500 mm on both sides of the parking robot's trajectory at an interval of 300 mm. The edge of the parking robot's contour envelope is 20 mm from the edge of the cylindrical column. When the parking robot runs back and forth between points P_1 and P_2 at the maximum operating speed without touching the cylindrical column, the test is qualified.

In the rated load and no-load conditions, the test is repeated 10 times each; if there is one failure, the test is considered to be failed.

parking space A. In the running stage when the parking robot moves the car to enter parking space A, the parking robot's anti-overlap automatic detection device shall be able to detect that a car has been parked in parking space A. At this time, the parking robot shall stop moving and send out a sound and light alarm.

8.2.4 Test of emergency stop function

For the running parking robot, after pressing down the emergency stop device, the parking robot shall be able to stop the movement and operation in the manner specified in GB/T 16754, without additional risks. After all emergency stop devices are manually reset, the parking robot can accept the restart function.

8.2.5 Test of alarm device performance

In the automatic operation state, confirm that the following various alarm devices are working properly:

a) Start indicator;

b) Operation indicator;

c) Fault indicator;

d) Sound and light alarm.

9 Inspection rules

9.1 Exit-factory inspection

Each parking robot shall be subject to exit-factory inspection by the manufacturer in accordance with the standard; the contents of the exit-factory inspection shall meet the requirements of Table 1.

type inspection is determined to be unqualified; however, the safety performance does not allow re-inspection.

10 Markings, instructions for use, packaging, transportation and storage

10.1 Nameplate

A nameplate that can display the following contents shall be installed on a prominent position of the parking robot:

a) Product name and model;

b) Self-weight;

c) Battery weight;

d) Rated load;

e) Maximum running speed;

f) Product number;

g) Date of manufacture;

h) Production organization.

10.2 Instruction for use

The instruction for use shall be compiled in accordance with the provisions of GB/T 9969.

10.3 Symbols

The symbols used as signs shall comply with the requirements in GB/T 191 and GB/T 36911.

10.4 Accompanying documents

The accompanying documents shall include:

a) The product qualification certificate implemented in accordance with the relevant requirements of GB/T 14436;

b) Instructions for use;

c) A list of accompanied accessories;

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